

FAULT CIRCUIT INDICATORS

FI/X/X rev.D 19.03.2014



Application

Fault circuit indicators are used to detect phase to phase or earth faults or short circuits 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.

FI/X/X is able to detect both phase to phase or phase to earth faults according to current sensors used for detection: to detect earth fault situations a three phase current sensor must be used.

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

Connection between tripping device and current sensor is made by electrical cables.

The energy to trip the remote indication relay is derived by fault itself, while test and manual reset are energized by internal li-ion battery (10 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 with stable relay maintain the changeover fault indication during the whole timing before reset, the latched one lasts only for 300ms.

The local LCD indication always lasts the whole timing before reset.

The sensors detect earth faults and short circuits inductively. The operating points for earth fault and short circuit 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 after switching by internal timer or with 230Vca restoring; a system to prevent false indication due to inrush current (after 230Vca restoring), disable sensing circuit for 5 seconds.

FI/X/L LATCHED RELAY TYPE

FI/X/S STABLE RELAY TYPE

Highlights

- Phase to phase fault indicator and earth fault indicator combined
- Automatic and manual reset
- Front push button for test and reset
- Selectable earth fault trip currents
- Selectable phase 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 phase to phase or earth faults
- External reset with dry contact or 230Vca restoring
- System to prevent false indication due to inrush current after 230Vca restoring
- Selectable time delay after fault detection
- Output suitable for blinking lamp indicator

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 or short 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 according to dip-switches selection. 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 (2h or 4h)
- b) manual reset by a push-button on front
- c) external reset by connecting together pins 13-14
- d) external reset with 230Vca restoring pins 17-18 and delayed filter of 5 seconds

Fault indication: two type of faults can be detected:

- a) 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.
- b) short circuit: a single phase current transformer must be connected to each input phase. If the current is above the threshold a lamp will appear on involved phase.

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 the output sensor current is sufficient li-ion battery will be disabled. An auto-diagnostic cycle supervise the circuitry and only if everything is OK the "smile" will appear.

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Material and dimensions

Box : polycarbonate
Mounting:.....panel mounted according to DIN 43700
Dimensions :wxhxd=96x48x81mm
Panel cut:wxh=92x44mm

Relè data

LATCHED RELAY features

Contacts Material	Ag. CdO
Nominal Value	6A 250VAC (cosφ=1.0)
	3A 250VAC (cosφ=0.4)
	6A 30VDC
Max changeover current	6 A
Max changeover voltage	250 VCA, 100VDC
Electric live	6A/250 VCA cosφ1 1 x 10 ⁵ cycles
Mechanical live	5 x 10 ⁶ cycles
Dielectric strength (open contacts)	1000VAC 1min
	(coil-contacts) 5000VAC 1min
Surge strength	min 10000V/1.2X50us

STABLE RELAY features

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

Technical Data

Inputs :.....phase or earth current transformer
Power:.....auto-powered by inputs
internal li-ion battery (replaceable)
Power consumption:.....<20uA (stand-by mode)
Trip indication:.....LCD graphic display
Outputs

- phase to phase fault: 1 change over contact, latched type (300ms)
- earth fault: 1 change over contact, latched type (300ms)
- source for external blinking lamp

Current transformer sensors:

- phase to phase fault: single phase laminated transformer plates with coil
- earth fault: 3 phases laminated transformer plates with coil

Selectable trip current:

- phase to phase fault:(*).....250, 400, 450, 500, 600 A
- earth fault:.....40, 60, 80 A

Accuracy(full scale):.....+/- 15%

Accuracy(half scale):.....+/- 10%

Test:.....manual test on front panel

Reset :manual, automatic (2, 4hours)

