

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 phase current sensor is made by optical fibres, while connection with earth sensor is by electrical cables.

Device is normally energized by 230Vca aux while the energy to trip the remote indication by 230Vca and manual reset is stored 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 keeps the remote fault indication during the whole timing before reset. 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 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 230Vca restoring; a system to prevent false indication due to inrush current (after 230Vca restoring), disable sensing circuit for 5 seconds.

FI/C

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
- Fixed phase trip current
- 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 230Vca 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

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. 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 3-4
- d) external reset with 230Vca restoring pins 10-11 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 Aux230Vca 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.

FAULT CIRCUIT INDICATORS

F/C rev.A 03.03.09

Material and dimensions

Box :..... polycarbonate
Mounting:.....wall mounting
Dimensions :.....wx dxh=94x130x57mm

Relè data

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 live :..... 1×10^6 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:.....<10s
Reset after 230Vca restoring:.....<10s

Technical Data

Inputs :.....phase or earth current transformer
Power:..... powered by 230Vca
:.....internal li-ion battery (replaceable)

Power consumption:.....<20uA (stand-by mode)

Trip indication:.....LCD graphic display

Outputs

- phase or earth fault: 1 change over contact,
- source for external blinking lamp

Current transformer sensors:

- phase to phase fault: single phase laminated transformer plates with coil, optical cable
- earth fault: 3 phases laminated transformer plates with coil, electrical cable

Threshold fault current:

- phase to phase fault: 200, 300, 400, 500, 600, 700, 800, 900, 1000A fixed value*
- earth fault:..... 50, 60, 70, 80A user selectable**

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

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

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

Reset :manual, automatic (4, 6hours)

.....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

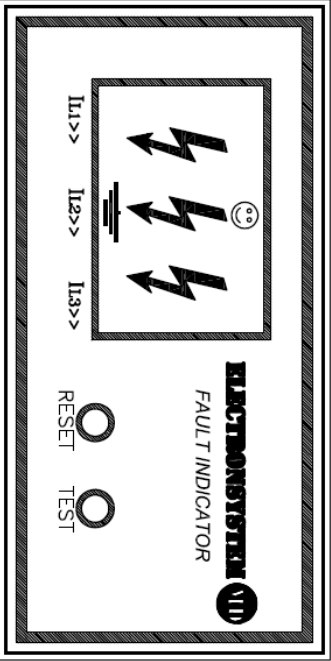
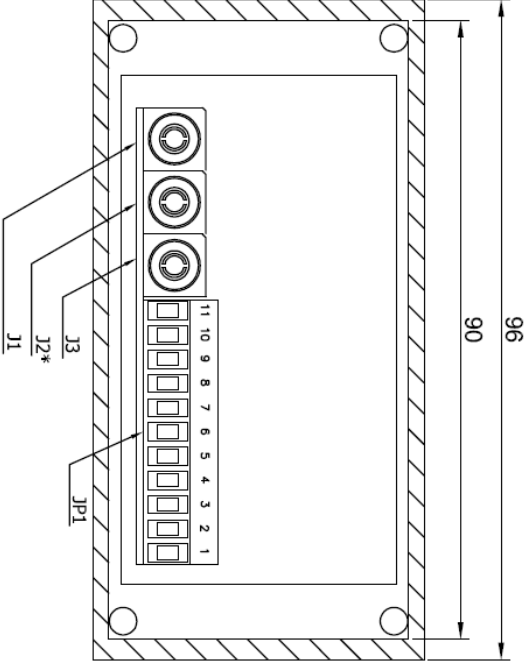
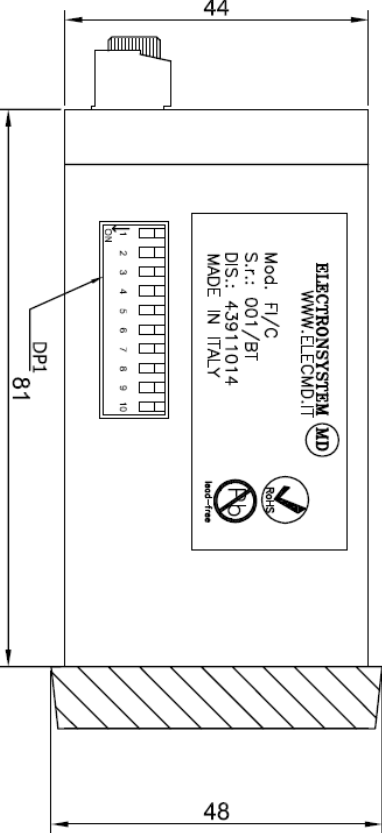
- control unit.....IP44
- current transformers sensors:.....IP67

