We touch your electricity everyday!

IRIPro -V3

Over current Short circuit & Earth Fault Protection Relay

Catalogue

C&S electric

CE

PMD Division

INDEX

1) Introduction

IRIPRO Series offers a compact Over-current protection solution for distribution/feeder segment.

IRIPRO Family of protective relays are numeric relays that provides protection and monitoring with reliable and fast protection solution in a single unit with programmable digital outputs.

2) Features

- Three Phase Time Over-current Protection.
- Three Phase Instantaneous Protection.
- Earth Time Over-current and Earth Instantaneous Over Current.
- Circuit Breaker Failure Detection.
- Fault Recorder.
- Output DO Programmable.
- USB Communication.

3) Application

The IRIPRO-V3 relays have been designed for controlling, protecting and monitoring industrial, utility distribution networks and substations. They can also be used as part of backup protection scheme for feeders, transformers and generators.

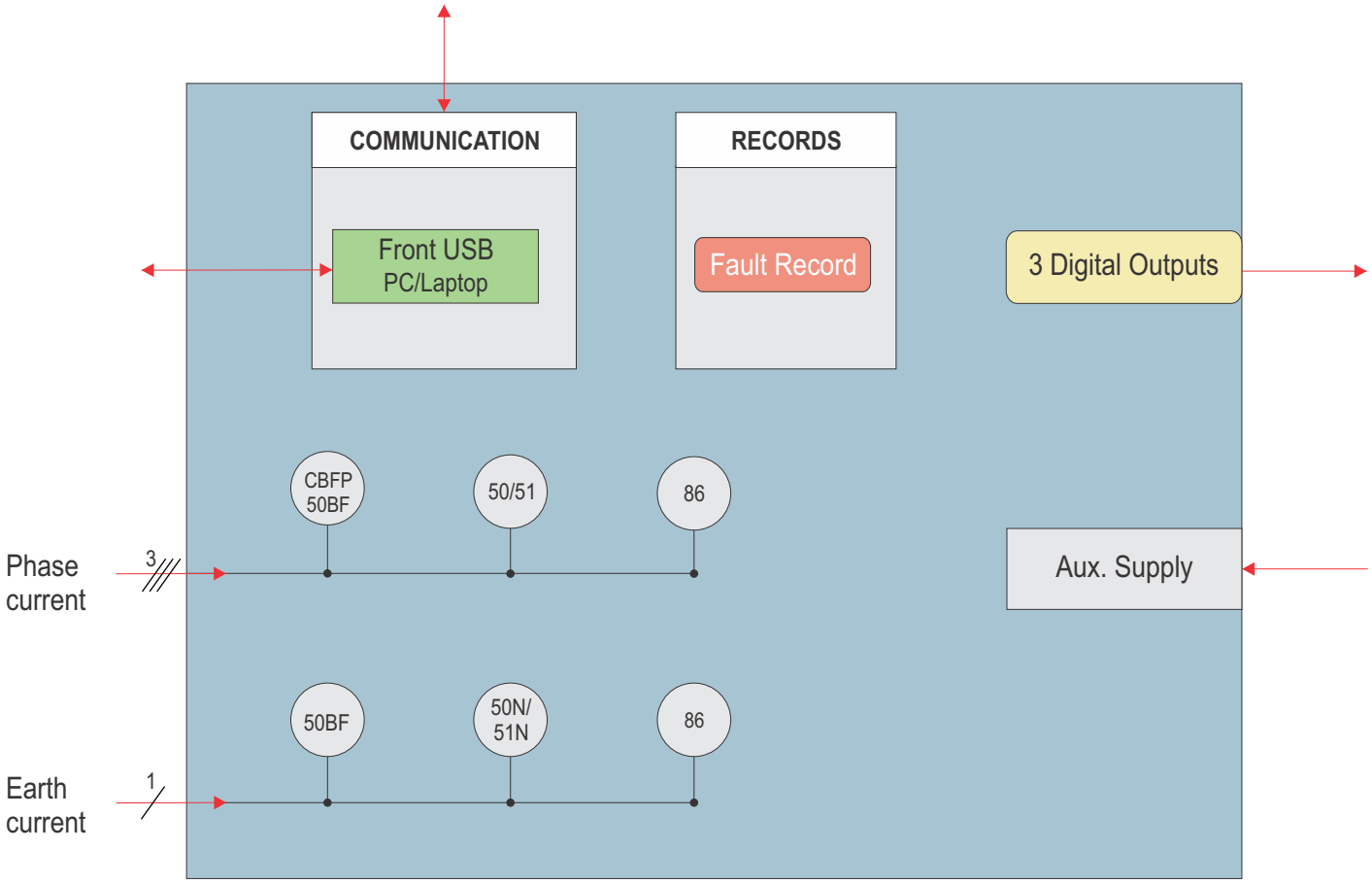
4) Hardware

- Micro Controller Based Numeric Design.
- Measures True RMS with DFT Filter .
- 4 Current Analog Inputs.
- Bright LCD Display.
- USB Communication.
- 3 Push Button on The Front For MMI.
- 5 LEDs for Annunciation.

5) Protection Features

- Three Phase Time Over Current Protection (51).
- Three Phase Instantaneous Protection (50).
- Earth Time Over-current (51N).
- Earth Instantaneous Over-current (50N).
- Circuit Breaker Failure Protection (50BF)

6) Functional Diagram



(Figure 1)

Protection Function

Three Phase Over-current Protection (50/51)

The independent two stages are available for phase fault protection. For first stage (I>) the user may independently select definite time delay or inverse time delay with different type of curves. The second Hi-Set stage (I>>) can be configured with definite time only.

Earth Fault Protection (50N/51N)

The independent two stages are available for earth fault protection. For first stage (Ie>) the user can select definite time delay or inverse time delay with different type of curves. The second Hi-Set (Ie>>) stage can be configured with definite time only.

Relay Latching (86)

Relay can be configured to Latch /Unlatch depending on configuration.
(Latching is possible in presence of Auxiliary supply voltage only)

Circuit Breaker Failure Protection (50 BF)

The CB Failure Protection is based on supervision of phase and earth currents after tripping events. The test criterion is whether all phase currents have dropped to less than 5% of In within tCBFP. If one or more of the phase currents have not dropped to specified current within this time, CB failure is detected and the assigned output relay is activated.

Reset Delay

This parameter introduces a delay in opening of relay contacts, when the current goes below the drop out value for over current, short circuit and earth faults. This parameter will not work when manual reset mode is selected.

7) Fault Recording

IRIPRO-V3 records last 5 faults in its non volatile memory with it's time stamp. Each record has the following information:
Fault Format