.....dry contact external reset

.....230Vca restoring reset

Temperature range : -30°C ÷ 60°C

Indication

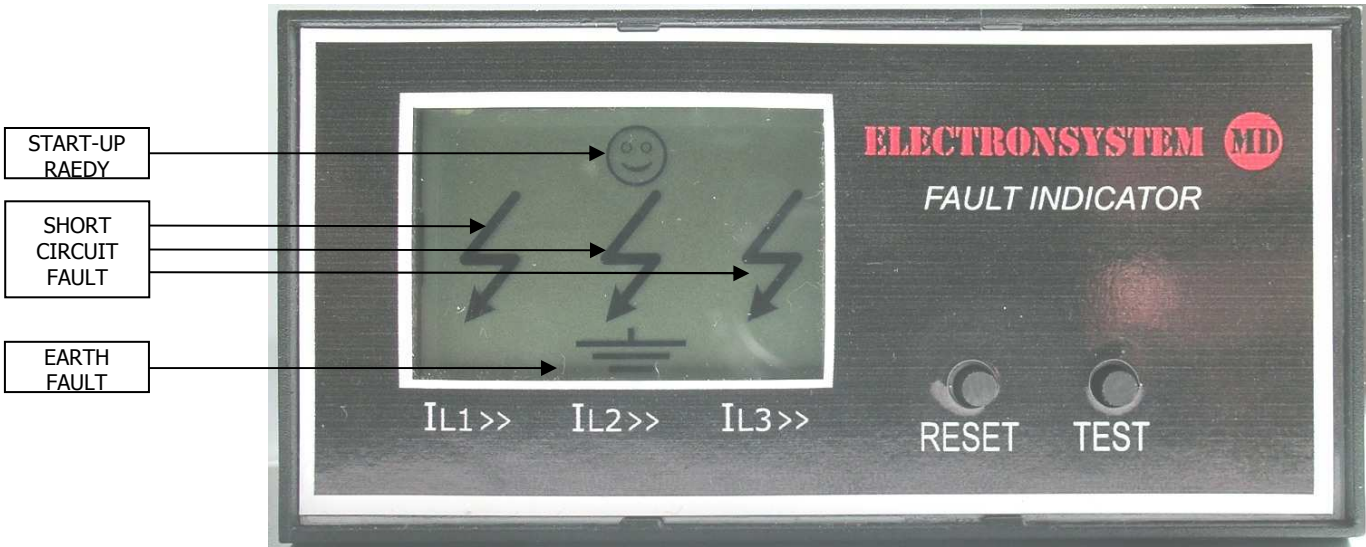
- Short circuit::blinking faulted phase lamp

- Earth fault:.....blinking faulted phase+ earth symbol

Protection class

- panel mounted instrument:.....IP65
- current transformers sensors:.....IP67

(*) different values on request



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ELECTRONSYSTEM MD

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Rev./Mod A Data 27.04.2007 Descrizione: MODIFICHE GENERALI	Rev./Mod B Data 14.04.2008 Descrizione: MODIFICHE GENERALI	Rev./Mod C Data 01/12/2008 Descrizione: Aggiornamento lunghezza	Rev./Mod Data Descrizione:	Rev./Mod Data Descrizione:	Rev./Mod Data Descrizione:
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ORDERING CODE:

TA/P /

length of cable in mm

TA CABLE DWG 43922270

double PVC 2x1mm²

—SUITABLE FOR CABLE WITH MAX DIAMETER OF 52 mm

Plano di Completamento (UNI 4942-75)

