

SHORT-CIRCUIT CURRENT INDICATOR

IZP 1



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MEgA



SHORT-CIRCUIT CURRENT INDICATOR IZP1

1. APPLICATION

The short-circuit current indicator IZP1 registers the passing of the short-circuit current through a phase conductor of the MV network, thus facilitating and accelerating the identification of the faulty line section including the faulty phase. The indicator has been designed for being used in radial or meshed networks supplied from one side. In cable networks with ground resistance it registers single(pole and multi-pole faults, in networks with a compensation coil it registers multi-pole faults.

2. DESCRIPTION OF COMPONENTS

The short-circuit current indicator IZP1 consists of an indicator unit and of three current transformers SPT. The indicator can be additionally supplemented with a module telesignalizing its state, with the possibility of remote setting to basic state.

A remote indication box located outside the object in which the indicator is installed can be connected to the IZP1 indicator supplemented with a telesignalization module.

A source for setting to basic state is used for setting the indicator to basic state, at the same time it is also used for supplying the circuits of the remote indication box. A checking equipment serves both for periodic checks of the indicator functioning, as well as for checking its performance and a correct connection of circuits of SPT current transformers during installation.

3. CONSTRUCTIONAL DESIGN

The indicator unit is made of insulating plastic. The values of parameters of the given indicator are indicated and the following elements are placed on its front panel:

- connector for checking the functioning of the indicator and for its external control
- button for the manual setting of the indicator to basic state
- LED diode signaling the possibility of manual and/or automatic setting to basic state
- sliding switch determining the mode of automatic setting to basic state.

A brief instruction for installing and three plug-in connectors distinguished by the number and/or spacing of poles are on the back panel of the unit. A six-pole connector enables three pairs of conductors from SPT transformers to be connected regardless of the polarity of their connection. A two-pole connector with pole spacing 7.5 mm can be used for connecting an auxiliary mains supply for setting the indicator to basic state. A five-pole connector is intended for telesignalization purposes. Its three poles are used for a switching contact which – without distinguishing the phase – signals the passing of the short-circuit current through the line section being monitored. The remaining two poles make possible a remote setting of the indicator to basic state.

Prior to installing the indicator, we may set – independently in individual phases – the sensitivity of the indicator to 300 A, 600 A and 900 A and the time of passing of the short-circuit current to 0.05 s, 0.1 s and 0.2 s by using jumpers inside the IZP1 unit. A time delay of the automatic setting to basic state of 1 hour, 2 hours or 4 hours can also be set by means of these jumpers.

The SPT current transformers are of one and the same type and they do not depend on the chosen sensitivity of the indicator. They have a split core and are provided with a clamping mechanism with a screw so that they can be installed without dismantling the power cables. The SPT transformers have two grips for pulling the clamping bands by which the transformers are fixed to individual cable cores. A double terminal of the transformer

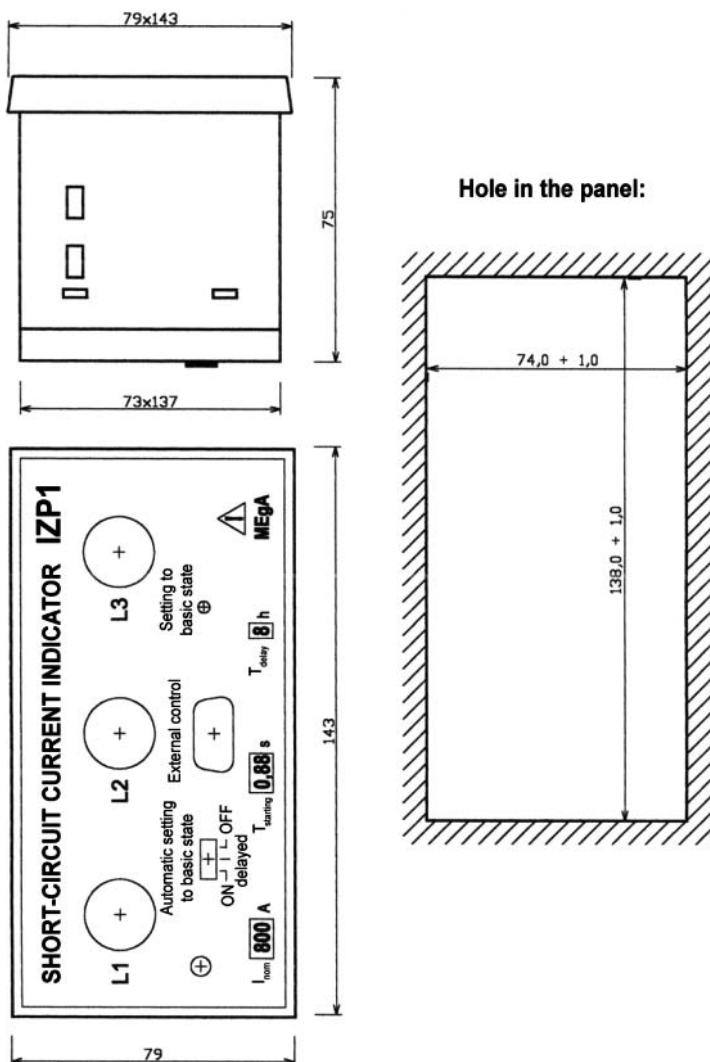


Fig. 1 Dimensions of the IZP1 unit and of the hole for its installing into the panel

enables conductors with diameters from 0.5 mm to 2.0 mm to be connected. The IZP1 indicator and its three SPT transformers are marked by an identical serial number and they form a unique whole.

A galvanically separated contact of the indicator with a telesignalization module can be used for telesignalizing the state of the indicator in the interaction with SCADA or for a remote indication.

A remote indication box enables a fast assessment of the indicator state (without distinguishing the faulty phase) outside the space in which the indicator is installed. It consists of three sections for making indication of up to three indicators. The box is robust, made of plastic and its unlosably fixed cover is provided with a special lock with the marked name of the power utility. The box may be either bricked in or fixed to the wall of the object.