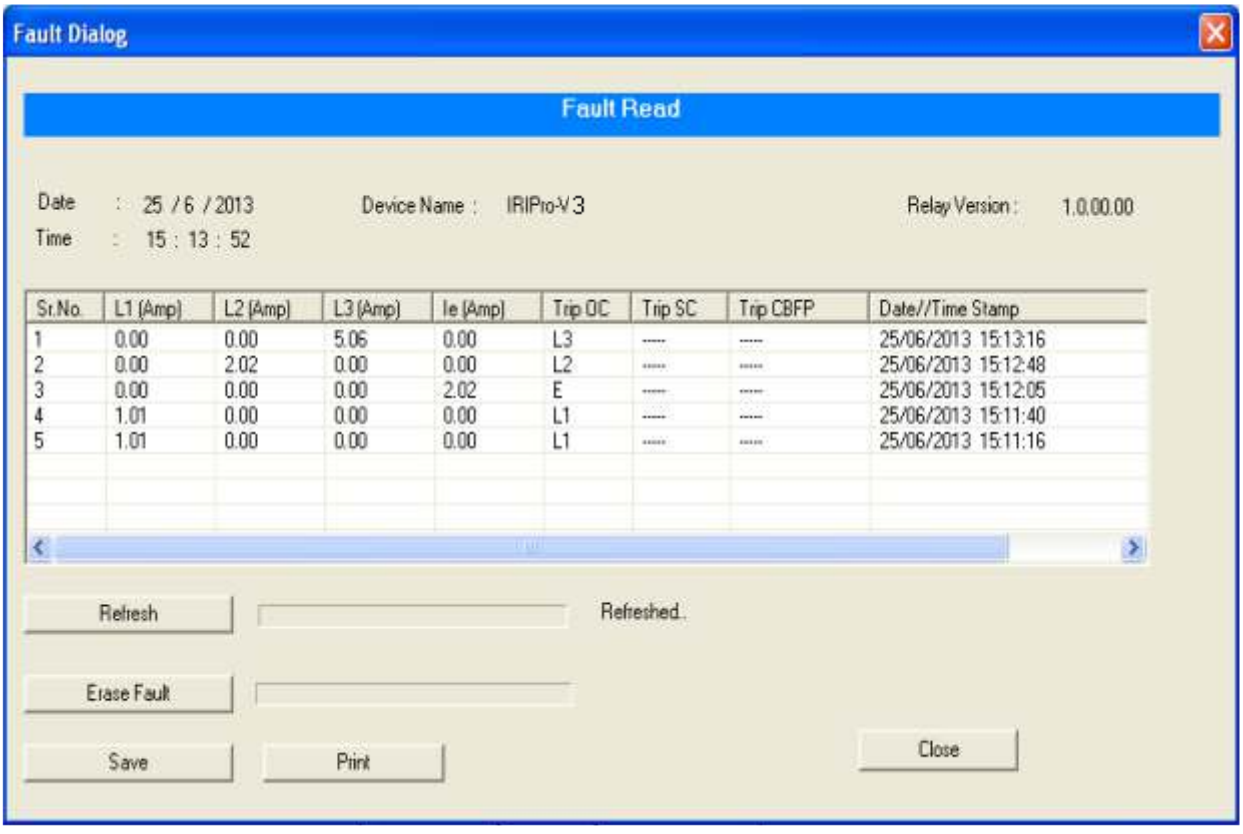
IL1 : 00.00A
IL2 : 00.00A
IL3 : 00.00A
Ie : 00.00A
TRIP OC : L1/L2/L3/E
TRIP SC : L1/L2/L3/E
TRP CBF : CBFP
TIM : HH:MM:SEC
DAT : DD:MM:YY

Where

[ILx] Magnitude of phase current's.
Ie Magnitude earth fault current's

FLT1 indicates the latest fault.

The user can view the fault record via the front USB interface software (See Figure 2).



(Figure 2) (Fault Data Recording on PC software)

Output Contacts

No. of Digital Outputs : 3 (DO1, DO2, DO3)
Type of Outputs : Relay
Programmable (DO Assignment) : Yes
Relay Reset Type : Programmable (Auto/Manual)

8) Human Machine Interface

It comprises of bright LCD display

- ❖ Two push switches for setting values of normal tripping characteristics and other operations for local access.
- ❖ One ‘RESET/ENTER’ push switch.
- ❖ Five LEDs.

Keys	Manual Key
R	is used to manual reset (after pressing for 3 sec) and also works as ENTER key.
▲	is used to scroll in backward direction.
▼	is used to scroll in forward direction.

(Figure 3) (HMI)

(Figure 4) (HMI)

9) Front Communication

The unit has:

❖ 1 Front USB port for direct connection to a PC

The entire setting, Fault is available on 'A' type USB (female) interface with saving & printing option. This unit also has Front-end simulation support for testing of relay even without any three phase injection source.