LIVELLO	LQA
L2	1

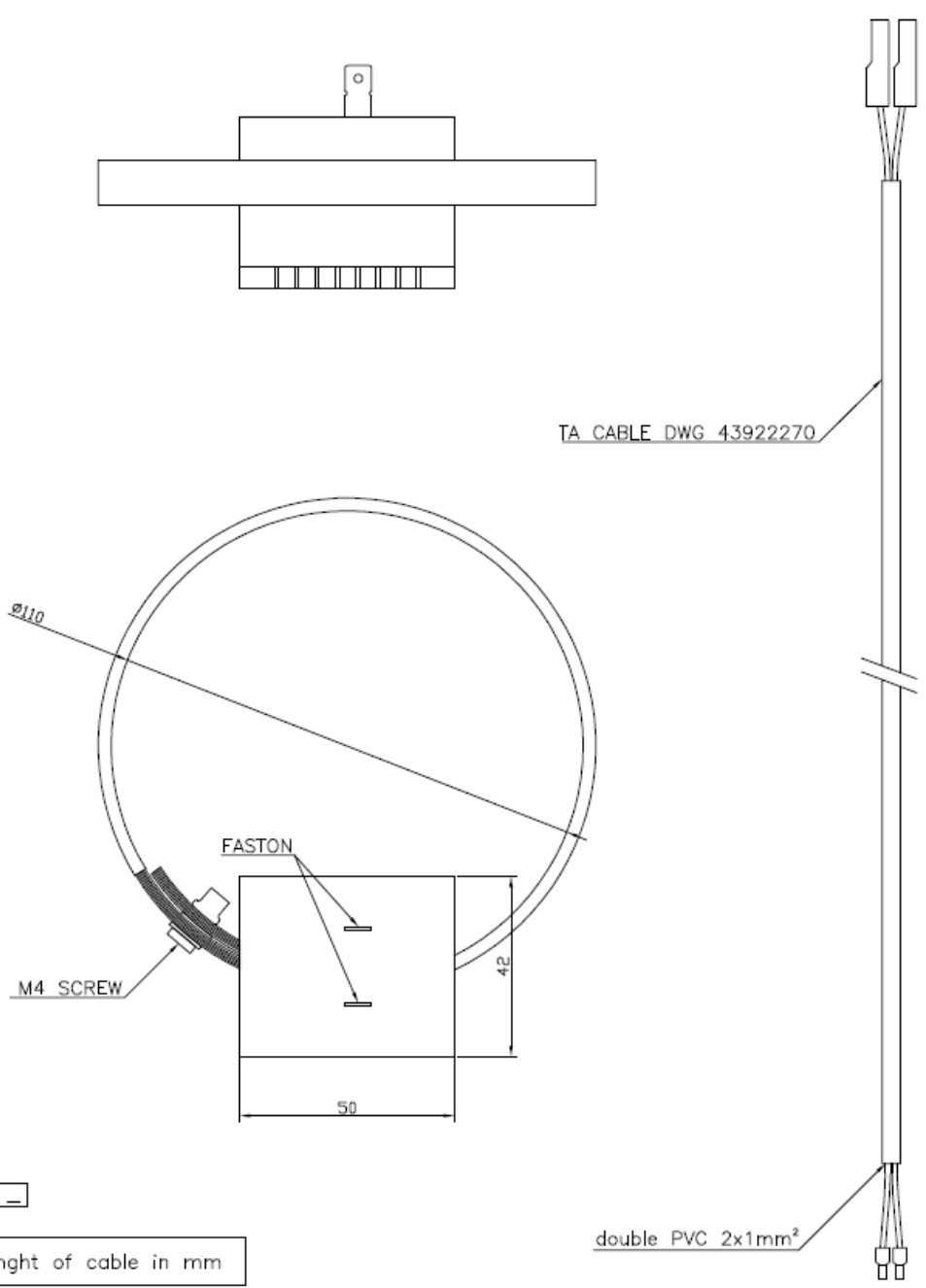



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Fig.	Materiale/Material	N° Series / Serie	Finishing / Finitura
Filling Room Archivio	Thread quality tolerance Tolleranza filetti qualitativa "6g-65" UNI 5541-65	General tolerance for machining / Tolleranze generali per lavorazioni meccaniche: Coord. punz. a C.N. JS11	Extra-fine / Fine Median / Medio Coarse / Grossolano JS12 JS13 JS15
Prep. G. FORLANI Dis. App. P. GUZZETTI	Resp. Dep. Uff. Tecnico	Title TA/P	
Rev./Mod. 01/26.02.2007 : Emissione nuovo disegno		Apparatus Dec. No. 43911905 N° Doc.	
ELECTRONSYSTEM MD S.r.l.		Scale 1:1 R°-Pag. 1/1	

