

# IRI-Pro-V2

Over-Current, Short-Circuit and Earth Fault Relay



**C&S Electric Limited**  
(Protection & Control Division)

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## 1. Characteristics and Features

- Microcontroller based Numeric Relay
  - Digital filtering of the measured values to suppress the high frequency harmonics and transient dc components during short circuit.
- Selectable protective functions between: definite time over-current relay and inverse time over-current relay.
- Selectable inverse time characteristics according to BS142 and IEC 255-4:
  - Normal inverse 3.0
  - Normal inverse 1.3
  - Normal inverse 0.6
  - Very inverse
  - Extremely inverse
- Two stage over-current time protection for phase current / earth fault current.
- Separately selectable characteristic for Earth fault and phase fault.
- Continuous self-supervision of software and hardware.
- Wide operating ranges of the supply voltage [AC/DC] 24V-260V AC / 24V-360V DC
- Last five faults recording with real time stamping (Date & time).
- Relay assignment configurable from HMI.
- Relay reset configurable from HMI.
- Primay current display with CT Ratio.
- Front USB interface for PC/Laptop.

## 2. Design

### 2.1 Front Panel

The front panel of the protective device IRI-PRO comprises the following operational and indication elements:

- 1 LCD-Liquid Crystal Display (16 x 2)
- Five keypads-for parameter setting
- 8 LEDs for annunciation

### 2.2 LEDs

On the front panel there are 8 LEDs. Their functions are indicated by the appropriate inscriptions. On fault I>, I>>, Ie> & Ie>> LEDs with appropriate phase lamps L1/ L2 / L3 give the fault indication. Flashing of the green LED marked ON gives the indication of healthiness of relay in terms of watchdog.

### 2.3. Output Contacts

Relay 3 is fixed for CB tripping, common for all type of faults. Relay1and Relay2 are user configurable for annunciations like OL / SC /E /EH /Self supervision. Reset function of all output contacts is individually programmable [Auto Reset / Manual Reset] from HMI. RESET DELAY is available with all output contacts but get disable in Manual Reset mode.

## 2.4 Power Supply

It has a universal auxiliary supply. The voltage range is 24V to 260VAC and 24V to 360VDC. Power supply connections are not polarized.

## 3. Fault Recording

IRI-PRO records secondary current for last five faults with real time stamp. It saves following information with CT current in non-volatile memory in following sequence.

Type of fault	:	SC / OL / E/EH
Faulty phase / Earth	:	L1 / L2 / L3 / E (secondary)
Value at Fault	:	L1, L2, L3, Ie Amps

(True RMS recording guaranteed only if trip time >= 40msec)

## 4. Reset Delay

This parameter [RST-D] introduces a delay in opening of relay contacts, when the current goes below the dropout value for overload and short circuit & earth faults. This parameter will not work when manual reset mode is selected.

## 5. Housing

The IRI-PRO is supplied in an individual housing for flush-mounting for installation in a DIN standard of 73 x 135 mm.

## 6. Communication

Front USB port is available on IRI\_PRO relay to provides a local communication with PC. The front end software provided for relay is fully Windows compatible.

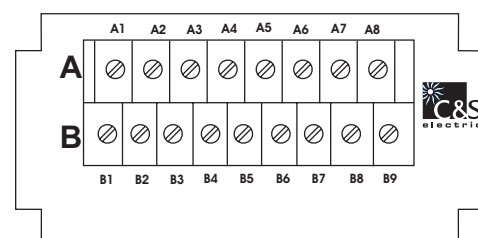
The front end software of IRI\_PRO relays has following functions:

- To edit the parameters of relay
- To view the running parameters of relay.
- To download the last faults of relay
- Simulation Injection source to test the complete functionality of all protections of relay without using any three phase injection current source

**Note : For USB communication, no power is required to energie the relay.**

## 7. Terminal Description

There are two terminal blocks A & B. Block A is for current connection while Block B is for Auxiliary & trip contact connection as per below table.



Terminal No	Description
<b>A</b>	
A1	L1 Current Transformer Phase
A2	L1 Current Transformer Neutral
A3	L2 Current Transformer Phase
A4	L2 Current Transformer Neutral
A5	L3 Current Transformer Phase
A6	L3 Current Transformer Neutral
A7	Earth CT1
A8	Earth CT2
<b>B</b>	
B1	Relay-1 NO
B2	Relay-1 COMM
B3	Relay-2 NO
B4	Relay-2 COMM
B5	Relay-3 NO
B6	Relay-3 COMM
B7	Auxiliary Supply Line (Non polar)
B8	Auxiliary Supply Line (Non polar)
B9	Earth

