



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 230-240Vca 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.

EFI/P

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

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.

FAULT CIRCUIT INDICATORS

EFI/P rev.0 14.07.09

Material and dimensions

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

Relè data

RELAY features

Contacts Material :.....Ag-Gold plated
Nominal Value :.....0.5A 125VAC (cosφ=1.0)
:.....1A 30VDC
Max changeover current :.....1 A
Max changeover voltage :.....125 VCA, 110VDC
Electric live :.....1A/30 VDC cosφ1 2×10^5 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

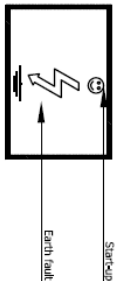
Technical Data

Inputs :..... earth current transformer
AUX power:..... powered by 230-240Vca
:.....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, 60, 80, 120A 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

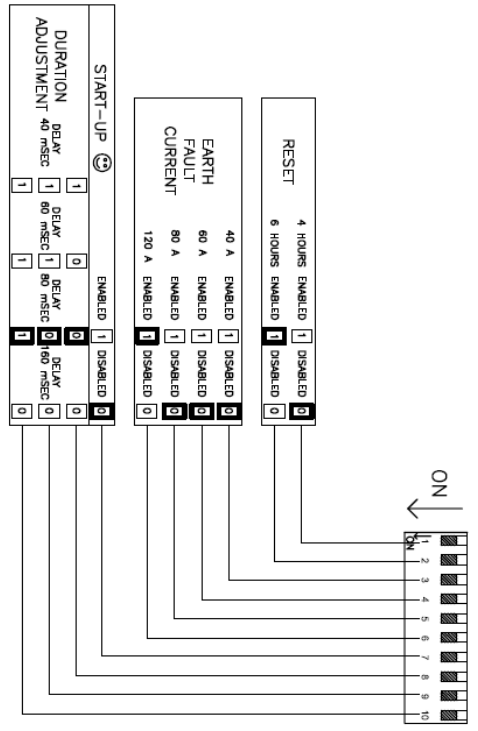
(**)Other values can be chosen by special request

FAULT CIRCUIT INDICATORS

EFI/P rev.0 14.07.09

Rev./Mod	Data	Rev./Mod	Data	Rev./Mod	Data	Rev./Mod	Data				
Descrizione:		Descrizione:		Descrizione:		Descrizione:					
TECHNICAL DATA											
<ul style="list-style-type: none"> -Inputs: electrical earth sensor remote contact for reset -Power: 230Vac 240Vac aux Internal 110n 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 earth fault, laminated plates coils with electrical cable 20m -Trip current: 40, 60, 80, 120A selectable for earth fault** -Accuracy: +/- 10% -Pick up times (Impulse duration): 40, 60, 80, 160 msec -Reset: manual, automatic (4, 6hours) dry contact external reset AUX restoring reset -Temperature range: -30°C + 60°C -Protection class: din rail mounted instrument 1P54 											
RELAY FEATURE											
<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 10⁴ cycles -Mechanical life: 1 x 10⁶ 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											
<p>Piano di Compiimento (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 style="text-align: center;">L2</td> <td style="text-align: center;">1</td> </tr> </table>								LIVELLO	LOA	L2	1
LIVELLO	LOA										
L2	1										
<p style="font-size: small;">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.</p>											
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DIP-SWITCH SELECTION DP1:



CONNECTORS

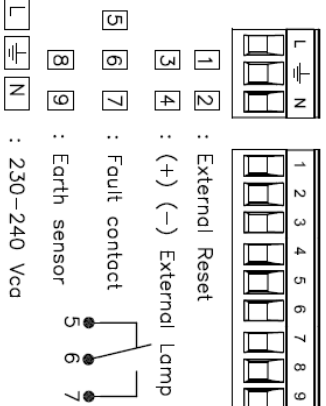


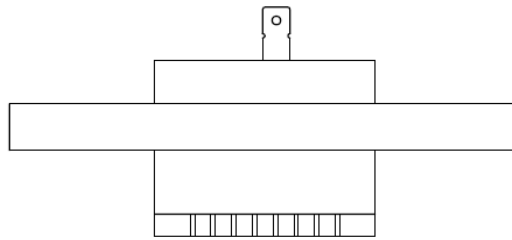
Fig.	Material/Materiale	N° Series / Serie	Finishing / Finitura
Filing Room	Thread quality tolerance Tolleranza filetti: qualità *Eg-5S* UNI 5541-65	General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:	JS12 JS13 JS15
Archivio	Coord. punzon. o C.N. JS11	Quality for linear dimension Qualità per quote lineari:	JS12 JS13 JS15
Prep. G. FORLANI	Resp. Dep. Uff. Resp.	Title EARTH FAULT INDICATOR	Lang. Lingua
App. P. GUIZZETTI	Uff. Tecnico	EFI/P	Scale 1:1
Rev./Mod.	0 14.07.2009 : Emissione nuovo disegno	Appartus Approvato	Scale 2/2
ELECTRONSYSTEM MD S.r.l.		Doc. No.	43911034
		N° Doc.	

FAULT CIRCUIT INDICATORS

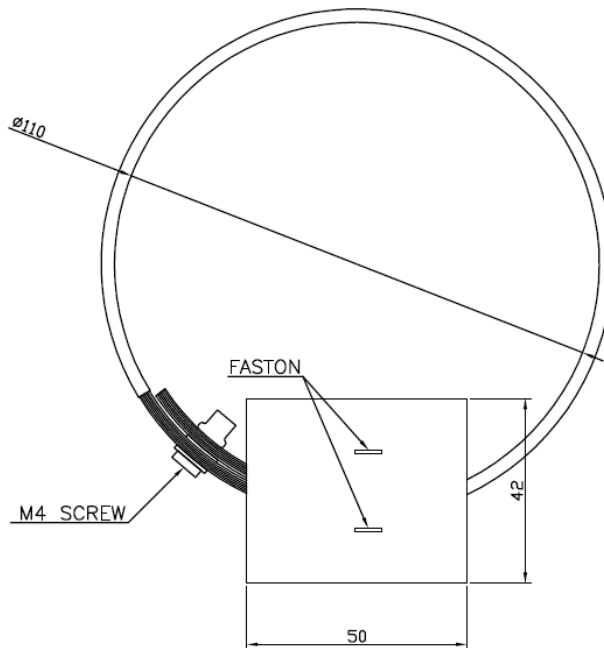
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TA CABLE DWG 43922270



double PVC 2x1mm²

ORDERING CODE:

TA/E/

length of cable in mm

—SUITABLE FOR CABLE WITH MAX DIAMETER OF 110 mm

LYNER PVC CON BIADESIVO									
Fig.	Material/Materiale	N° Series / Serie	Finishing / Finitura						
Filing Room Archivio	Thread quality tolerance Tolleranza filetti qualita' "6g-6S" UNI 5541-65	General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:							
		Coord.Punching N.C. mach. Coord. punzon. a C.N. JS11	Quality for linear dimension Qualita' per quote lineari						
			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Extra fine / Fine</td> <td style="text-align: center;">JS12</td> </tr> <tr> <td style="text-align: center;">Median / Media</td> <td style="text-align: center;">JS13</td> </tr> <tr> <td style="text-align: center;">Coarse / Grossolano</td> <td style="text-align: center;">JS15</td> </tr> </table>	Extra fine / Fine	JS12	Median / Media	JS13	Coarse / Grossolano	JS15
Extra fine / Fine	JS12								
Median / Media	JS13								
Coarse / Grossolano	JS15								
Prep. Dis. G. FORLANI	Resp. Dep. Off. Resp.	Off. Tecnico	Title Titolo TA/E						
App. P. GUIZZETTI			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Lang. Lingua</td> </tr> </table>	Lang. Lingua					
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Rev./Mod	0 05.03.2008 : Emissione nuovo disegno		Apparatus Apparecchio						
ELECTRONSYSTEM MD S.r.l.		Doc. No. N° Doc.	43911906						
			Scale Scala						
			Sh.No. N° Pag. 1/1						