(*)Must be defined with the order placement, other values can be chosen by special request

(**)Other values can be chosen by special request

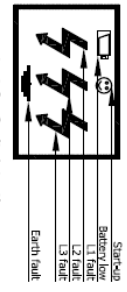
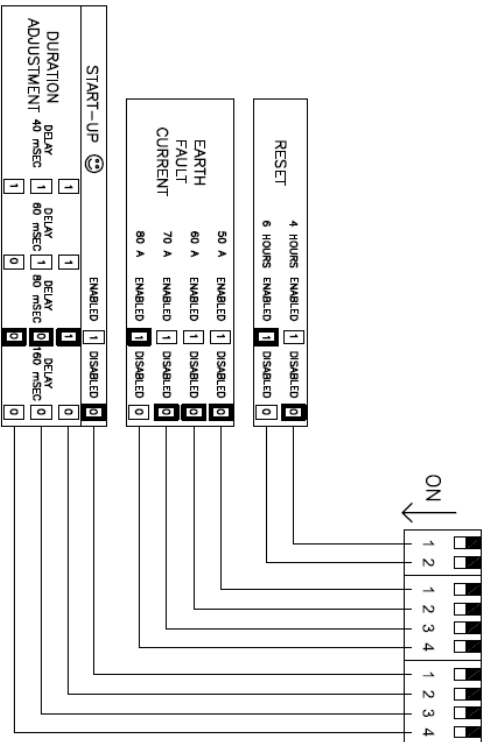
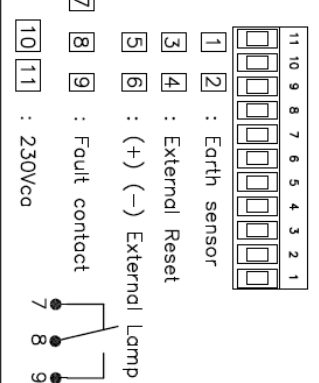
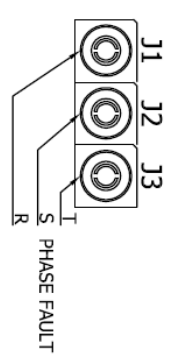
FAULT CIRCUIT INDICATORS

