FAULT CIRCUIT INDICATORS

EFI/W/L

Highlights

- **Earth fault passage indicator combined**
- **Designed to be installed on MV cables up to 33kV**
- **Local earth fault signalling by means of flashing LED**
- **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**
- **IP65 box and resin filled CT**
- **Remote indication by change-over contact for fault condition (option)**
- **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 (option)**

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 LED indicator 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 (10 years is the estimated life time).
A diagnostic test can be performed locally by pressing a push-button. Reset con 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 flag indicator 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. 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.

** Picture indicated is only a draft

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 flag indicator.
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)
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 CIRCUIT INDICATORS

EFI/W/L rev.B 29 July 2020

Material and dimensions

Box :..... polycarbonate
Mounting:……..……wall mounting
Dimensions :.....wxdxh=94x130x57mm
- other dimensions available

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 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:…….....50ms
Reset after 230Vca restoring:……..…….20s

Option

SCADA output:……..…dry contact for remote signalling
Blinking lamp:…….waterproof lamp for remote indication

Technical Data

Inputs :..... earth current transformer
AUX power:…….. powered by 230-240Vca
……internal 3,6V 1/2AA li-ion battery (replaceable)
……duration 10 years, 2500 flashing hours
Power consumption:……<20uA (stand-by mode)
Trip indication……..LED
Outputs
- earth fault: 1 change over contact (option)
- source for external blinking lamp (option)

Threshold fault current:
- earth fault:……50A **
Accuracy:……..……+/- 20%
Test:……..manual test on front panel
Reset : ……..……manual, automatic (2 hours**)
……..dry contact external reset
……..AUX restoring reset
Temperature range :..... -20°C ÷ 55°C
Protection class
- control unit……IP65
- current transformers sensors:……...IP65

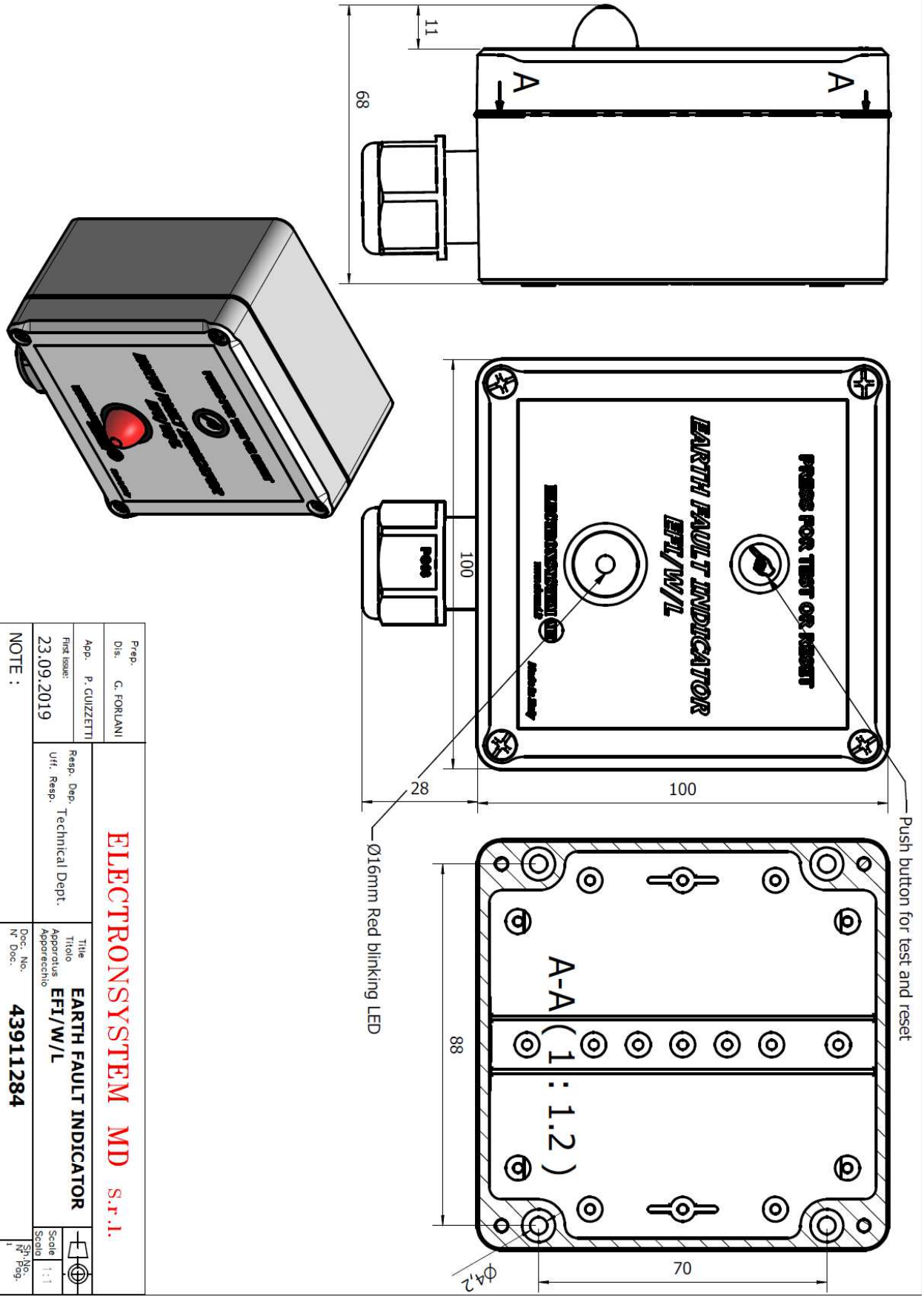
(**)Other values can be chosen by special request
Factory calibrated