10) Setting Ranges

IRIPRO-V3 Setting

S. No	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	Phase over-current characteristics	P-Char			DEFT/EINV/VINV/ NINV1.3/NINV3.0 NINV0.6	DEFT
2	Earth over-current Characteristics	E-Char			DEFT/EINV/VINV /NINV1.3/NINV3.0/ NINV0.6	DEFT
3	Phase over-current low set pickup setting Phase over-current definite timing Phase over-current inverse timing	I> t> ti>	0.20xIp 0.1 Sec 0.01	2.5xIp 150 Sec 1.500	0.05xIp 0.01Sec 0.005	EXIT 0.10 Sec 0.05
4	Phase over-current hi-set pickup setting Phase over-current hi-set definite timing	I>> t>>	0.5xIp 0.03 Sec	25xIp 20 Sec	0.5xIp 0.01Sec	EXIT 0.10 Sec
5	Earth over-current low set pickup setting Earth over-current low set definite timing Earth over-current low set inverse timing	E> te> tie>	0.05xIn 0.03 Sec 0.01	2.5xIn 150 Sec 1.500	0.05xIn 0.01Sec 0.005	EXIT 0.10 Sec 0.05
6	Earth over-current hi-set pickup setting Earth over-current hi-set definite timing	E>> te>>	0.5xIn 0.02 Sec	15xIn 20 Sec	0.05xIn 0.01 Sec	EXIT 0.10 Sec
7	Circuit Breaker Failure protection definite timing	tCBFP	0.05 Sec	2 Sec	0.01 Sec	EXIT

Very Inverse $t = \dfrac{13.5}{(I/I_s)-1}$ ti [s]

Extremely Inverse $t = \dfrac{80}{(I/I_s)^2 - 1}$ ti [s]

Normal Inverse 3.0/1.3/0.6 $t = \dfrac{0.14/0.061/0.028}{(I/I_s)^{0.02}-1}$ ti [s]

Where t = Tripping time ti= Time multiplier
I = Fault current I_s= Setting value of current

Trip timing Accuracy : As per IEC-255-3 (2xIs to 20xIs)
DEFT / NINV 3.0 / 1.3 : ±5% OR ±30mSec (whichever is higher)
VINV / NINV 0.6 /EINV : ±7.5% OR ±40mSec (whichever is higher)

DO Assignment

S.No	Parameter	Display	Setting Range
1	Phase over-current low set	OC	DO1/DO2/EXIT
2	Phase over-current hi-set	SC	DO1/DO2/EXIT
3	Earth over-current low set	E	DO1/DO2/EXIT
4	Earth over-current hi-set	EH	DO1/DO2/EXIT
5	Self supervision	SelfSup	DO1/DO2/EXIT
6	Circuit breaker failure protection	CBFP	DO1/DO2/EXIT

Note: DO 3 is common to all protections.

DO Reset Mode

S.No.	Parameter	Display	Setting Range		Default Setting
			Min.	Max.	
1	Digital Output-1	DO 1	Auto	Manual	Auto
2	Digital Output-2	DO 2	Auto	Manual	Auto
3	Digital Output-3	DO 3	Auto	Manual	Auto

Note: DO 3 is common to all protections.

Common Setting: (These are the settings common for all protections)

S.No.	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1.	Phase CT ratio	P-CTR	1	9999	1	1
2.	Earth CT ratio	E-CTR	1	9999	1	1
3.	Reset Delay	R_dly	0	20 Sec	0.1 Sec	0 Sec

USB Communication		
Protocol	:	CSE proprietary protocol: available with front software
Cable required for interface	:	USB cable type (A to A)

Auxiliary Supply

Rated Auxiliary voltage U_H	18-60V DC (for L Model) or 85-280V AC / 100V-300V DC (for H model)
Power consumption	Quiescent approx. 3W Operating <7W