F/C rev.A 03.03.09

Rev./Mod	Data	Rev./Mod	Data	Rev./Mod	Data	Rev./Mod	Data	Rev./Mod	Data																										
Descrizione:		Descrizione:		Descrizione:		Descrizione:		Descrizione:																											
<p>*OPTIONAL</p> <p>Piano di Compimento (UNI 4842-75)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">LIVELLO</td> <td style="width: 50%;">LOA</td> </tr> <tr> <td>L2</td> <td>1</td> </tr> </table>		LIVELLO	LOA	L2	1							<p style="text-align: center;">SUITABLE FOR CABINET / PANEL MOUNTING ACCORDING TO DIN 43700</p>		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Fig.</td> <td style="width: 30%;">Material/Materiale</td> <td style="width: 30%;">N° Series / Serie</td> <td style="width: 10%;">Finishing / Finitura</td> </tr> <tr> <td>Filing Room Archivio</td> <td>Thread quality tolerance Tolleranza filetti: qualità "Bg-5S" UNI 5541-65</td> <td>General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:</td> <td>Extra-fine / Fine JS12 Medium / Media JS13 Coarse / Grossolana JS15</td> </tr> <tr> <td>Prep. G. FORLANI</td> <td>Resp. Dep. Uff. Resp.</td> <td>Uff. Tecnico</td> <td>Title Title FAULT INDICATOR F1/C</td> </tr> <tr> <td>App. P. GUIZZETTI</td> <td>Rev./Mod.</td> <td>0/23.02.2009 : Emissione nuovo disegno</td> <td>Appontatus Appreccchio Doc. No. 43911014</td> </tr> <tr> <td colspan="2" style="text-align: center;">ELECTRONSYSTEM MD S.r.l.</td> <td colspan="2" style="text-align: center;">Lang. Scale 1:1 SN No. 1/2</td> </tr> </table>		Fig.	Material/Materiale	N° Series / Serie	Finishing / Finitura	Filing Room Archivio	Thread quality tolerance Tolleranza filetti: qualità "Bg-5S" UNI 5541-65	General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:	Extra-fine / Fine JS12 Medium / Media JS13 Coarse / Grossolana JS15	Prep. G. FORLANI	Resp. Dep. Uff. Resp.	Uff. Tecnico	Title Title FAULT INDICATOR F1/C	App. P. GUIZZETTI	Rev./Mod.	0/23.02.2009 : Emissione nuovo disegno	Appontatus Appreccchio Doc. No. 43911014	ELECTRONSYSTEM MD S.r.l.		Lang. Scale 1:1 SN No. 1/2	
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FAULT CIRCUIT INDICATORS

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Rev./Mod	Data	Rev./Mod	Data	Rev./Mod	Data	Rev./Mod	Data				
Descrizione:		Descrizione:		Descrizione:		Descrizione:					
<p>TECHNICAL DATA</p> <ul style="list-style-type: none"> -Inputs: electrical earth sensor optical phase sensor remote contact for reset -Power: 230Vca aux Internal NiHn battery (replaceable) -LCD Indication:  <ul style="list-style-type: none"> -Outputs: 1 change over contact for fault detection power source for blinking lamp -Current transformer sensors: for phase fault, laminated plates coils with optical fiber cable 6m for earth fault, laminated plates coils with electrical cable 20m -Trip current: 200, 300, 400, 500, 600, 700, 800, 900, 1000A fixed for phase fault** 50, 60, 70, 80A selectable for earth fault** -Accuracy: +/- 15% -Pick up times (Impulse duration): 40, 60, 80, 160 msec -Reset: manual, automatic (4, 6hours) dry contact external reset 230Vca restoring reset -Temperature range: -30°C + 60°C -Mounting: on cabinet or panel according to DIN 43700 <p>RELAY FEATURE</p> <ul style="list-style-type: none"> -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 <p>(*) Must be defined with the order placement, other values can be chosen by special request (**) Other values can be chosen by special request</p>		<p>DIP-SWITCH SELECTION DP1:</p> 		<p>CONNECTOR JP1:</p> 		<p>OPTICAL INPUT:</p>  <p>ORDERING CODE: Code : FI/C</p> <p>NOTE: - Default dip-switch configuration is marked by bold square</p>					
<p>Piano di Compiimento (UNI 4842-75)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>LIVELLO</td> <td>LOA</td> </tr> <tr> <td>L2</td> <td>1</td> </tr> </table>		LIVELLO	LOA	L2	1	<p>We reserve all rights in this document and in the information contained therein. Reproduction, use or disclosure to third parties without express authority is strictly forbidden.</p> <p>Ci riserviamo tutti i diritti connessi con il presente documento e con l'oggetto o la materia ivi rappresentati con divieto di riproduzione, utilizzo o rendelo accessibile a terzi in assenza di previa autorizzazione.</p>		<p>Fig. _____</p> <p>Filing Room Archivio</p> <p>Thread quality tolerance Tolleranza filetti: qualità *Eg-55* UNI 5541-65</p> <p>General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:</p> <p>Coord. punching N.C. mach. Coord. punzon. a C.N. JS11</p> <p>Prep. G. FORLANI</p> <p>Resp. Dep. Uff. Resp. Uff. Tecnico</p> <p>App. P. GUIZZETTI</p> <p>Rev./Mod. 0 23.02.2009 : Emissione nuovo disegno</p> <p>ELECTRONSYSTEM MD S.r.l.</p> <p>Title Title FAULT INDICATOR FI/C</p> <p>Appartus Apparecchio Dec. No. 43911014</p> <p>Lang. Lingua Scale Scale 1:1 Sp. No. Sp. No. 2/2</p>		<p>N° Series / Serie</p> <p>Finishing / Finitura</p> <p>Extra-fine / Fine Medion / Media Coarse / Grossolana</p> <p>JS12 JS13 JS15</p>	
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FAULT CIRCUIT INDICATORS