A source for setting to basic state with a 9 V battery for the external setting of the IZP1 indicator to basic state, which is independent on the current of the monitored line and on the auxiliary low voltage, is being supplied. It can be inserted into a nine-pole connector "External control" on the front panel.

When it is necessary to check the functioning of the indicator, a connecting cable of the checking equipment shall be inserted into the connector "External control". By using it we check the functioning and the correct setting of individual inputs of the indicator, as well as the function of its setting to basic state. By connecting a six-pole connector with connected three SPT transformers into the checking equipment a correct interconnection of the circuits of SPT transformers can be checked up during installation.

4. DESCRIPTION OF FUNCTIONING

The short-circuit current indicator IZP1 is a three-channel instrument evaluating, continuously and independently, the magnitude of each half-period of the current in individual channels. When the current being monitored exceeds the set starting value and when this increase of the current lasts continuously during the prechosen starting time, the indicating elements of the given phase become initiated. The colour of their indication

part then changes from black to yellow. Indicating elements are provided with a magnetic memory and, therefore, they require energy only for changing their state.

If the IZP1 indicator is equipped with the telesignalization module, the polarized relay of the telesignalization module will also be switched over into a faulty state when the monitored current of any input of IZP1 will be exceeded.

As follows from the description, the faulty line section is situated between the last started IZP1 indicator and the first following IZP1 indicator being in idle condition.

The supply of the short-circuit current indicator IZP1 is provided by current transformers SPT taking energy from the monitored circuits. For the registration of the short-circuit current, the IZP1 indicator requires no flowing current prior to the origination of the short-circuit, because it takes the energy necessary for its functioning as lately as from the passing of the short-circuit current.

The IZP1 indicator has the following possibilities of being set to basic state:

- Setting to basic state by inserting the source for setting to basic state into the connector for the external control of the IZP1 indicator. This is independent on the position of the switch of the automatic setting to basic state and on supplying the indicator either from the monitored current or from the LV network.
- Manual instantaneous setting to basic state by pressing the button Setting to basic state on the panel of the IZP1 indicator. This is independent on the position of the switch of the automatic setting to basic state but it can be only used when the IZP1 indicator is supplied from the current of the monitored MV line through SPT transformers or from the LV network by means of an auxiliary supply.
- Automatic setting to basic state whose individual modes can be set by using a sliding switch.
 - a) Automatic setting to basic state will be carried out immediately after restoring the supply of the IZP1 indicator from the monitored current or from the LV network, if the switch of the automatic setting to basic state is in position ON.

- b) Automatic setting to basic state with time delay 1 hour, 2 hours or 4 hours will be carried out automatically, if the supply of the IZP1 indicator lasts continuously during the above-mentioned preset time and if the switch of the automatic setting to basic state is in position "delayed". If the supply is interrupted during the time delay of setting to basic state, the time delay will be counted from the beginning after the supply has been restored.
- c) Automatic setting to basic state is blocked, if the switch of the automatic setting to basic state is in position OFF.
- The remote setting to basic state shall be carried out by applying the voltage to contacts DN1 and DN2 of a five-pole connector of the IZP1 indicator with the telesignalization module. This can be performed from the remote indication box by pressing the button NUL when the supply of the circuit is ensured by inserting the source for setting to basic state into the connector of the box. The remote setting to basic state can also be carried out by using the SCADA system. The remote setting to basic state is independent on the position of the switch of the automatic setting to basic state but it can be only used when the indicator is supplied from the monitored current or from the LV network.

The remote indication box comprises two LED diodes for each indicator which, by their lighting, signalize the state of the monitored current at the place where the indicator is installed. The red LED diode YES signalizes the exceeding of the current over the set level, the green LED diode NO indicates that the current has not been exceeded. After the source for setting to basic state has been inserted into the connector of the remote indication box, one of these diodes starts to light. By pressing the button for setting to basic state on the remote indicator box, with the inserted source for setting to basic state, the circuits of the IZP1 indicator can be set to basic state.

As the circuits of the remote setting to basic state are galvanically separated from the evaluation circuits of the indicator, the remote setting to basic state shall be carried out only in that case when the IZP1 indicator is supplied from the monitored line or from the LV supply. The setting to basic state is indicated by changing the light from the red LED diode to the green one.

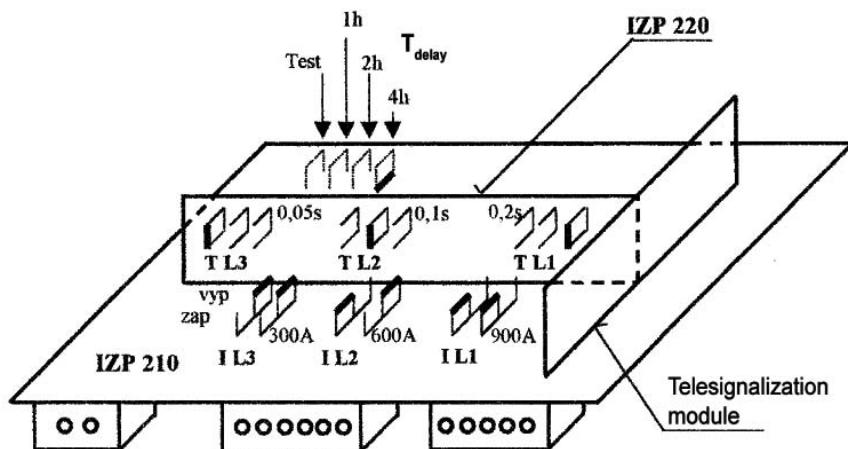


Fig. 2 Disposition of setting elements of the IZP1 indicator

5. SETTING OF PARAMETERS

The necessity of resetting the parameters of the indicator can arise when installing it or in the course of its operation. Such a resetting can be carried out even at the place where the indicator is installed and may be performed only by a person acquainted with working with CMOS circuits and trained by the manufacturer.