### 8. Trip Test

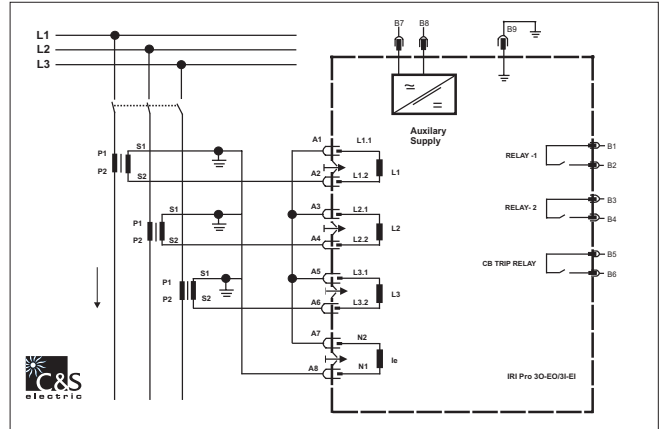
This feature allows the user to check contact operation. TRIP test can be used while commissioning the relay to see the operation of contacts of IRI-PRO. It is selectable from front LCD menu and becomes active only when currents are below all pickup levels and trip levels. Selecting trip test, gives the momentary operation of all three available contacts in IRI-PRO one by one with LED flashing indications.

### 9. Contact Details

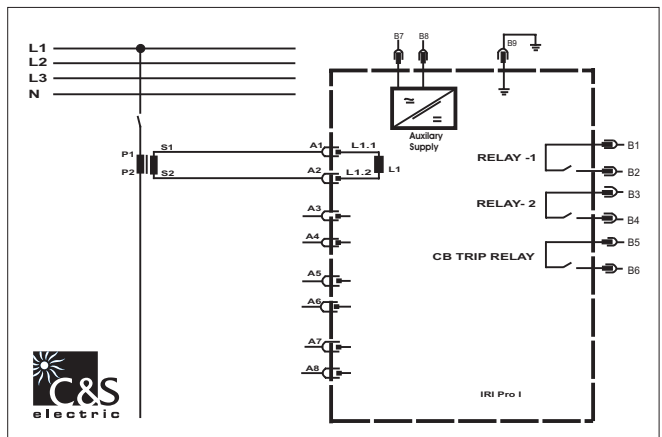
Number of relays	: 3 [Relay 1,2,3]
Type of Contact [Relay 1,2,3]	: (SPST-NO, type A )
Assignment of Contact	: Relay3 common for trip on I > and I >> , IE > and IE >>  Relay 1 & 2 are configurable for O/L,S/ C ,E,EH, Self supervision ]
Max. breaking capacity	: 1250 VA / 150 W resistive 500 VA / 90 W inductive
Max. breaking voltage	: 400 V AC, 125 V DC
Max. continuous current	: 8 A
Max. making current (16 ms)	: 20 A

## 10. Circuit Diagram

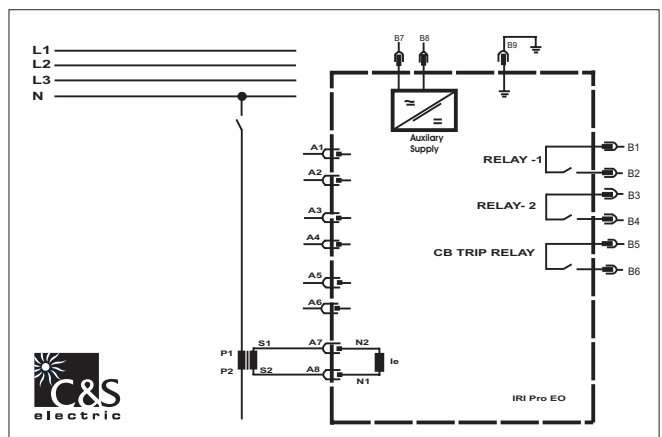
IRI-PRO-3I-EI/3O-EO



IRI-PRO-I



IRI-PRO-EO



## 11. Technical Data

### 11.1 Measuring input

Rated data	:	Rated current $I_N$ Rated frequency $F_N$	1A or 5A 50Hz
Power consumption in current circuit	:	At $I_N = 1A$ At $I_N = 5A$	0.2 VA 0.1 VA
Thermal withstand capability in current circuit	:	for 1 s for 10 s continuously	$100 \times I_N$ $20 \times I_N$ $4 \times I_N$
Dropout ratio	:		> 96 %
Returning time	:		30 ms
Minimum operating time	:		30 ms