F/C rev.A 03.03.09

Rev./Mod A Data 23.02.2009 Descrizione: GENERAL MODIFICATIONS	Rev./Mod B Data 03.03.2009 Descrizione: GENERAL MODIFICATION	Rev./Mod Data Descrizione:	Rev./Mod Data Descrizione:	Rev./Mod Data Descrizione:	Rev./Mod Data Descrizione:
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ORDERING CODE:
TA/PO

NOTE:
-SUITABLE FOR CABLE WITH MAX DIAMETER OF 52 mm
-OPTICAL FIBER LENGHT = 6 mt

PIANO di Campionamento (UNI 4842-75) LIVELLO L2	LQA 1	We reserve all rights in this document and in the information contained therein. Reproduction, use or disclosure to third parties without express authority is strictly forbidden. Ci riserviamo tutti i diritti connessi con il presente documento e con l'oggetto o la materia ivi rappresentati con divieto di riproduzione, utilizzo o renderlo accessibile a terzi in assenza di previa autorizzazione.
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Fig. _____ Filing Room Archivio Thread quality tolerance Tolleranza filetti: qualità "9g-5S" UNI 5541-65 General tolerance for machining / Tolleranze generali per lavorazioni meccaniche: Coord. Punching N.C. mach. JS12 Coord. punzon. a C.N. JS13 JS11 JS15	Material/Materiale N° Series / Serie Finishing / Finitura	Prep. G. FORLANI App. P. GUIZZETTI Resp. Dep. Uff. Tecnico Title TA/PO	Quality for linear dimension Qualità per quote lineari Dec. No. 43911011 Appointus Approvecchio N° Doc. 1/1
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Electronsystem MD S.r.l.