FAULT CIRCUIT INDICATORS

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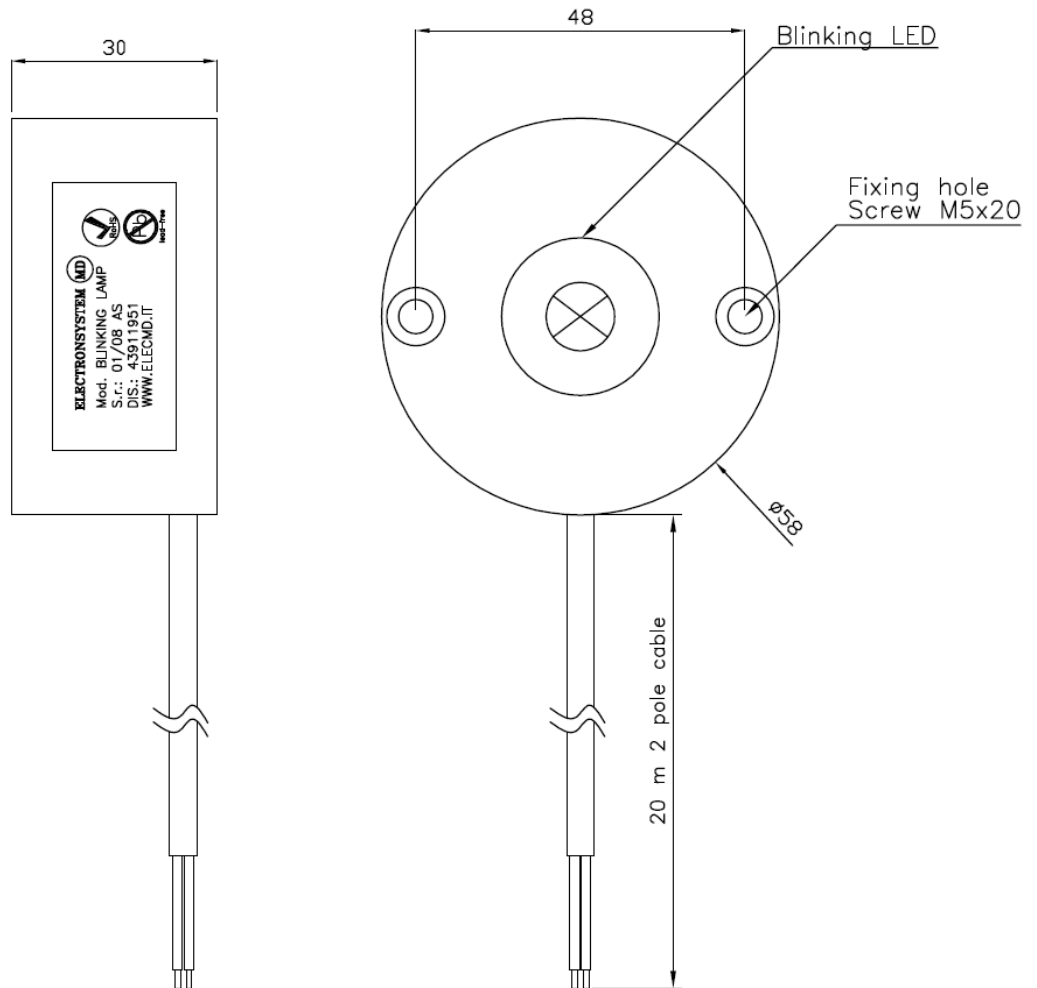
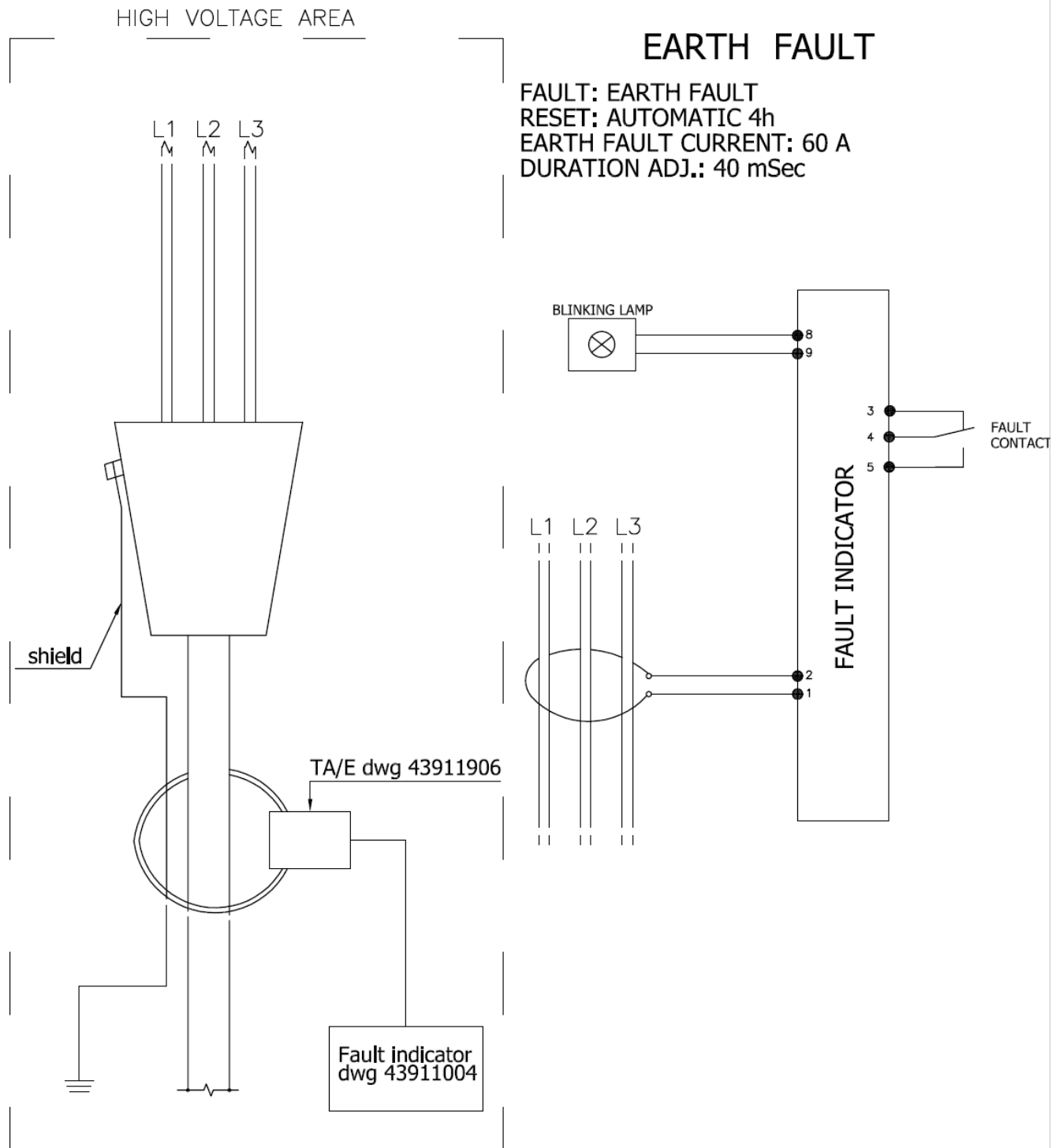