A new setting of the parameters of the IZP1 indicator shall be carried out by displacing the jumpers on cards IZP210 and IZP220 (see Fig. 2) where the interconnection fields I L1, I L2 and I L3 enable the value of the starting current I_{nom} of the indicator to be set. If both jumpers of the interconnection field are in position OFF, the sensitivity of the given channel is set to 300 A. If anyone of the jumpers of the interconnection field is displaced into position ON, the given channel is set to 600 A and if both jumpers are in position ON, the sensitivity of the given channel is set to 900 A.

The interconnection fields T L1, T L2 and T L3 on card IZP220 enable the starting time $T_{starting}$ of the given channel to be set to 0.05 s, 0.1 s and 0.2 s. If the jumper of each field is situated to the left when looking on the interconnection field from the back side, i. e. from the side of row-connectors,

the starting time is set to 0.05 s, in the medium position it is 0.1 s and in position to the right it is 0.2 s.

The time delay T_{delay} of the automatic setting of the IZP1 indicator to basic state can be set to 1 hour, 2 hours and 4 hours. This time delay is valid for all three phases. The setting of the time delay shall be carried out by interconnecting the contacts of the interconnection field T_{delay} situated on the bottom side of board IZP210. By placing the jumper as nearly as possible to the connector "External control" the time delay of setting to basic state will be set to 4 hours, in the second nearest position the time delay will be 2 hours and in the third position it will be 1 hour. The jumper "Test" serves for testing during manufacturing, it should not be interconnected during operation.

When the IZP1 indicator has been mechanically assembled, initial values of the parameters shall be washed away with spirit on its front and back panels and new valid values of the parameters shall be marked there by using a LUMOCOLOR 318 permanent (Staedtler) dyeing pencil.

ATTENTION! Only one jumper may be interconnected in the interconnection fields T_{delay} T L1, T L2 and T L3. The IZP1 indicator enables the values I_{nom} and T_{starting} to be set differently in each of its three channels. However, this possibility is not used in practice and the parameters of the channels are being set identically.

6. INSTRUCTION FOR INSTALLING

A split-core current transformer SPT (see Fig. 3) shall be installed on each phase of the monitored MV cable. Care should be taken when installing the SPT transformer that the contact surfaces be clean and that the core of the transformer be clamped sufficiently. It is recommended to grease the contact surfaces of the core with silicon vaseline at a long-term operation in the environment with a higher humidity. The SPT transformers shall be placed at distance X at least from live parts as given in Fig. 4 and the position of transformers should be fixed by two clamping bands. Fig. 4 also shows a correct installation of SPT transformers which ensures the elimi-

nation of capacity and ground currents flowing through the shielding or the sheathing of the cable core.

Each SPT current transformer shall be connected to two poles of a six-pole connector by using a pair of conductors with maximum diameter 2.0 mm and maximum length 20 m. When connecting SPT transformers, a correct order of their connection to the connector should be regarded. However, the connection does not depend on the "polarity" of the pairs of conductors being connected, i. e. on the direction of the current flowing through the transformer.

A correct connection of the circuits of SPT transformers can be checked by inserting a six-pole connector with three connected SPT transformers into the checking equipment. When the electric circuits of the SPT trans-

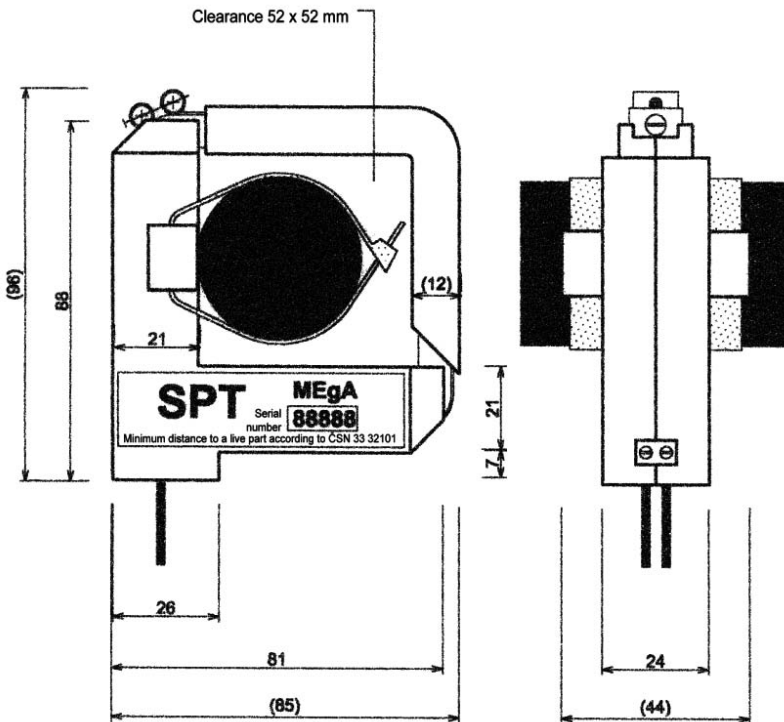


Fig. 3 Dimensions of the SPT transformer

formers are connected correctly, all the three green LED diodes YES will light up.