Scale 1:1
SN No. 1/1

FAULT CIRCUIT INDICATORS

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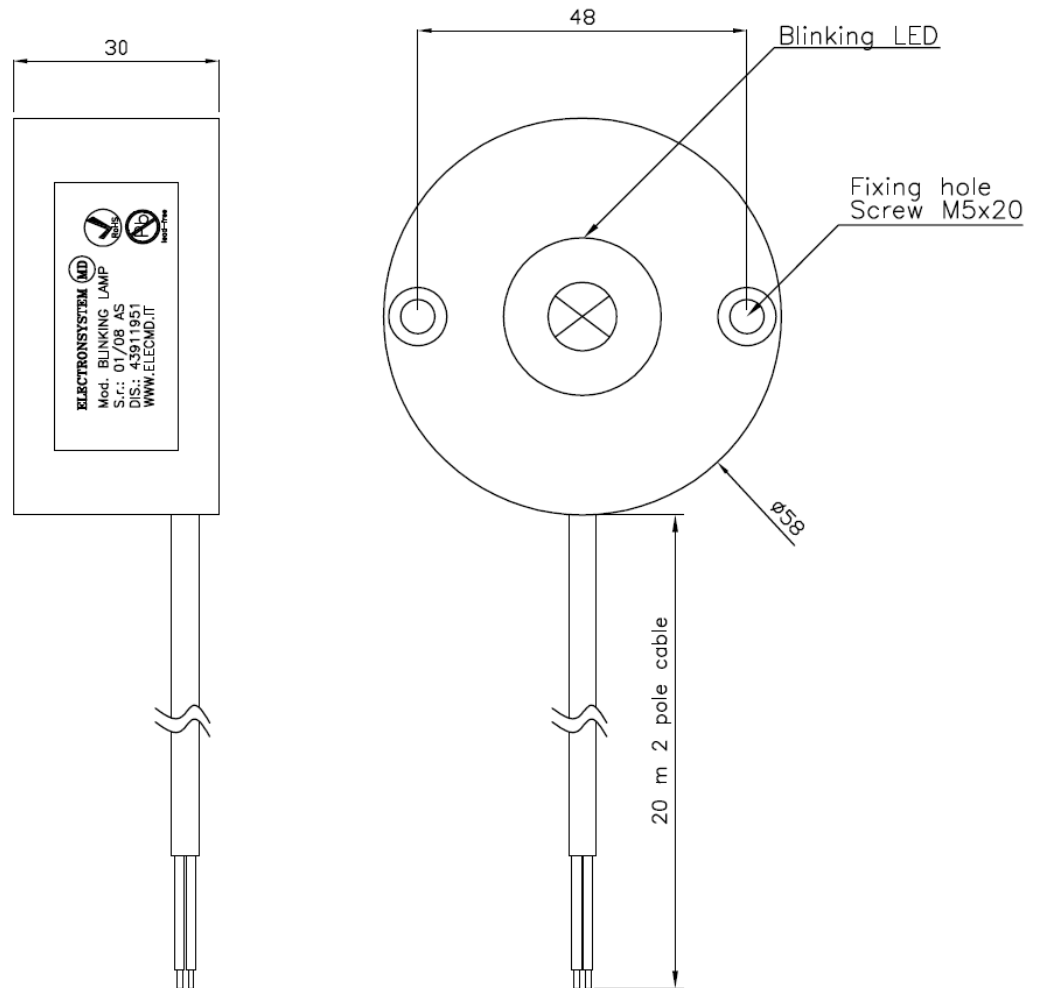
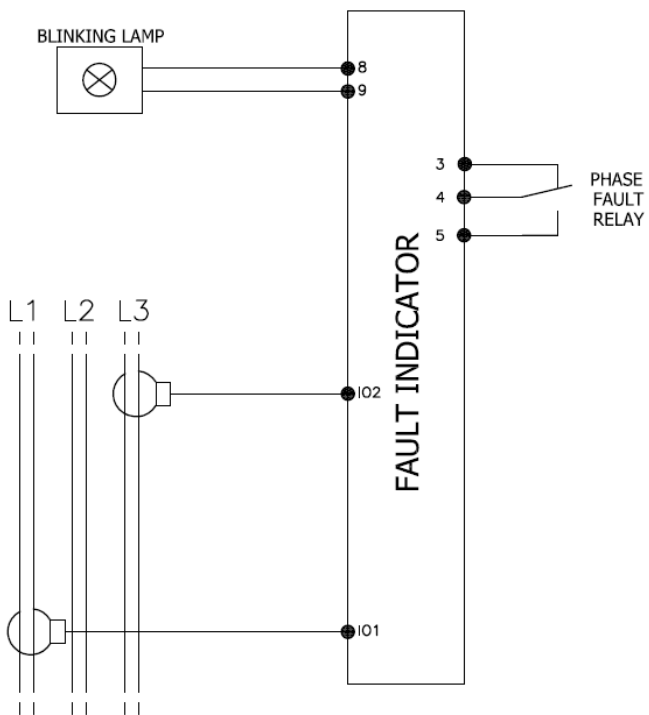


Fig.	Material/Materiale	N° Series / Serie	Finishing / Finitura						
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Prep. Dis. G. FORLANI	Resp. Dep. Uff. Resp.	Title Titolo							
App. P. GUIZZETTI	Uff. Tecnico	BLINKING LAMP							
Rev./Mod	0 23.01.2008 : Emissione nuovo disegno	Apparatus Apparecchio	Scale Scala						
ELECTRONSYSTEM MD S.r.l.		Doc. No. N° Doc.	Sh.No. N° Pag. 1/1						
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APPLICATION EXAMPLE