CT

Type :.....ring type split core transformer
Mounting:……metallic screw tie cable mounting
Dimensions :…….suitable for cable up to 110mm diam.
Protection:……...IP65 resin filled two halves
Cable :……...5m 2x1sqmm PVC cable

FAULT CIRCUIT INDICATORS

Rev./Mod	Data	Descrizione
A	12.06.2020	General modification



Prep. Dis. G. FORLANI			
App. P. GUIZZETTI			
First issue: 23.09.2019	Resp. Dep. Uff. Resp. Technical Dept.	Title Titolo Apparatus Apparecchio	EARTH FAULT INDICATOR EFI/W/L
NOTE :		Doc. No. N° Doc.	43911284
		Scale Scala	1:1
		Sh. No. N. Pag.	1

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FAULT CIRCUIT INDICATORS

TECHNICAL DATA

-Earth fault trip Current Factory default: 50A ±20% (current value can be customer defined).
-Min. Fault Duration (Delay) Factory default: 50ms ±20ms (time value can be customer defined). See S2 dip-switch

CBCT Current Transformer (dwg 43911285)
-Resin, split in 2 halves tied by metallic screw tie.
-Internal standard diameter 110mm - option 150mm.
-Device link with CBCT 5m 2x1sqmm PVC cable (custom lengths on request).

Visual Fault Signalling
-Flashing red LED, ultra bright flash at 1 flash per second.
-Visibility in excess of 5m.

Power Supply
-Self-powered by internal lithium battery 3,6V - ½ AA type (remove the plastic seal before use).
-10 years lifetime with over 2500 hours flashing time.
-Battery can be easily replaced with lithium 3,6V - ½ AA standard type (no soldering or tools required).

Reset modes
(All features present)
- Automatic after time delay, factory default: 2hrs ± 5min (time value can be customer defined).
-When the 230 Vac mains voltage is restored (link cable not provided).
-By the pushbutton placed on the cover.

Device Test By the pushbutton placed on the cover.