In case when a LV voltage is at disposal at the place where the IZP1 indicator is installed, it is advantageous to use the LV voltage as an auxiliary supply for the function of setting to basic state. The LV voltage shall be connected to a 230 V two-pole connector. The mains circuits of the IZP1 indicator require no special protec-

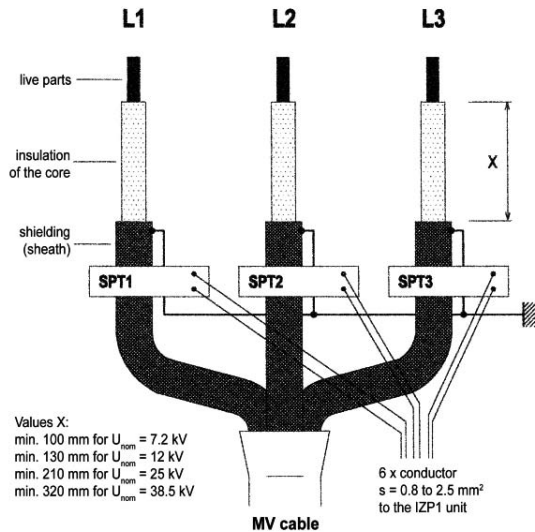


Fig. 4 Installing SPT transformers on a MV cable

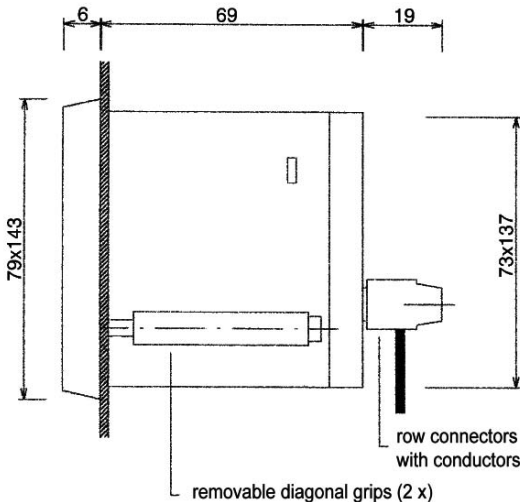


Fig. 5 Side view of the IZP1 unit position in the panel

tion and, for that reason, the type and the value of the protecting element are determined only by the location and constructional design of supply conductors.

Possibilities of the mechanical placing of the IZP1 indicator are demonstrated in Figs 5 to 7. Fig. 5 shows the IZP1 indicator unit

built-in into the panel, dimensions of the mounting hole are $(138+1) \times (74+1)$ mm. Fixing the IZP1 indicator on the bracket by means of clamping bands is shown in Fig. 6. It is advantageous to insert the IZP1 indicator into a special bracket manufactured by PREmont Prague – see Fig. 7.

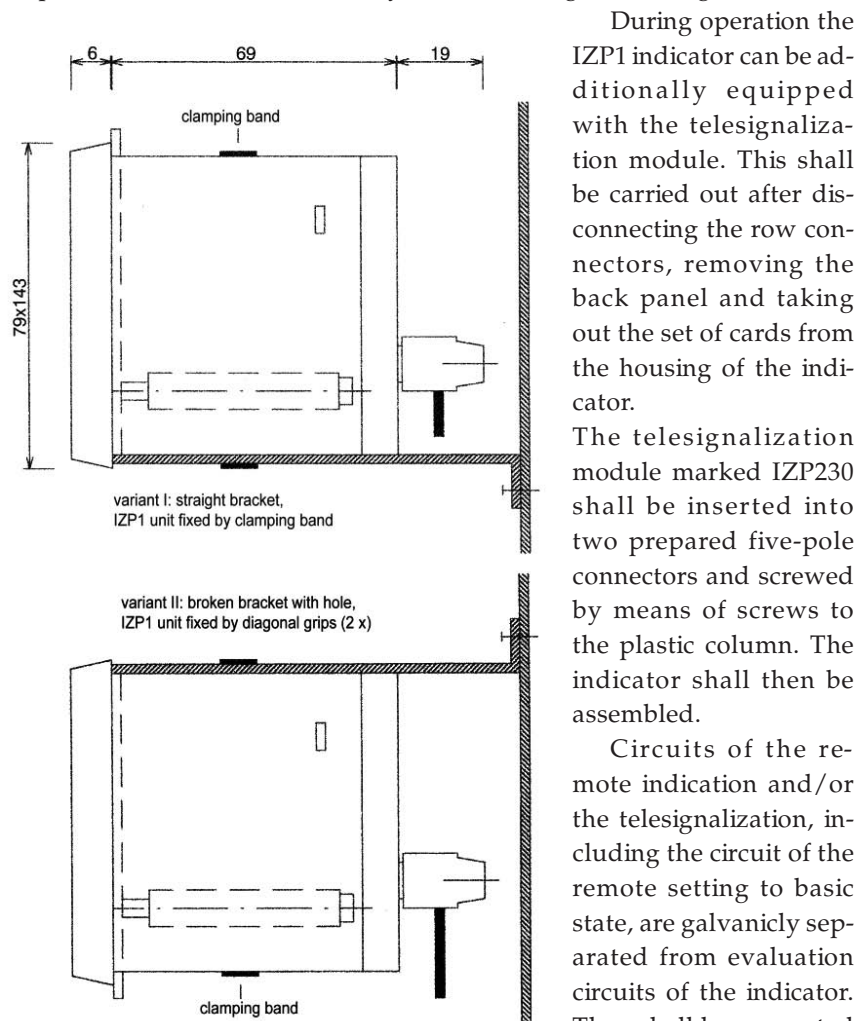


Fig. 6 IZP1 unit installed on a bracket

During operation the IZP1 indicator can be additionally equipped with the telesignalization module. This shall be carried out after disconnecting the row connectors, removing the back panel and taking out the set of cards from the housing of the indicator.

The telesignalization module marked IZP230 shall be inserted into two prepared five-pole connectors and screwed by means of screws to the plastic column. The indicator shall then be assembled.

Circuits of the remote indication and/or the telesignalization, including the circuit of the remote setting to basic state, are galvanically separated from evaluation circuits of the indicator. They shall be connected to a five-pole connector

of the IZP1 indicator completed with the telesignalization module. The length of the cable to the remote indication box should not be greater than 100 m and it is primarily determined by disturbing electric influences. The diameter of the conductors for connecting the circuits of the remote indication box ranges from 0.5 mm to 2.0 mm.

The IZP1 indicator has been designed as an equipment with strengthened insulation and, therefore, it is not grounded anywhere.