### 11.2 Setting ranges and steps

Parameter	Display	Setting range	Step
I >	I >	$0.20 - 2.5 \times I_N$	$0.05 \times I_N$
	t >	0.1 - 150 s	0.01 s
	ti >	0.01 - 1.500	0.005
I >>	I >>	$0.5 - 25 \times I_N$	$0.5 \times I_N$
	t >>	0.03 - 20 s	0.01 s
I <sub>E</sub> >	I <sub>E</sub> >	$0.05 - 2.5 \times I_N$	$0.05 \times I_N$
	t <sub>E</sub> >	0.03 - 150s	0.01s
	ti <sub>E</sub>	0.01 - 1.500	0.005
I <sub>E</sub> >>	I <sub>E</sub> >>	$0.5 - 15 \times I_N$	$0.05 \times I_N$
	ti <sub>E</sub> >>	0.02 - 20 s	0.01s
Reset Delay	RST-D	0 - 20sec	0.1sec
CT Ratio	CT Ratio	1-2500	1
Trip Time Tolerances	± 5% or + 20msec for VINV,NINV3.0/1.3, ± 3 % or ± 20 ms for DEFT (whichever is higher)		
Pickup Tolerances	± 7.5% or + 30msec (whichever is higher) for EINV , NINV0.6 Accuracy as per IEC-255-4 in band of (I/Is > 2 to I/Is < 20) and Is > 0.1In		
Pickup Tolerances	± 5% from set value		

$$\text{Normal Inverse 3.0} \quad t = \frac{0.14}{(I / I_s)^{0.02} - 1} t_i \text{ [s]}$$

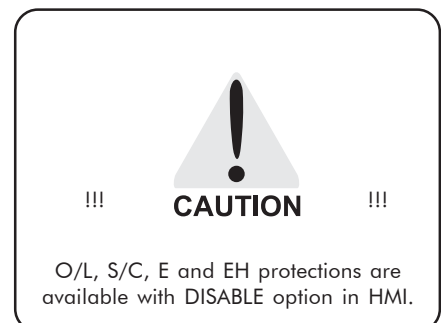
$$\text{Normal Inverse 1.3} \quad t = \frac{0.061}{(I / I_s)^{0.02} - 1} t_i \text{ [s]}$$

$$\text{Normal Inverse 0.6} \quad t = \frac{0.028}{(I / I_s)^{0.02} - 1} t_i \text{ [s]}$$

$$\text{Very Inverse} \quad t = \frac{13.5}{(I / I_s) - 1} t_i \text{ [s]}$$

$$\text{Extremely Inverse} \quad t = \frac{80}{(I / I_s)^2 - 1} t_i \text{ [s]}$$

I : Injected Current  
Is : Pickup Set Level  
ti : TMS for Inverse Characteristic  
t : Definite delay in DEFT characteristic