Device Enclosure IP65 Polycarbonate
Ambient temperature -20 to +55 deg C.
Impact resistance conform to IK07
Max short time current 400A 100ms

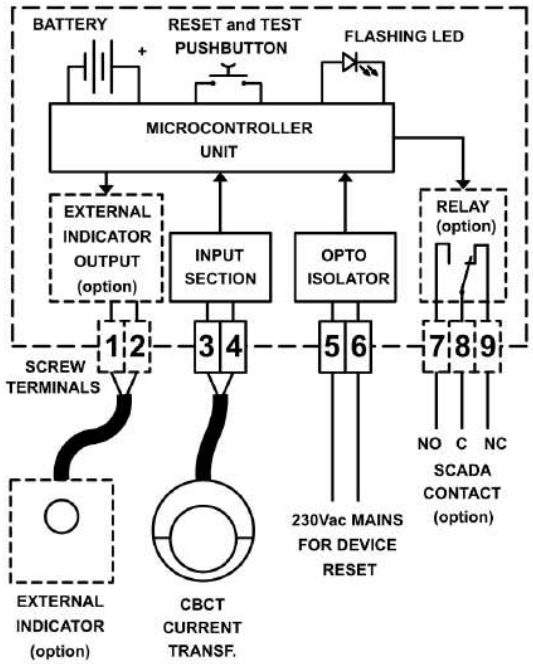
OPTION: Remote Fault Signalling (SCADA relay)
NO+NC changeover SCADA relay contact - Signalling time (pulse): 500ms.
Contact ratings: 1A max, 230Vac, 30W max (OPTION: permanent contact)

OPTION: External indicator output
Screw terminal outputs to drive the external flashing indicator.

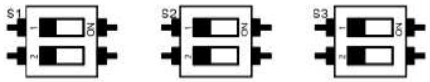
OPTION: S2 inrush current filter for trip

OPTION: S3 reset time delay

SCHEMATIC DIAGRAM



DIP-SWITCH CONFIGURATION



S1 Trip current		
1	2	I
Off	Off	25A
On	Off	50A
Off	On	75A
On	On	100A

S2 Inrush filter*		
1	2	Inrush filter
Off	Off	40ms
On	Off	80ms
Off	On	120ms
On	On	160ms

S3 Reset*		
1	2	Timeout reset
Off	Off	∞
On	Off	2 Hrs
Off	On	4 Hrs
On	On	8 Hrs

NOTE
To update the configuration press Test and then Reset
* Optional

Ordering code:

EFI / W / L / _ _ _

- 0/1 with scada relay option
- 0/1 with S2+S3 option
- 0/1 with external indicator terminal