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Data Rev./Mod Descrizione:	 <p>TA CABLE DWG 43922270</p> <p>ORDERING CODE: TA/E/ <input type="text"/></p> <p>length of cable in mm <input type="text"/></p> <p>—SUITABLE FOR CABLE WITH MAX DIAMETER OF 110 mm</p>																	
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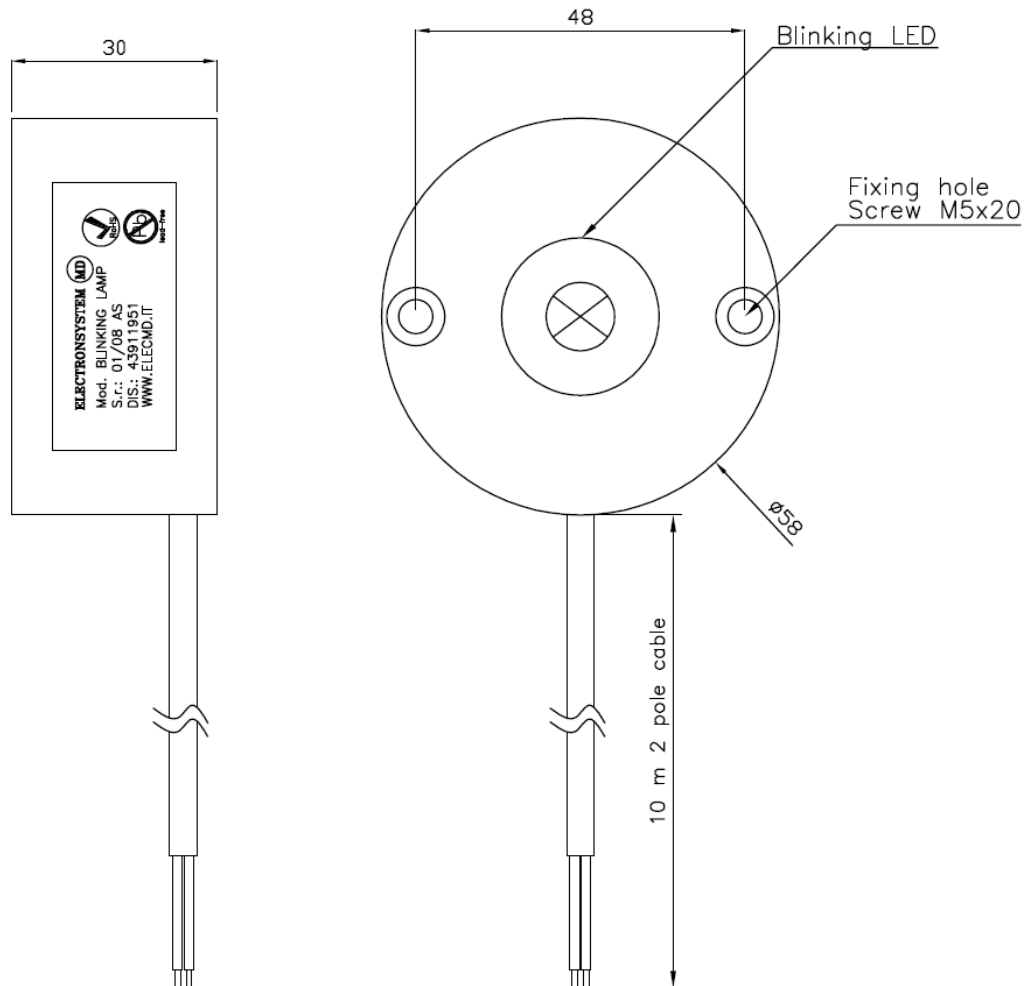


Fig.	Material/Materiale	N° Series / Serie	Finishing / Finitura
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Prep. Dis. G. FORLANI	Resp. Dep. Uff. Tecnico	Title Titolo BLINKING LAMP	<div> <div>Extra fine / Fine</div> <div>Median / Media</div> <div>Coarse / Grossolano</div> </div>
App. P. GUIZZETTI	Rev./Mod 0 23.01.2008 : Emissione nuovo disegno	Apparatus Apparecchio Doc. No. 43911951	<div> <div>Scale Scala</div> <div>Sh. No. N° Pag. 3/3</div> </div>