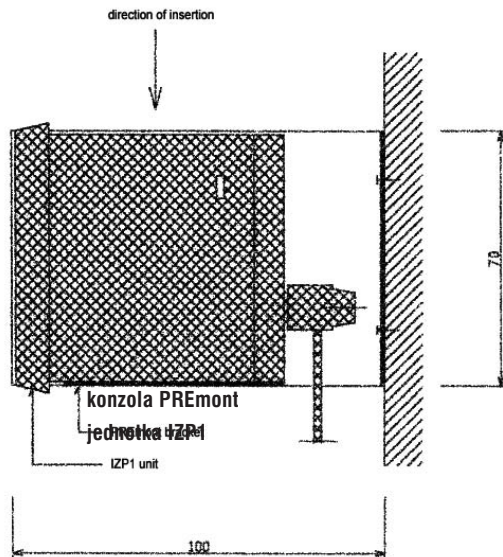


Fig. 7 IZP1 unit installed into the PREmont bracket

The protection provided by the equipment may be impaired by using the IZP1 indicator in another way than in that indicated in this description.

7. CHECKING THE FUNCTIONING

The functioning of the installed IZP1 indicator can be checked by means of a checking equipment, without the necessity of dismantling the indicator. Time interval of repeating these checks shall be chosen by the network operator. The IZP1 indicator has been designed in such a way that the interval of repeating the checks of indicator functioning may be longer than two years. The function of indicating individual phases for a set magnitude of the starting current as well as the function of setting to basic state shall be checked. The checking equipment requires the supply by 230 V and it shall be connected to the connector "External control" of the indicator by using an interconnecting cable.

The value of the current to which the indicator being checked has been set shall be chosen on the checking equipment by means of sliding the switch. The button of the checked phase shall then be pressed for the time longer than the starting time set on the indicator. The indication of the respective phase of the indicator will thus be reset to the yellow colour. When the IZP1 indicator is equipped with the telesignalization module, its relay switches over into a faulty state at the same time and the circuit in the remote indication box thus switches over from the green diode to the red one. The setting to basic state can be executed both by means of the button "Setting to basic state" on the indicator panel and by pressing the button NUL in the remote indication box.

8. DEMANDS ON MAINTENANCE

Beside usual cleaning the panel and checking the functioning the IZP1 indicator requires no other maintenance.

The time interval of checking the functioning of the instrument shall be chosen by the network operator depending on operating conditions. Only the checking equipment delivered by the manufacturer of IZP1 should be used for checking the functioning of the instrument. The responsible person must not disconnect the circuits of SPT current transformers when the checked feeder is energized.

When the indicator is connected to the mains voltage, the removing of its housing, front panel or back panel is dangerous to life.

9. CONTENT OF THE DELIVERED SET

The basic set of the IZP1 indicator is composed as follows:

- 1 pc IZP1 indicator unit
- 1 pc six-pole connector
- 1 pc two-pole connector
- 3 pcs SPT current transformers
- 6 pcs clamping band with locking
- 1 pc user guide

Complying with the order the delivery can further include:

- 1 pc telesignalization module with two screws
- 1 pc five-pole connector
- source for setting to basic state
- checking equipment
- remote indication box

10. DELIVERY

The place of delivery is the address of the manufacturer's seat if not otherwise stated. The portable set of the short-circuit current indicator IZP1 is delivered in polystyrene packing in which two sets of IZP1 can be packed. Certificate of guarantee is a part of the delivery.

11. GUARANTEE

A guarantee in the length of one year since the date of sale to the user is provided for the short-circuit current indicator IZP1. Defects originating during this period as a demonstrable result of defective design, manufacturing or using improper material will be repaired free of charge by the manufacturer. The place of repair is the manufacturer's seat.

The guarantee becomes invalid if the user carries out unpermitted modifications or changes on the IZP1 indicator or on its accessories, if he connects the instrument incorrectly or if the IZP1 indicator or its accessories were operated out of keeping with technical conditions.

The defects on the IZP1 indicator and its accessories originating during the guarantee period shall be claimed by the user to the manufacturer of the IZP1 indicator. The claim without the attached certificate of guarantee will not be accepted.

The manufacturer bears in any case no responsibility for subsequent damages caused by using the IZP1 indicator and its accessories. No responsibility which would exceed the price of the IZP1 indicator follows for the manufacturer from this guarantee.

12. DATA FOR ORDERING

The number of IZP1 indicators set to

- nominal value of the starting current $I_{nom} = 300 \text{ A} / 600 \text{ A} / 900 \text{ A}$,
- starting time $T_{starting} = 0.05 \text{ s} / 0.1 \text{ s} / 0.2 \text{ s}$,
- time delay of setting to basic state $T_{delay} = 1 \text{ h} / 2 \text{ h} / 4 \text{ h}$

should be given in the order.

A component part of the delivery of each indicator are 3 pcs of SPT transformers with 6 clamping bands.

A telesignalization module with a five-pole connector can be ordered and installed into the IZP1 indicator additionally. Its installing shall be carried out by a person trained by the manufacturer of IZP1.

A source for setting to basic state shall be used for setting the indicator to basic state at the monitored current lower than 7 A and without the supply LV voltage.

The performance of the indicator shall be checked by using a checking equipment.

Příklady objednávek:

- a) We order by you N1 pcs of short-circuit current indicators IZP1 with basic setting.
The indicators will be set to $I_{nom} = 300 \text{ A}$, $T_{starting} = 0.1 \text{ s}$ and $T_{delay} = 2 \text{ h}$ by the manufacturer.
- b) We order by you N2 pcs of short-circuit current indicators IZP1 set to $I_{nom} = 900 \text{ A}$, $T_{starting} = 0.2 \text{ s}$, with the telesignalization module.
The indicators will be set to $I_{nom} = 900 \text{ A}$, $T_{starting} = 0.2 \text{ s}$ by the manufacturer and will be equipped with the telesignalization module. As the time of setting to basic state has not been indicated, it will be $T_{delay} = 2 \text{ h}$.
- c) We additionally order N3 pcs of telesignalization modules for the IZP1 indicator.
- d) We order by you N4 pcs of sources for setting to basic state and N5 pcs of checking elements.