Rev./Mod	Data	Descrizione:
A	12.06.2020	General modification

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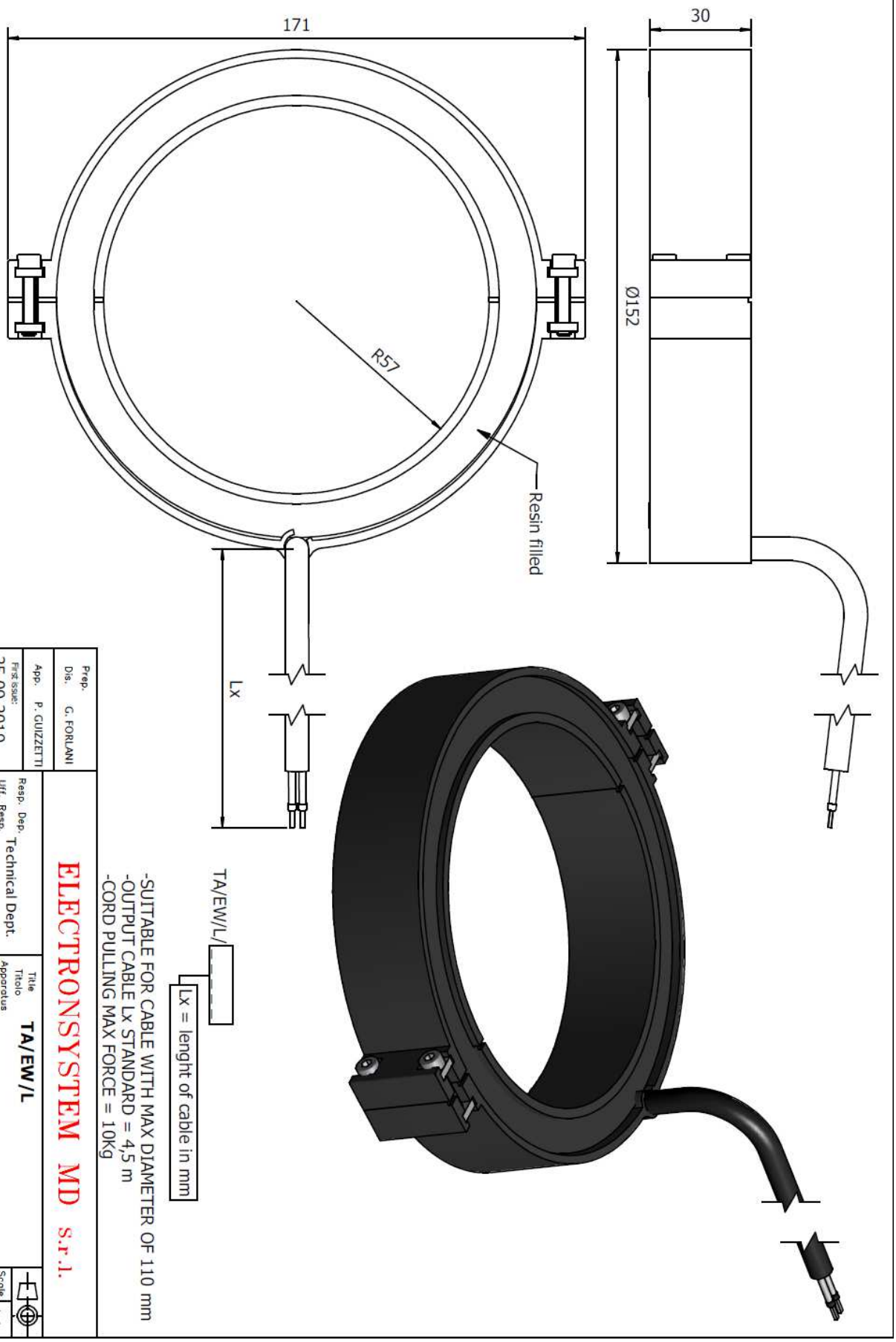

-SUITABLE FOR CABLE WITH MAX DIAMETER OF 110 mm
-OUTPUT CABLE Lx STANDARD = 4,5 m
-CORD PULLING MAX FORCE = 10Kg

NOTE :