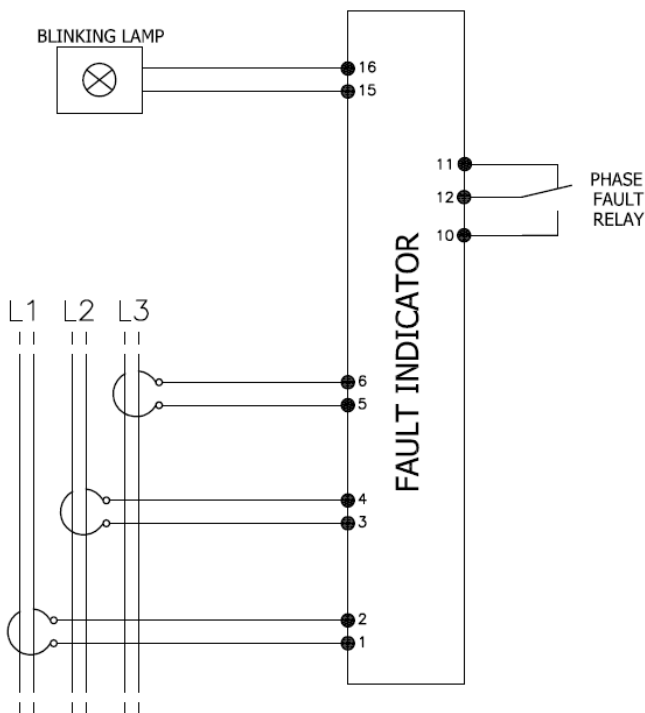
ELECTRONSYSTEM MD S.r.l.

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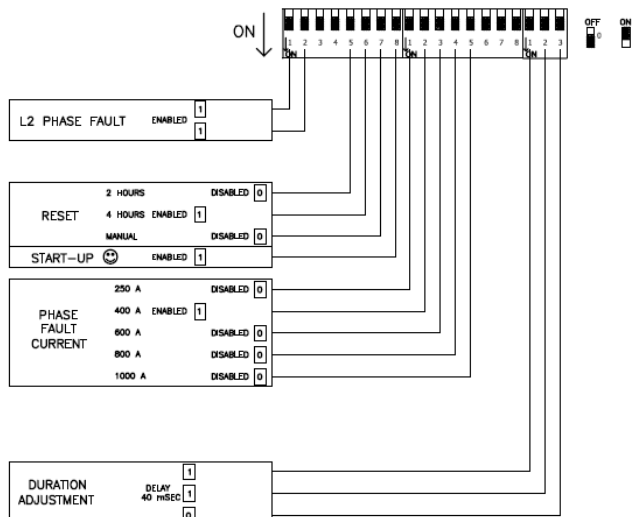
APPLICATION EXAMPLE