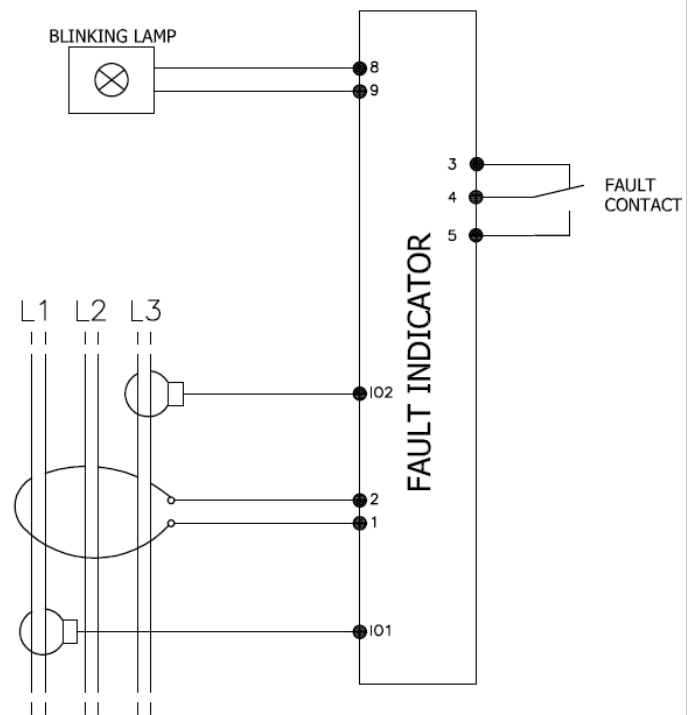
PHASE TO PHASE FAULT

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

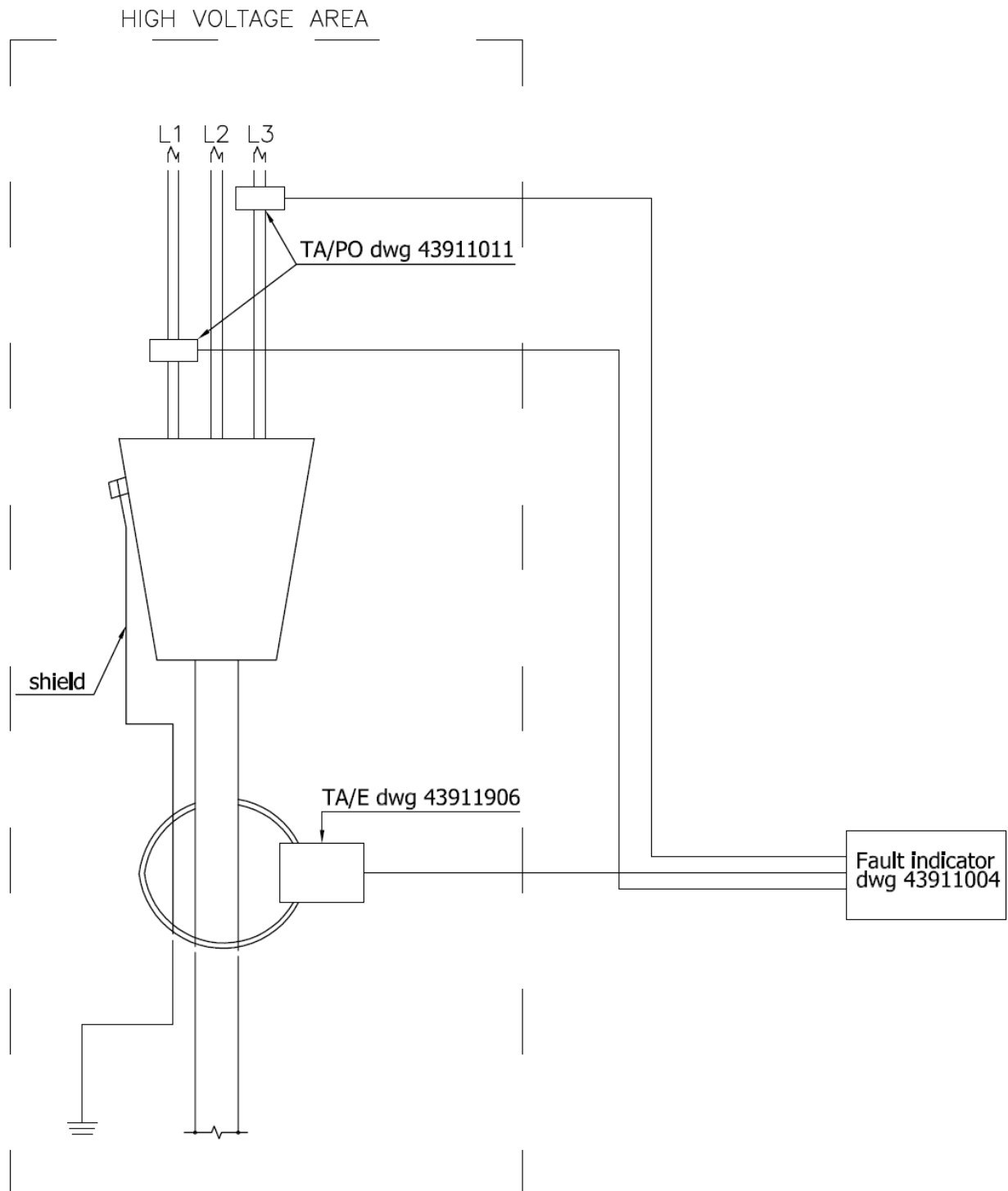


PHASE TO PHASE FAULT + EARTH FAULT

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

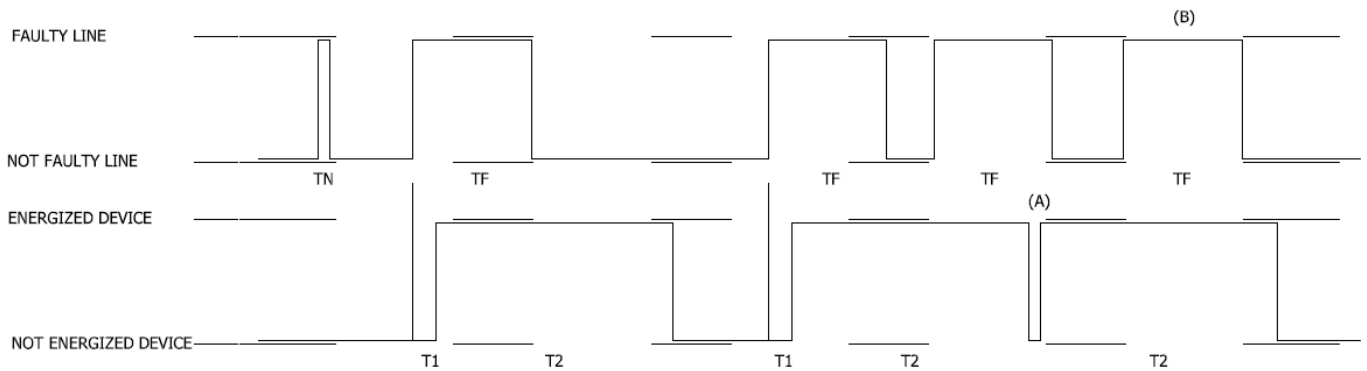


INSTALLATION EXAMPLE



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

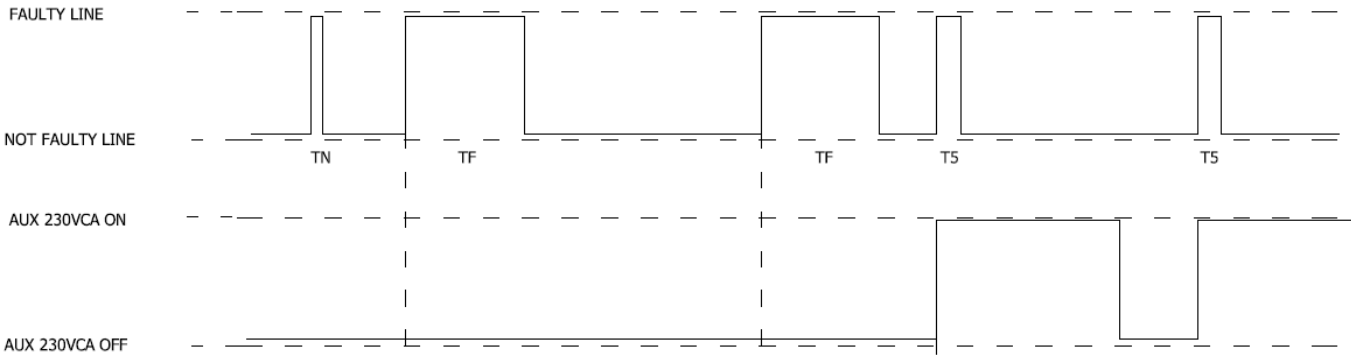