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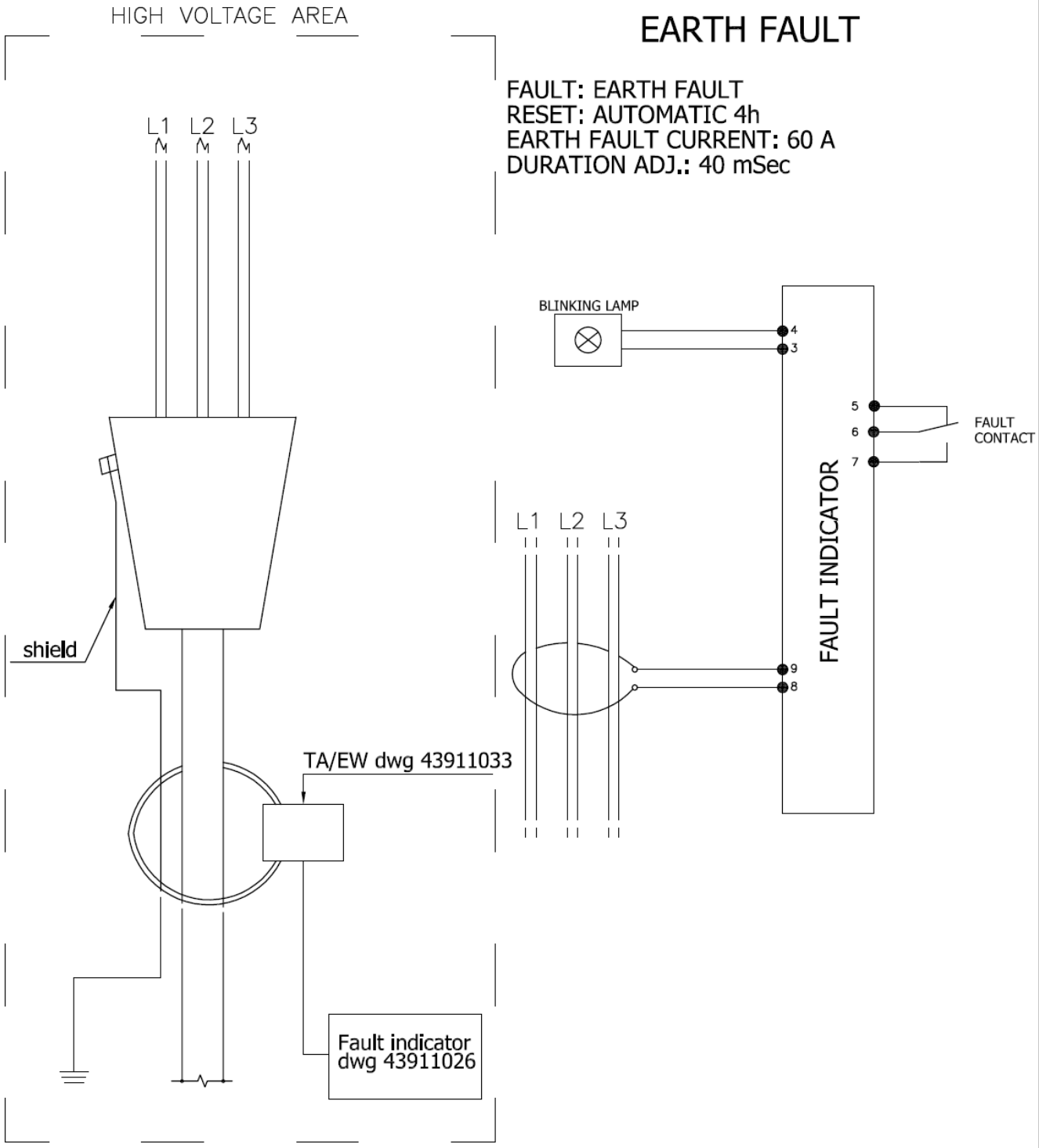
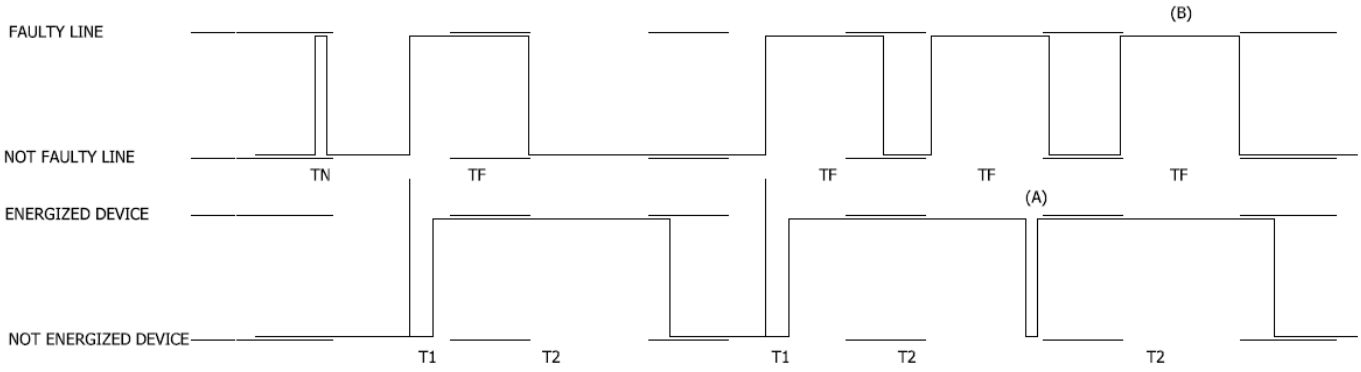
INSTALLATION EXAMPLE



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.