PHASE TO PHASE FAULT

FAULT: PHASE FAULT
RESET: AUTOMATIC 4h
PHASE FAULT CURRENT: 400 A
DURATION ADJ.: 40 mSec

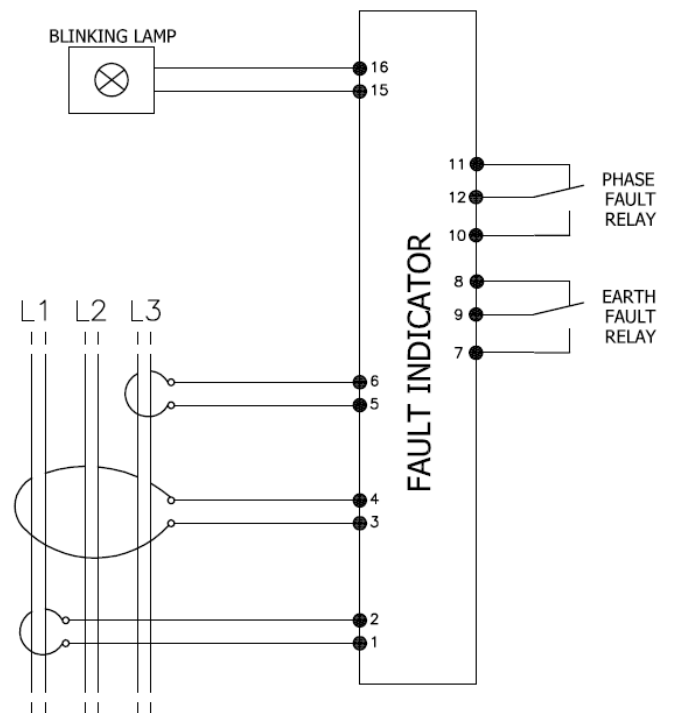


DIP-SWITCH CONFIGURATION

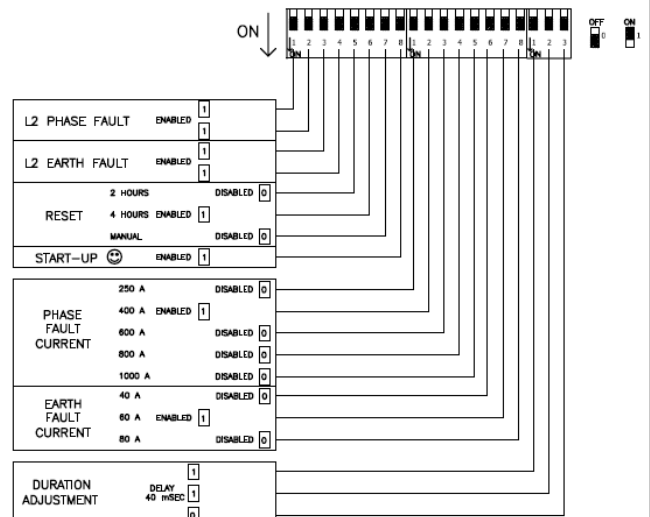


PHASE TO PHASE FAULT + EARTH FAULT

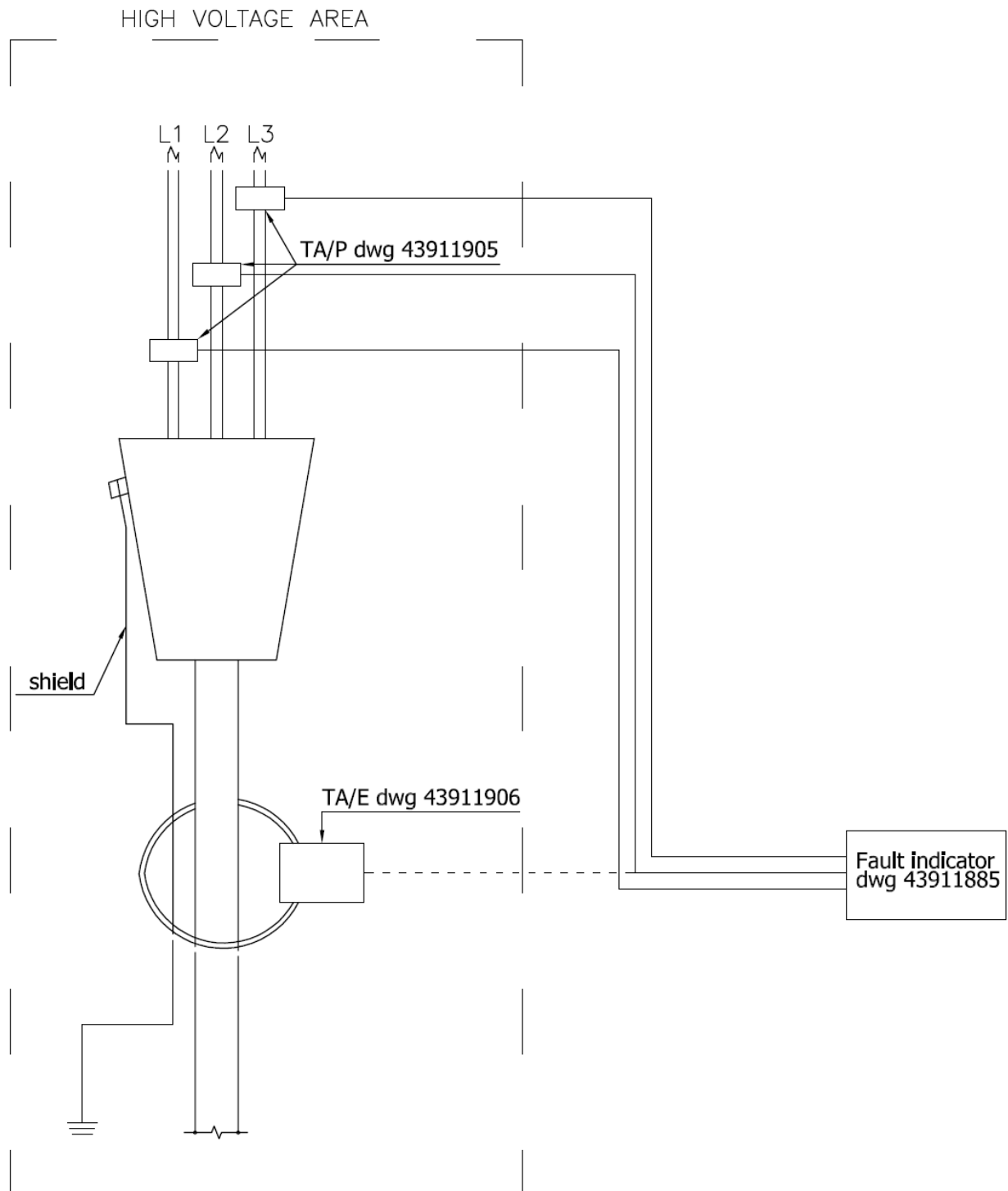
FAULT: PHASE FAULT + EARTH FAULT
RESET: AUTOMATIC 4h
PHASE FAULT CURRENT: 400 A
EARTH FAULT CURRENT: 60 A
DURATION ADJ.: 40 mSec