13. TECHNICAL PARAMETERS

SHORT-CIRCUIT CURRENT INDICATOR UNIT

- Starting current: $I_{nom\ ef} = 300\ A, 600\ A, 900\ A \pm 10\% I_{nom}$
- Starting time: $T_{starting} = 0.05\ s, 0.1\ s, 0.2\ s$
- Time of delay of the automatic setting to basic state: $T_{delay} = 1\ h, 2\ h, 4\ h$
- Supply of indicator including the telesignalization module:
from currents being measured
- Time of getting ready for operation under a short-circuit current:
less than 30 ms
- Registration of short-circuit currents even at a zero current measured prior to the origination of a short-circuit.
- Internal setting to basic state is functional at the current in individual phases greater than 7 A.
- Dimensions: $143 \times 72 \times 72\ mm$
- Diameter of the disk of indicating element: 13.5 mm
- Weight: 0,3 kg
- IZP1 indicator satisfies conditions of the climatic class 3k4,
with occasional condensation
- IZP1 indicator has been designed for a stationary use in locations protected against weather conditions with enlarged temperature range $-25^{\circ}C$ to $+55^{\circ}C$, ČSN EN 60 721-3-3.
- When being stored it satisfies the class 1k3 ($+5^{\circ}C$ to $+40^{\circ}C$, relative humidity 5% to 85%), ČSN EN 60 721-3-1.
- During transportation it satisfies the class 2k2 ($-25^{\circ}C$ to $+60^{\circ}C$, relative humidity 75%/30°C), ČSN EN 60 721-3-2.
- Auxiliary mains supply for setting to basic state:
230 V, 50 Hz, 1,5 VA, resistant against short-circuits
- Protection (IEC 60529): front panel IP40
other parts IP20
- Telesignalization is provided by a galvanically free switching contact of the polarized relay.

Parameters of the contact: max. AC/DC voltage – 120 V/120 V
 max. switched/steady current – 2 A
 max. switched power – 60 VA

Electric strength between the coil and the contact of the relay: $30 V_{AC}$

The state of the contact remains maintained even at a zero current measured.

The remote setting to basic state is galvanically separated by the optron with insulation strength $5000 V_{RMS}/1 \text{ min.}$ Maximum permissible voltage between DN1 and DN2 terminal equals $30 V_{DC}$. The polarity of the voltage used for setting to basic state plays no role when installing the indicator.

SPT CURRENT TRANSFORMER

The transformer shall be fixed to the insulation of the phase conductor by two plastic clamping bands at the distance greater than

100 mm from a live part for networks with nominal voltage 7.2 kV

130 mm from a live part for networks with nominal voltage 12 kV

210 mm from a live part for networks with nominal voltage 25 kV

320 mm from a live part for networks with nominal voltage 38.5 kV

Outside dimensions of the transformer: $96 \times 85 \times 26 \text{ mm}$

(height 46 mm at the place of grips)

Maximum dimensions of the phase conductor including insulation:

$52 \times 52 \text{ mm}$

Maximum voltage at the output of the transformer loaded by IZP1: $30V_{ef}$

The transformer should not be operated at no-load

Weight of the transformer: 0.3 kg

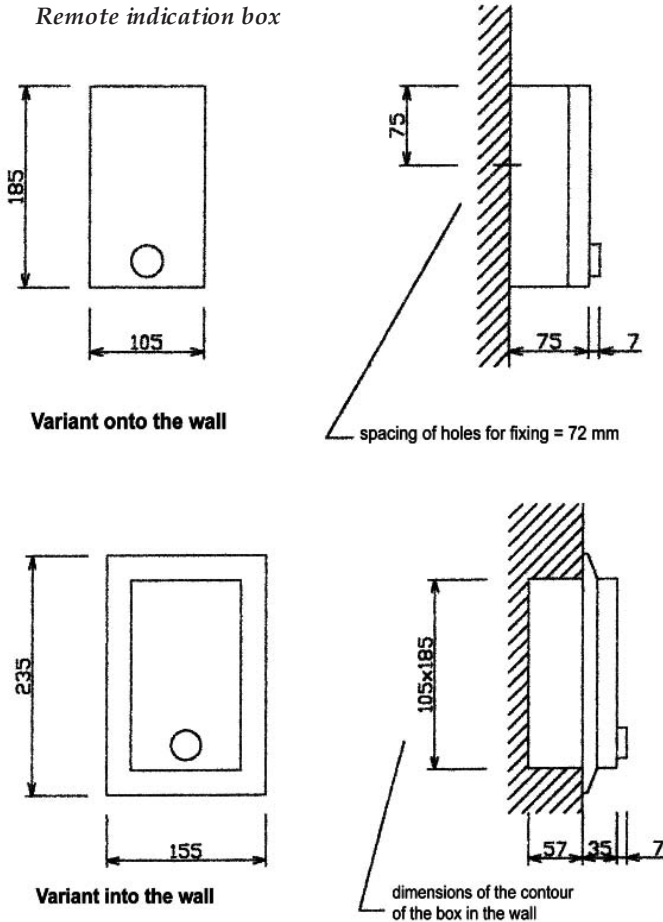
Range of operating temperatures: -30°C to $+90^{\circ}\text{C}$

Maximum relative humidity: 75% at 30°C ,
 occasional condensation permitted

The transformer has a split core

The polarity of connection plays no role when installing the transformer.