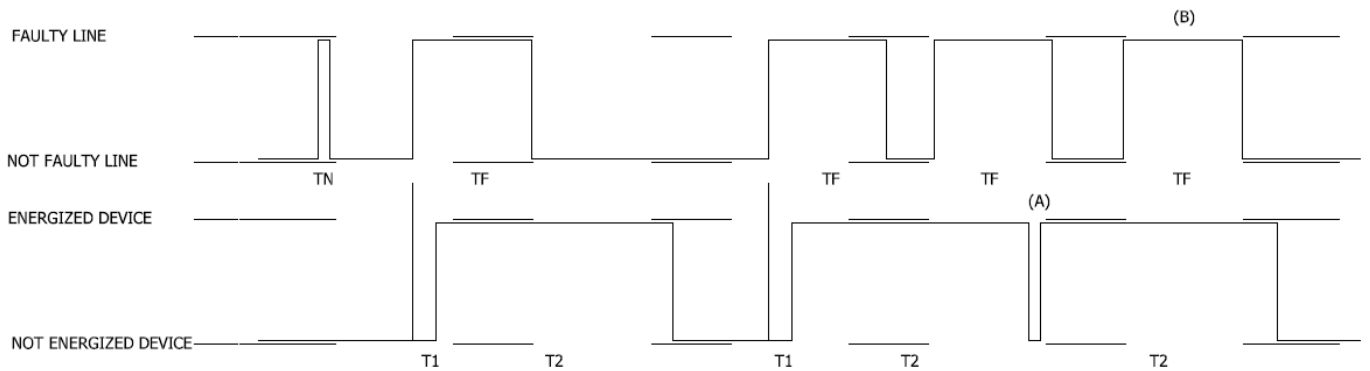
Fig.	Material/Materiale	N° Series / Serie	Finishing / Finitura						
Filing Room Archivio	Thread quality tolerance Tolleranza filetti qualita' "6g-6S" UNI 5541-65	General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:							
		Coord.Punching N.C. mach. Coord. punzon. a C.N. JS11	Quality for linear dimension Qualita' per quote lineari						
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Extra fine / Fine	JS12								
Median / Media	JS13								
Coarse / Grossolone	JS15								
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.	43911951						
			Sh.No. N° Pag. 1/1						

INSTALLATION EXAMPLE



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 DIAGRAMS WITH FAULTY LINE



COMMENTS:

TN: NOISE DURATION <T1

TF: FAULT DURATION

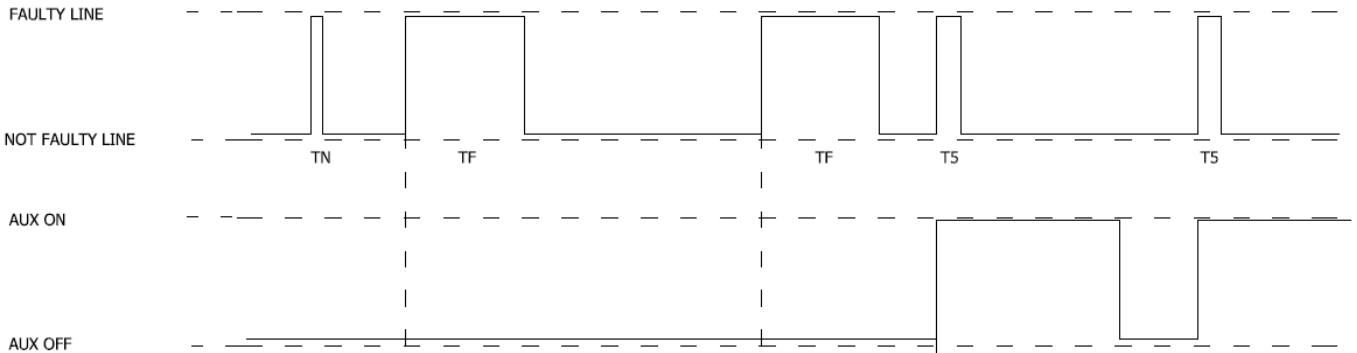
T1: FILTER DURATION SET BY DIP-SWITCH

T2: AUTOMATIC RESET DURATION SET BY DIP-SWITCH

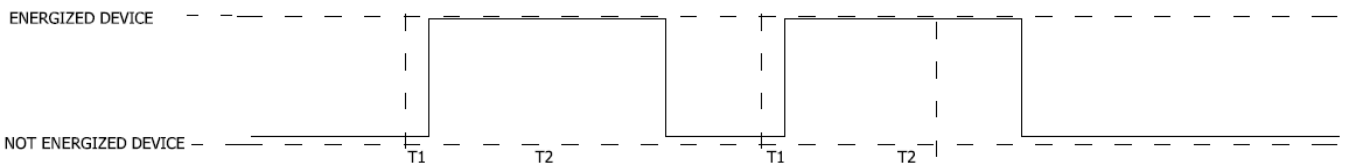
(A) IN CASE OF RESET WITH STILL FAULTY LINE THE DEVICE ENERGIZES AGAIN

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

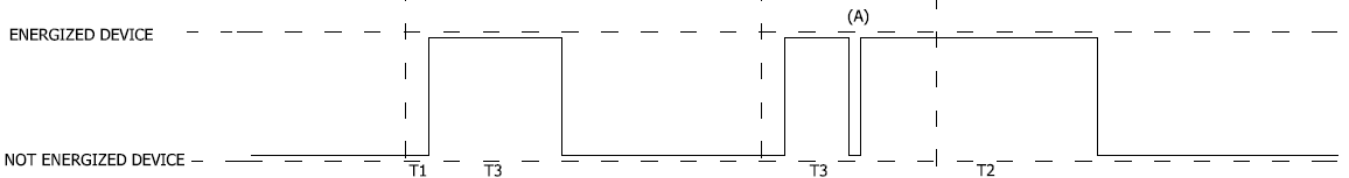
OPERATING RESET DIAGRAMS



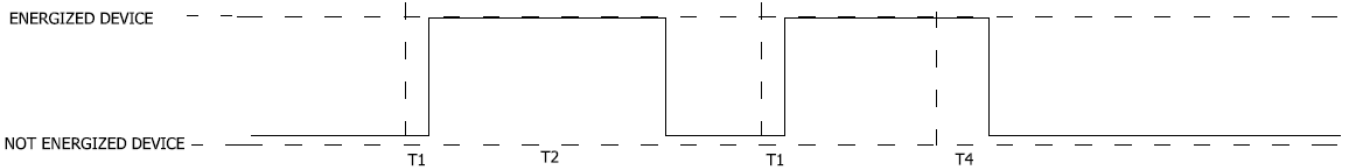
(1) AUTOMATIC RESET



(2) MANUAL/EXTERNAL RESET



(3) AUX RESTORING



COMMENTS:

- TN: NOISE DURATION <math>< T1</math>
- 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 AUX RESTORING; ABOUT 5s
- T5: INRUSH CURRENT AFTER AUX RESTORING <math>< T4</math>
- (A) IN CASE OF RESET WITH STILL FAULTY LINE THE DEVICE ENERGIZES AGAIN

MAINTENANCE SPECIFICATIONS

KIT ASSEMBLIES

Nº EFI/P DWG. 43911034
Nº TA/E DWG. 43911906
Nº 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: $-30^{\circ}\text{C} \div +70^{\circ}\text{C}$

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: 2200mAh

NOMINAL VOLTAGE: 3,6 Vdc

STANDARD DISCHARGE CURRENT: 2mA

MAXIMUM CONTINUOUS CURRENT: 100mA

MAXIMUM PULSE CURRENT: 200mA

OPERATING TEMPERATURE RANGE: $-30^{\circ}\text{C} \div +85^{\circ}\text{C}$

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