DIP-SWITCH CONFIGURATION

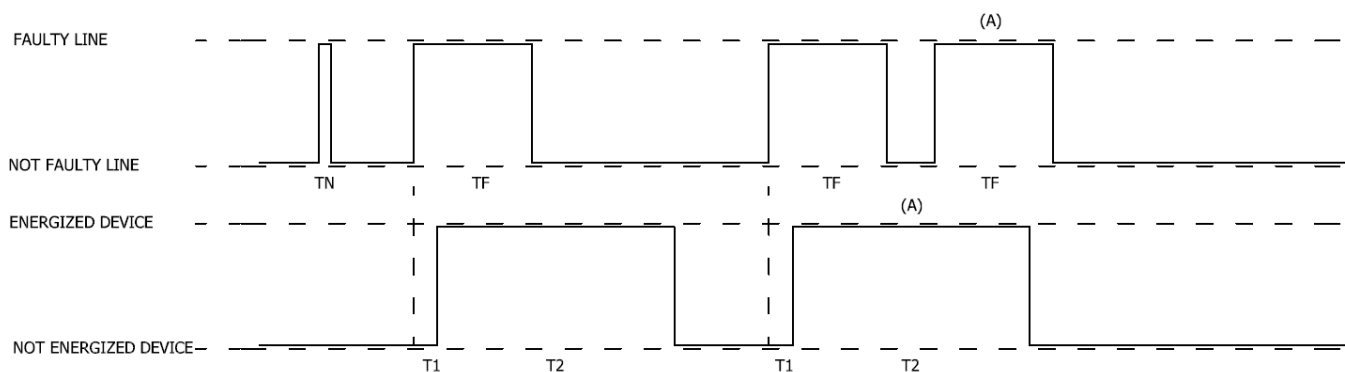


INSTALLATION EXAMPLE



The reading instruments has to be installed outside the high voltage area.
It is possible to install the short circuit sensors 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 DIAGRAMS WITH FAULTY LINE



COMMENTS:

TN: NOISE DURATION < T1

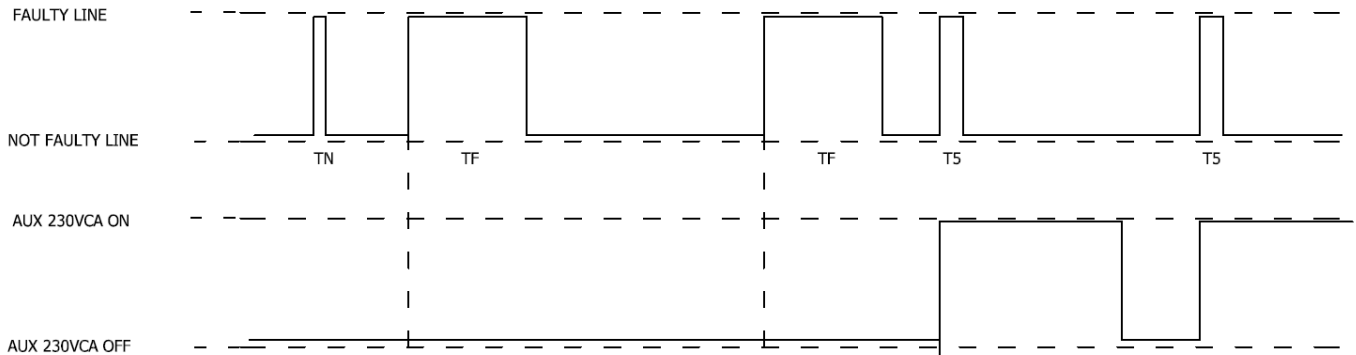
TF: FAULT DURATION

T1: FILTER DURATION SET BY DIP-SWITCH

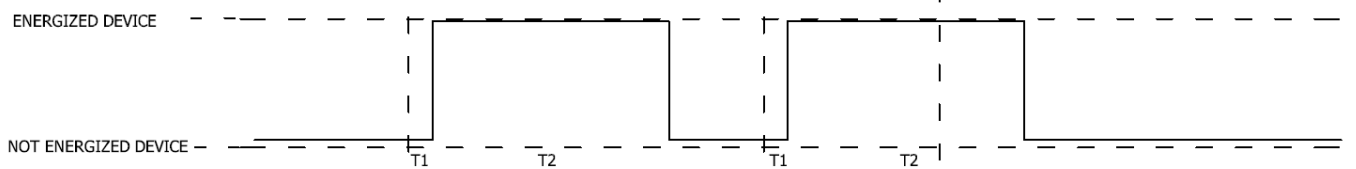
T2: AUTOMATIC RESET DURATION SET BY DIP-SWITCH

(A) IN CASE OF NEW FAULT WITH ALREADY ENERGIZED DEVICE NOTHING HAPPENS

OPERATING RESET DIAGRAMS



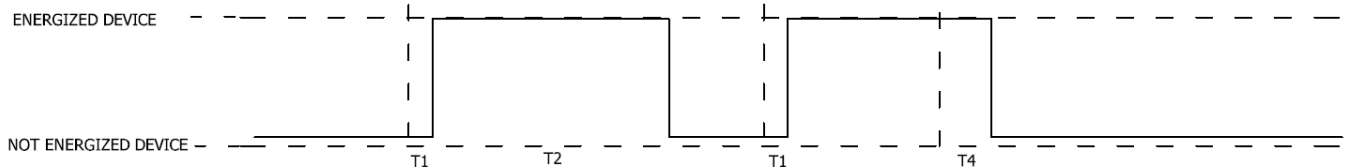
(1) AUTOMATIC RESET



(2) MANUAL/EXTERNAL RESET



(3) 230VCA RESTORING



COMMENTS:

TN: NOISE DURATION < T1
 TF: FAULT DURATION
 T1: FILTER DURATION SET BY DIP-SWITCH
 T2: AUTOMATIC RESET DURATION SET BY DIP-SWITCH
 T3: RANDOM DURATION OF MANUAL OR EXTERNAL RESET
 T4: DELAY OF RESET AFTER 230Vca RESTORING: ABOUT 5s
 T5: INRUSH CURRENT AFTER 230Vca RESTORING < T4

MAINTENANCE SPECIFICATIONS

KIT ASSEMBLIES

FOR PHASE TO PHASE FAULT :

N°1 FI/P/X DWG. 43911885

N°3 TA/P DWG. 43911905

N°1 BLINKING LAMP DWG. 43911951*

FOR PHASE TO PHASE FAULT + EARTH FAULT:

N°1 FI/E/X DWG. 43911885

N°2 TA/P DWG. 43911905

N°1 TA/E DWG. 43911906

N°1 BLINKING LAMP DWG. 43911951*

*optional

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: $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$

STORAGE TEMPERATURE: $-40^{\circ}\text{C} \div +85^{\circ}\text{C}$

RELATIVE HUMIDITY: 95% @ $+40^{\circ}\text{C}$

BATTERY SPECIFICATIONS

TYPE: ER14505 Lithium thionyl chloride battery

NOMINAL CAPACITY: 2400mAh

NOMINAL VOLTAGE: 3,6 Vdc

STANDARD DISCHARGE CURRENT: 2mA

MAXIMUM CONTINUOUS CURRENT: 100mA

MAXIMUM PULSE CURRENT: 200mA

OPERATING TEMPERATURE RANGE: $-55^{\circ}\text{C} \div +85^{\circ}\text{C}$

STORAGE TEMPERATURE: $+30^{\circ}\text{C}$ Max (recommended)