Fig. 8 Remote indication box



REMOTE INDICATION BOX

The remote indication box for IZP1 consists of the box itself with an unlosably fixed cover with a special lock for the key of the power utility and of a removable covering frame. The box with the frame shall be installed into the wall, the box without the frame shall be installed onto the wall. The parts of the box are made of a grey frostproof thermoplast with increased resistance against external mechanical influences in the direction

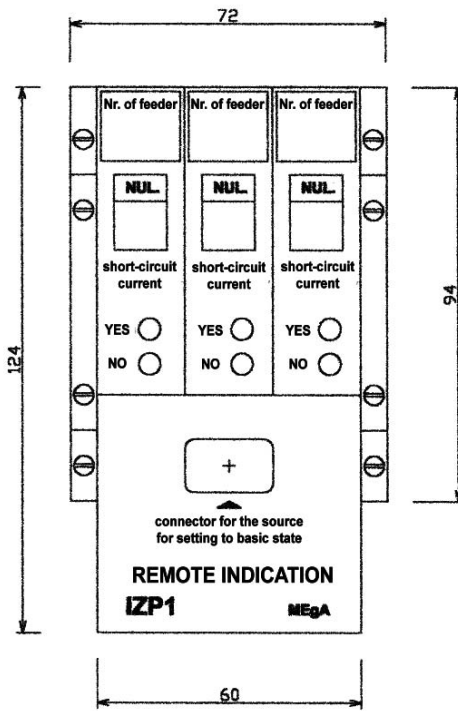


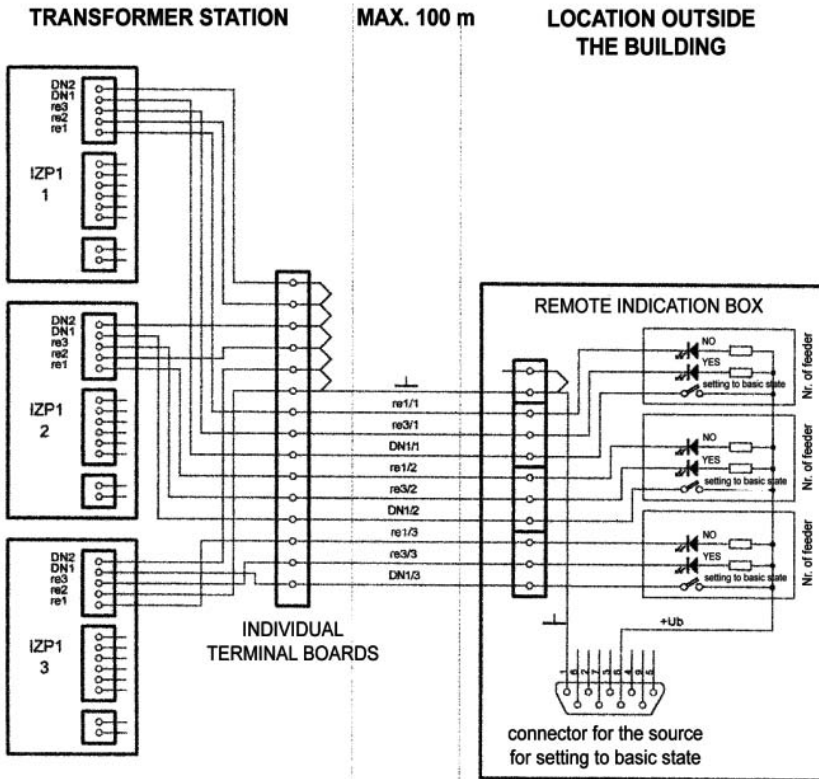
Fig. 9 View of the panel of the remote indication box

from the cover. The box is provided with bushings on its bottom part and it can bear a marking of the power utility on its cover. A space for placing the key for the entry into the object with the transformer is provided in the box.

A panel with three sections for the telesignalization of up to three IZP1 indicators is located inside the box. Each section has an area for marking the number of the feeder with the installed IZP1 indicator, the button NUL for a remote setting of the respective indicator to basic state and a pair of LEDs indicating the short-circuit current. The red LED diode YES indicates the passing of the short-circuit current through the monitored feeder while the green LED

diode indicates that no short-circuit current has passed through it.

A nine-pole connector CANNON for inserting the source for setting to basic state is provided in the bottom part of the box. The insertion of this source activates the circuits of the remote indication box, i. e. one of the two LED diodes of each connected indicator lights up and the circuit of the remote setting to basic state will be prepared. When the remote setting of the IZP1 indicator to basic state is required, the button NUL in the respective section of the panel shall be pressed. When the current flowing through the phases of the monitored line is sufficiently high or when a LV supply is at disposal, the indicating elements of the IZP1 indicator as well as its remote indication circuit will be set to basic state and the green LED diode NO will thus start to light.


Note:

4 conductors are necessary for connecting one indicator,
 7 conductors are necessary for connecting two indicators,
 10 conductors are necessary for connecting three indicators

Fig. 10 Interconnection of IZP1 indicators with the remote indication box

Outside dimensions of the box including the frame:

height - 235 mm, width - 155 mm, depth - 92 mm

Weight: 0.6 kg

Protection: IP 54 according to ČSN EN 60 529

Degree of self-extinguishing: VO according to UL 94

Colour of the box: light grey

Bushings: 2 × diameter 21 mm, 5 × diameter 11 mm

The remote indication circuits are galvanically separated from those of the IZP1 indicator, insulation strength is higher than 1500 V_{AC}. Interconnection of the IZP1 indicators and the remote indicator box is shown in Fig. 10. The marking of connectors on the back side of the IZP1 indicator can be seen in Fig. 11.

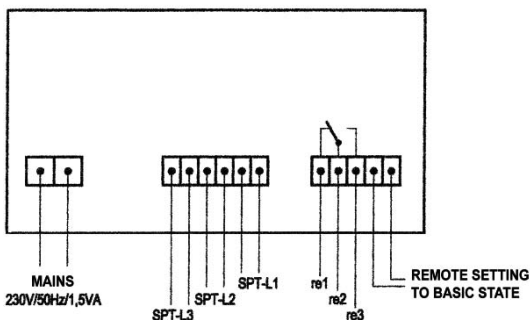


Fig. 11 Connectors on the back panel of the IZP1 indicator unit

The distance between the short-circuit current indicator and the remote indicator box should not be greater than 100 m. Diameter of the conductor ranges from 0.5 mm to 2.0 mm. Voltage of the battery UB of the source for setting to basic state for supplying the circuits of the box is 9 V_{DC}.