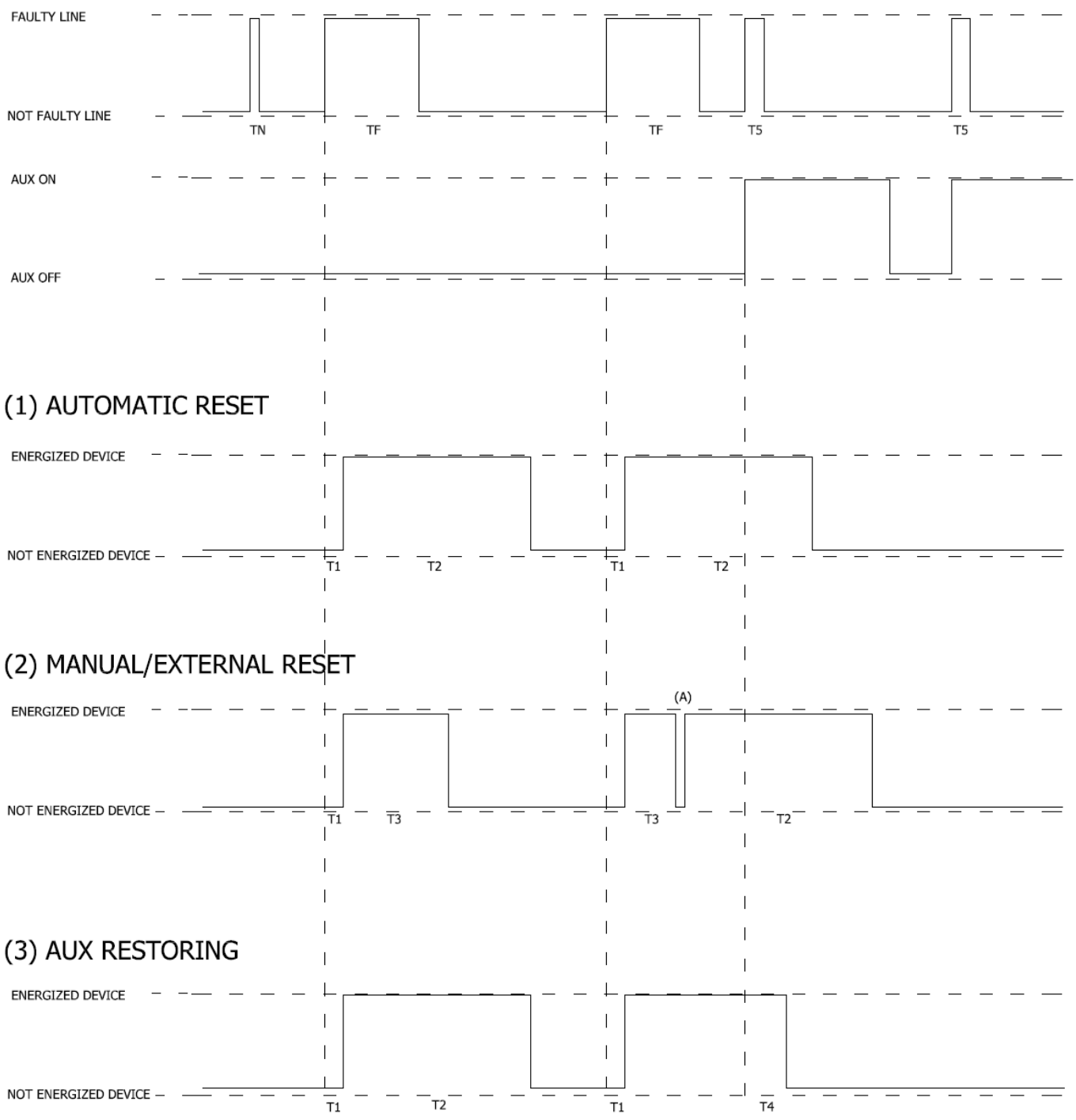
OPERATING DIAGRAMS WITH FAULTY LINE



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



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 AUX RESTORING: ABOUT 5s
T5: INRUSH CURRENT AFTER AUX RESTORING <T4
(A) IN CASE OF RESET WITH STILL FAULTY LINE THE DEVICE ENERGIZES AGAIN