T1: FILTER DURATION SET BY DIP-SWITCH

T2: AUTOMATIC RESET DURATION SET BY DIP-SWITCH

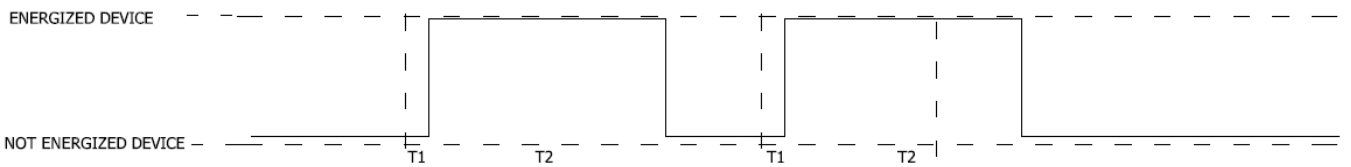
(A) IN CASE OF RESET WITH STILL FAULTY LINE THE DEVICE ENERGIZES AGAIN

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

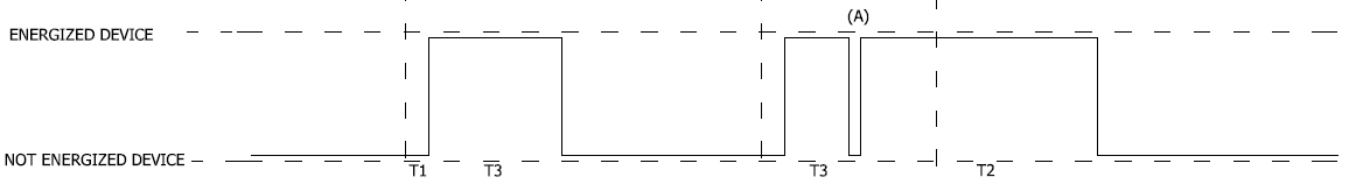
OPERATING RESET DIAGRAMS



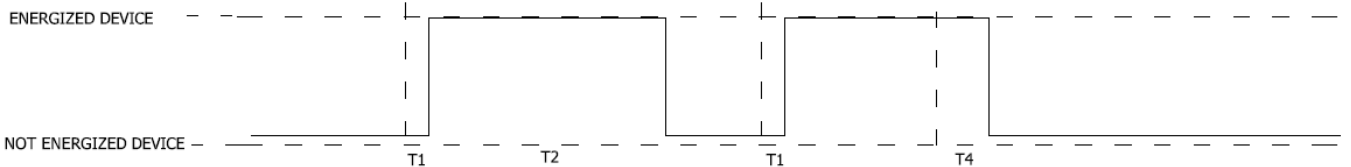
(1) AUTOMATIC RESET



(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
- (A) IN CASE OF RESET WITH STILL FAULTY LINE THE DEVICE ENERGIZES AGAIN

MAINTENANCE SPECIFICATIONS

KIT ASSEMBLIES

FOR PHASE TO PHASE FAULT & EARTH FAULTS:

Nº1 F/C DWG. 43911014

Nº2 TA/PO DWG. 43911011

Nº1 TA/E DWG. 43911906

Nº1 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: $-20^{\circ}\text{C} \div +70^{\circ}\text{C}$

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)