SOURCE FOR SETTING TO BASIC STATE

This source shall be used for setting the short-circuit current indicator IZP1 to basic state and for activating the remote indication and the remote setting of the indicator to basic state.

The setting of the IZP1 indicator to basic state shall be carried out by inserting the source for setting to basic state into connector "External control" of the indicator. By doing this, all the three indicating elements of the indicator will be set to basic state instantaneously and independently on the position of the switch of the automatic setting to basic state and on the magnitudes of currents flowing through the phases of the monitored line. The source is ready for setting another indicator to basic state after 1 s following its withdrawal from the connector "External control".

The remote indication circuits of the IZP1 indicator can be activated by inserting the source for setting to basic state into a nine-pole connector CANNON in the remote indication box.

REPLACEMENT OF BATTERY

It is recommended to replace the battery after 2000 settings to basic state, but not later than 1 year after the source has been installed. The source sets to basic state reliably if the voltage of the battery is higher than 8.5 V. When the source for setting to basic state is not inserted into the indicator, the circuit of the battery will be interrupted and the battery will not discharge.

Four screws on the cover of the source for setting to basic state shall be loosened and the cover removed when replacing the battery. The battery connected to a two-pole ending shall be replaced (change of polarity of the battery is not possible) and the cover shall be screwed on back.

TECHNICAL PARAMETERS

Dimensions 90 × 50 × 24 mm (length × width × height)

Battery 9 V, type 6F22

Capacity of the battery is sufficient for more than 2000 settings to basic state.

Prior to a further setting to basic state, the source must be withdrawn from the IZP1 indicator for about 1 s.

CHECKING EQUIPMENT

The checking equipment for IZP1 is intended to be used for periodic checking the correct functioning of the short-circuit current indicator IZP1 and for checking the interconnection of the circuits of SPT current transformers and the function of the IZP1 indicator when being installed.

DESCRIPTION OF FUNCTIONING

The checking equipment for IZP1 consists of two parts. The part for checking the correct functioning of the IZP1 indicator includes a nine-pole connector for connecting the connection cable, a sliding switch for setting the magnitude of the current, three switches L1, L2 and L3 for checking the

function of circuits for the signalization of individual phases and a switch NUL for checking the function of setting to basic state, The part for checking the correct interconnection of circuits of SPT transformers includes a six-pole connector TRAFa SPT and a field of six LED diodes: three green diodes YES signalize the correct interconnection and three red LED diodes NO signalize the incorrect interconnection of the circuits. The pair of diodes YES and NO is assigned to individual SPT transformers – phases.

The basic component of the part for checking the functioning of the IZP1 indicator is a source of the rectified alternating current which is applied, as need be, to the input circuit of the evaluation scheme of the first, the second or the third phase of the indicator. This shall be carried out by pressing the buttons L1, L2 or L3. The magnitude of the current is preset to a value corresponding to the passing of the current 300 A, 600 A and 900 A through the SPT current transformer, so that it is possible to verify the correct functioning of the signalization of the short-circuit current by the indicator with the level of the starting current set to 300 A, 600 A or 900 A. The magnitude of the current can be switched over by means of a sliding switch.

For checking the function of setting to basic state, a DC voltage is generated in the control equipment which – across the closed button NUL of the checking equipment – activates the circuits for setting to basic state of all phases of the IZP1 indicator.

The part for checking the interconnection of SPT transformers consists of three comparison circuits signalizing the interconnection or disconnection of the monitored circuits of SPT transformers installed on phases L1, L2 and L3. The state of interconnection of these circuits is signalized by LED diodes YES (green) or NO (red).

CHECKING PROCEDURE

1. The checking equipment shall be connected to mains supply 230 V/50 Hz. The power input of the checking equipment does not exceed 5 VA in any regime. The supply of the checking equipment is indicated by the lighting of diode MAINS and, when the SPT transformers are not connected, also by the lighting of diodes NO of individual phases.

2. The IZP1 indicator being checked shall be interconnected with the checking equipment by using a connecting cable. When interconnecting the both instruments, the activated indicating elements of the indicator will be set to basic state automatically in case that the indicator is not supplied either from SPT transformers or from the mains and that the switch of automatic setting to basic state on the IZP1 indicator is in position ON at the same time.
3. A current corresponding to the starting current of the indicator shall be set by using the sliding switch of the checking equipment. By means of pressing the switch of the chosen phase the current will flow through the input circuits of this phase and its indicating element will be activated. The indicating element will be activated even in case when a higher value of the current has been set. On the contrary, a lower value of the current set in the checking equipment must not activate the indicating element. During a running check, when currents are flowing through SPT transformers connected to the IZP1 indicator, the signals of the checking equipment and of the SPT transformer will be summed up and the indicating elements may be activated even at a lower value of the current set in the checking equipment. When pressing more than one button switch the generated current divides into more inputs and the function of checking may be impaired.
4. In any step of the checking, all activated indicating elements will be set to basic state by pressing the switch NUL on the panel of the checking equipment.
5. By connecting the checking equipment even to the IZP1 indicator which has not been connected or to that one where no current is flowing through its connected SPT transformers, the lighting of the signal LED diode as well as the proper function of the button Setting to basic state on the panel of the indicator may be checked.
6. The correct interconnection of the circuits of SPT transformers can be checked only in that case when no current is flowing through phases being checked and thus through the SPT transformers. The green LED diodes YES light up when inserting the six-pole connector with three connected SPT transformers into the connector TRAFASPT of the checking equipment. When the circuit of the SPT transformer is

interrupted, the red LED diode NO of the respective phase will keep lighting.

Dimensions	215 × 130 × 82 mm
Supply	230 V, 50 Hz, 5 VA
Mains fuse	F 250 V/100 mA
Maximum output voltage	24 V

Note:

The mains fuse is situated on the bottom side of the printed circuit card and it becomes accessible after dismantling the panel of the checking equipment and the card and after disconnecting the 230 V mains supply.

MANUFACTURER:

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