## 12 Setting Procedure

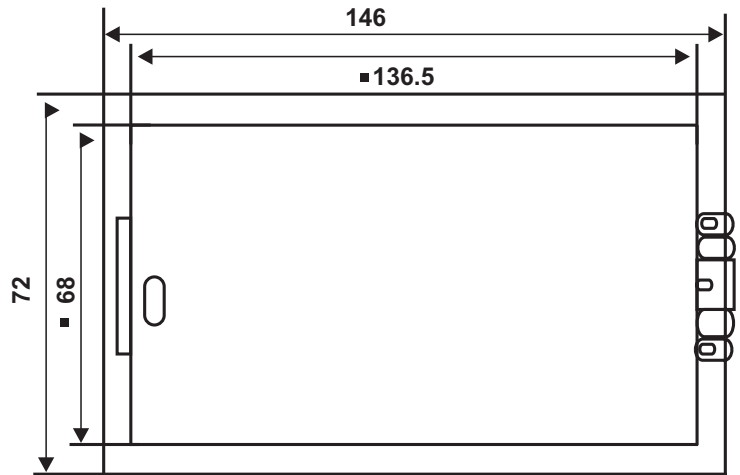
### Menu Frames

<p>Menu 1 Default Page (Running Parameters)</p>	<p>Ir ly lb le XX .XX A (RMS)</p>	<p>Menu 5 : (ENTER Key on Relay Assignment)</p>	<p>OL - RELAY : RLY1 SC - RELAY : ----- E - RELAY : ---- EH - RELAY : ----- SUPERVISION - RELAY : ←BACK</p>
<p>Menu 2 (Pressing Enter Key)</p>	<p>#EDIT/VIEW MENU# &lt;PROTECTION&gt; &lt;LAST FAULT1&gt; &lt;LAST FAULT2&gt; &lt;LAST FAULT3&gt; &lt;LAST FAULT4&gt; &lt;LAST FAULT5&gt; &lt;RELAY ASSIGN&gt; &lt;TRIP TEST&gt; &lt;EDIT RTC&gt; &lt;CHANG PASSWORD&gt;</p>	<p>Menu 6: (ENTER Key on Relay Reset)</p>	<p>RELAY 1 : AUTO RELAY 2 : AUTO ←BACK</p>
<p>Menu 3 : (Pressing Enter Key on PROTECTION selection )</p>	<p>#EDIT# &lt;CT -RATIO&gt; &lt;CHAR - P&gt; &lt;CHAR - E&gt; l&gt; ti&gt; t&gt; l&gt;&gt; t&gt;&gt; le&gt; tie&gt; te&gt; le&gt;&gt; te&gt;&gt; RST- Delay</p>	<p>Menu 7 (Pressing Enter Key on FAULT 1,2,3,4,5 selection )</p>	<p>#TRIP# [F] Ir XX.XXA (Fault Current) [F] ly XX.XXA (Fault Current) [F] lb XX.XXA (Fault Current) [F] le XX.XXA (Fault Current) Trip OL : L1, L2, L3, E Trip SC : L1, L2, L3, E + [ Date / Time Stamp) ←BACK</p>
<p>Menu 4 : (Pressing Enter Key on CHAR-P/E selection )</p>	<p># CHAR P/E# DEFT EINV VINV NINV0.6 NINV1.3 NINV3.0 ←BACK</p>		

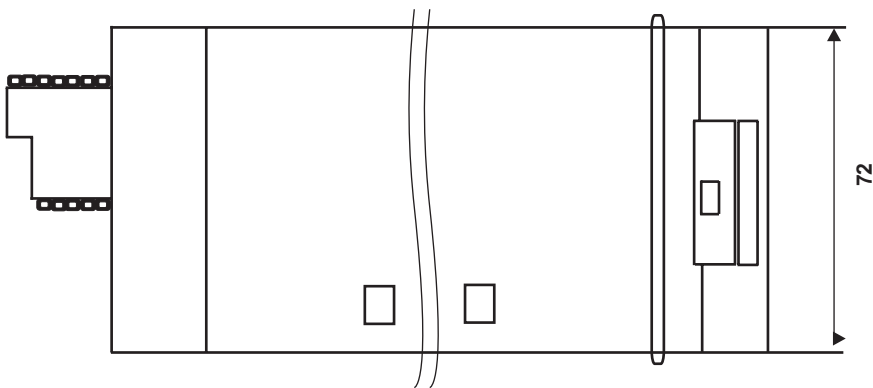
ti : Time multiplier setting only for Inverse time characteristic  
t : Timer setting only for definite time characteristic

### 13. Dimensional Drawing

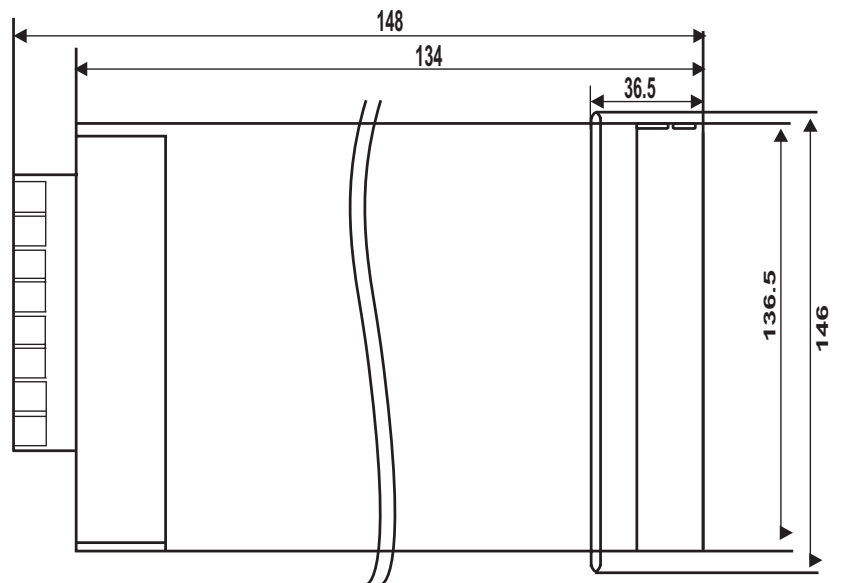
Front View



Side View



TOP View



■ Cut out Dimensions  
 Installation Depth : 175mm  
 All dimensions in : mm

#### 14. Order Form

IRI-PRO-V2	Protection	Phase Rated	Earth Rated
1 E/F with High set	- EO -		
3/OC + 1 E/F Without High set	- 3O-EO -		
3/OC + 1 E/F with High set	- 3I-EI -		
1 O/C + High set	- I1 -		
Rated Current(O/C Element) IN 1-Amp 5-Amp		-1 - 5	
Rated Current for Earth 1-Amp 5-Amp			-1 - 5

We touch your electricity everyday!



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