APPLICATIONS

- Detect earth faults in medium voltage net

Highlights

- Earth fault passage indicator combined
- Automatic and manual reset
- Front push button for test and reset
- Selectable earth fault trip currents
- Long lasting li-ion battery for stand-alone service during fault condition (up to 50 hours)
- High efficiency high resolution display for fault indication
- Remote indication by change-over contact for fault condition
- External reset with dry contact or external AUX restoring
- System to prevent false indication due to inrush current after 230Vca restoring
- Selectable rise time before fault remoting
- Output suitable for blinking lamp indicator
APPLICATION

Fault circuit indicators are used to detect earth faults in medium voltage net: a change-over contact is used to remote the over-current tripping while a local LCD display indication is used to select the faulted area of the net.

The high sensitivity of earth fault indicators allow to use them in the most typical application.

Connection between tripping device and earth current sensor is made by electrical cables suitable to be used in tropical environments.

Device is normally energized by 100÷240Vca/Vdc aux while the energy to trip the remote indication relay and manual reset is stored by internal li-ion battery (15 years is the estimated life time).

A diagnostic test can be performed locally by pressing a push-button. Reset can be performed locally by a second push button or by a remote command.

The device keeps the remote fault indication during the whole timing before reset. The local LCD indication always lasts the whole timing before reset.

The operating points for earth fault are adjusted with a threshold level electronic. When the current exceeds the pre-adjusted threshold level, a signal is sent to the reading instrument for evaluation. The respective LCD indication is activated and starts to blink.

Automatic reset is possible either after elapsing of internal timer or after AUX restoring; a system to prevent false indication due to inrush current (after AUX restoring), disable sensing circuit for some seconds.

FUNCTIONS

Minimum impulse adjustment: the reading instrument is equipped with a setting for minimum impulse duration. The impulse picked up from the sensor is evaluated for its duration. If the impulse length is shorter than the adjusted value for the minimum impulse duration, no fault will be indicated. If the impulse duration is longer than the pre-adjusted duration, an earth fault circuit will be indicated.

Test: a push button on front panel allows to verify all the functions are ready to run. Pressing “test” also the remote relay will change state. Test can be done only if start-up “smile” indication appears on display

Reset: the reset of the earth fault or short circuit can be done over:

A) automatic reset: a time element controls the indication and resets it after a pre-adjusted time (4h or 6h)
B) manual reset by a push-button on front
C) external reset by connecting together pins 1-2
D) external reset with AUX restoring pins L-N and delayed filter

Fault indication:
earth fault: must be detected connecting a three-phase current transformer on input phase L2. If the current is above threshold a lamp & earth symbol will appear on LCD display.

Start-up: a dip switch allows to activate this function that enables power on through li-ion battery. A “smile” will appear on display indicating the device is ready to run and test or reset can be achieved. If AUX is present li-ion battery will be disabled. An auto-diagnostic cycle supervise the circuitry and only if everything is OK the “smile” will appear.
### Material and dimensions

| Box | polycarbonate |
| Mounting | panel mounted according to DIN 43700 |
| Dimensions | w×h×d=96×48×81mm |
| Panel cut | w×h=92×44mm |

### Rele data

#### RELAY features

| Contacts Material | Ag-Gold plated |
| Nominal Value | 0.5A 125VAC (cos φ=1.0) 1A 30VDC |
| Max changeover current | 1 A |
| Max changeover voltage | 125 VAC, 110VDC |
| Electric live | 1A/30 VDC cos φ 2 x 10^5 cycles |
| Mechanical live | 1 x 10^6 cycles |
| Dielectric strength (open contacts) | 300VAC 1min |
| (coil-contacts) | 1000VAC 1min |
| Surge strength | min 1500V/1.2X50us |

### Filtering

| Pick up times (dip switch) | 40, 60, 80, 160ms |
| Inrush current time | <15s |
| Reset after 230Vca restoring | 20s |

### Technical Data

#### Inputs
- earth current transformer

#### AUX power
- powered by 100÷240Vca/Vdc
- internal li-ion battery (replaceable)

#### Power consumption
- <20uA (stand-by mode)

#### Trip indication
- LCD graphic display

#### Outputs
- earth fault: 1 change over contact,
- source for external blinking lamp

#### Current transformer sensors
- earth fault: 3 phases laminated
- transformer plates with coil, electrical cable

#### Threshold fault current
- earth fault: 40, 100, 150, 240A user selectable**

#### Accuracy
- +/- 10%

#### Test
- manual test on front panel

#### Reset
- manual, automatic (4, 6hours**)
- dry contact external reset
- AUX restoring reset

#### Temperature range
- -30°C ÷ 60°C

#### Protection class
- control unit: IP54
- current transformers sensors: IP67

(All specs are subject to change without notice.)
FAULT INDICATOR
Type EFI/P

ELECTRONSYSTEM MD TECHNICAL SHEET
Revision A of 5 September 2013

Dimension EFI/P

Drawing:
43911034

DIP-SWITCH SELECTION DP1:

CONNECTORS

ORDERING CODE:
Code: EFI/P

NOTE:
- Default dip-switch configuration is marked by bold square

All specs are subject to change without notice

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FAULT INDICATOR
Type EFI/P

TECHNICAL DATA

-Inputs: electrical earth sensor
  remote dry contact for reset

-Aux Power: 100÷240 Vdc/Vac
  Internal Li-Ion battery 3,6V 2,5Ah (replaceable)

-LCD Indication:

-Outputs: 1 change over contact for earth fault detection
  power source for blinking lamp

-Current transformer sensors: for earth fault, laminated plates coils with electrical cable

-Trip current: 40, 100, 150, 240A selectable for earth fault**

-Accuracy: +/- 10%

-Pick up times (Impulse duration): 40, 60, 80, 160 msec

-Reset: manual, automatic (4, 8hours)
  dry contact external reset
  AUX restoring reset

-Temperature range: -30°C ÷ 60°C

-Humidity range: 30% ÷ 95%

-Protection class: din rail mounted instrument IP54

RELAY FEATURE

-Contacts Material: Ag-Gold plated

-Nominal Value: 0.5A 125Vac (cosφ=1.0)
  1A 30Vdc

-Max changeover current: 1A

-Max changeover voltage: 125 Vac, 110Vdc

-Electric life: 1A/30Vdc cosφ 1 2 x 10^5 cycles

-Mechanical life: 1 x 10^6 cycles

-Dielectric strength (open contacts): 300Vac 1min
  (coil-contacts) : 1000Vac 1min

-Surge strength: min 1500V/1.2X50us

(**) Other values can be chosen by special request
Accessories | Blinking lamp

Drawing: 43911951

- Blinking LED
- Fixing hole
- Screw M5x20
- 20 m 2 pole cable

All specs are subject to change without notice.
Accessories TA/E

Drawing: 43911906

ORDERING CODE:
TA/E/__ __ __

length of cable in mm

-Suitable for cable with max diameter of 110 mm

double PVC 2x1mm²
INSTALLATION EXAMPLE

HIGH VOLTAGE AREA

EARTH FAULT

FAULT: EARTH FAULT
RESET: AUTOMATIC 4h
EARTH FAULT CURRENT: 60 A
DURATION ADJ.: 40 mSec

BLINKING LAMP

FAULT INDICATOR

dwg 43911906

The reading instruments has to be installed outside the high voltage area.
It is possible to install the CT on screened and unscreened cables.
The earth fault sensor must be installed around all three cores to assure that the
sum current of all the three cables is picked up.
The frames of the sensors can be opened for installation.
OPERATING RESET DIAGRAMS

1) AUTOMATIC RESET

2) MANUAL/EXTERNAL RESET

3) AUX RESTORING

Comments:
TN: Noise duration < T1
T1: Fault duration
T2: Filter duration set by dip-switch
T3: Automatic reset duration set by dip-switch
T4: Delay of reset after aux restoring + 5s
T5: Tripping current after aux restoring + 14
(A) In case of reset with still faulty line the device energizes again
MAINTENANCE SPECIFICATIONS

KIT ASSEMBLIES

N°1 EFI/P DWG. 43911034
N°1 TA/E DWG. 43911906
N°1 BLINKING LAMP DWG. 43911951

STORAGE

If the complex must be storage before use, please keep dry and repaired from cold and hot climates, respecting the original position of case. Move and take care to prevent injures.

OPERATING TEMPERATURE RANGE: -30°C ÷ +70°C
STORAGE TEMPERATURE: -40°C ÷ +85°C
RELATIVE HUMIDITY: 95% @ +40°C

BATTERY SPECIFICATIONS

TYPE: Lithium thionyl chloride battery
NOMINAL CAPACITY: 2500mAh
NOMINAL VOLTAGE: 3,6 Vdc
STANDARD DISCHARGE CURRENT: 2mA
MAXIMUM CONTINUOUS CURRENT: 100mA
MAXIMUM PULSE CURRENT: 200mA
OPERATING TEMPERATURE RANGE: -30°C ÷ +85°C
STORAGE TEMPERATURE: +30°C Max (recommended)

Electronsystem MD work in partnership with its customers in designing customized executions in order to meet specific requirements, please contact us.