Measurement Accuracy

S.No	Quantity	Range	Frequency Range	Accuracy
1	Current	1 - 20 x I_p	50 Hz	±2%

11) Technical Data

Measuring Inputs

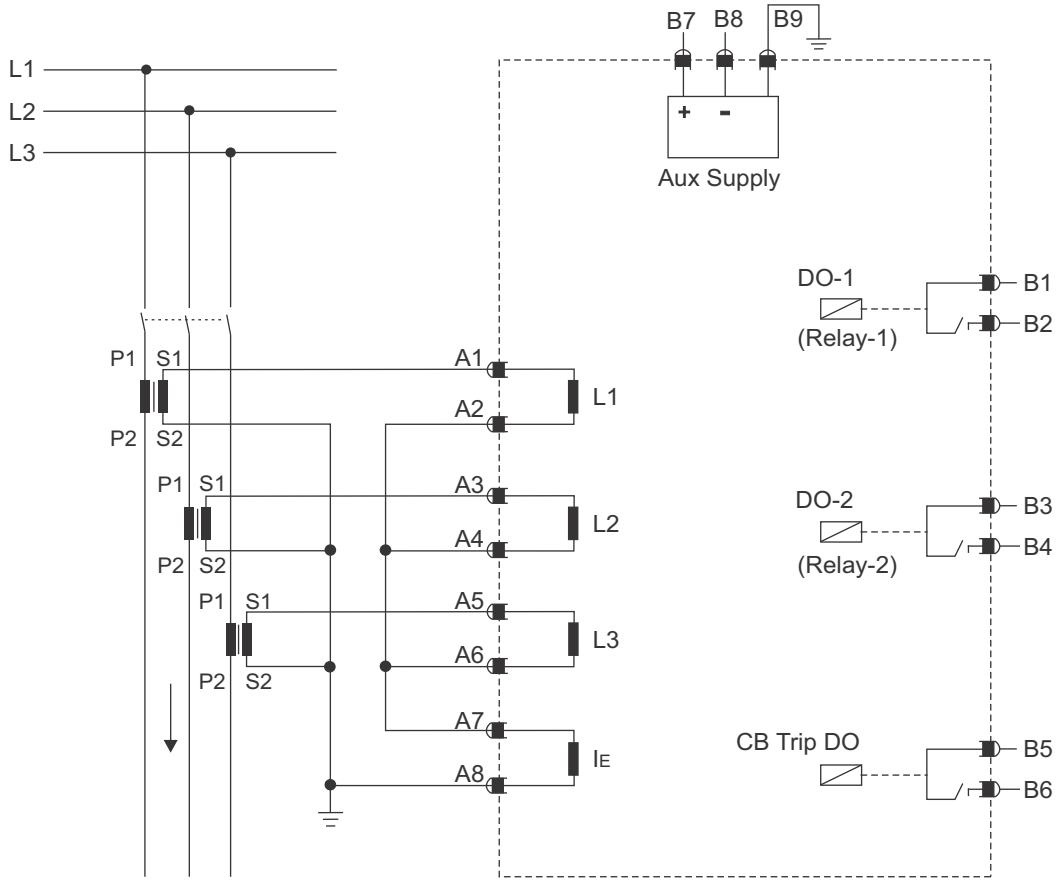
Rated Data	Rated current I_p :1A or 5A Rated frequency F_n : 50 Hz
Drop out to Pickup Ratio	>96%
	Power consumption in current circuitAt I_p=1A 0.2 VA At I_p=5A 0.4 VA
	Thermal withstand capacity in current circuit Dynamic current withstand (half wave): 250 x I_p for 1 Sec : 100 x I_p for 10 Sec : 30 x I_p continuously : 4 x I_p
Protection-Front Panel	IP-54
Weight	Approx. 1.0 Kg

12) Model Description Table

Function	IRIPRO-V3
CT Inputs	4
Over Current (50/51)	✓
Earth Fault (50N/51N)	✓
CBFP (50BF)	✓
Digital Output	3
Fault Record	5
Selection of 1/5A	Ordering information
Enclosure Type	Non Draw-out
Enclosure Size (WxHxD)	(136 x 68 x 134) mm
Front Communication	✓

13) Connection Diagram

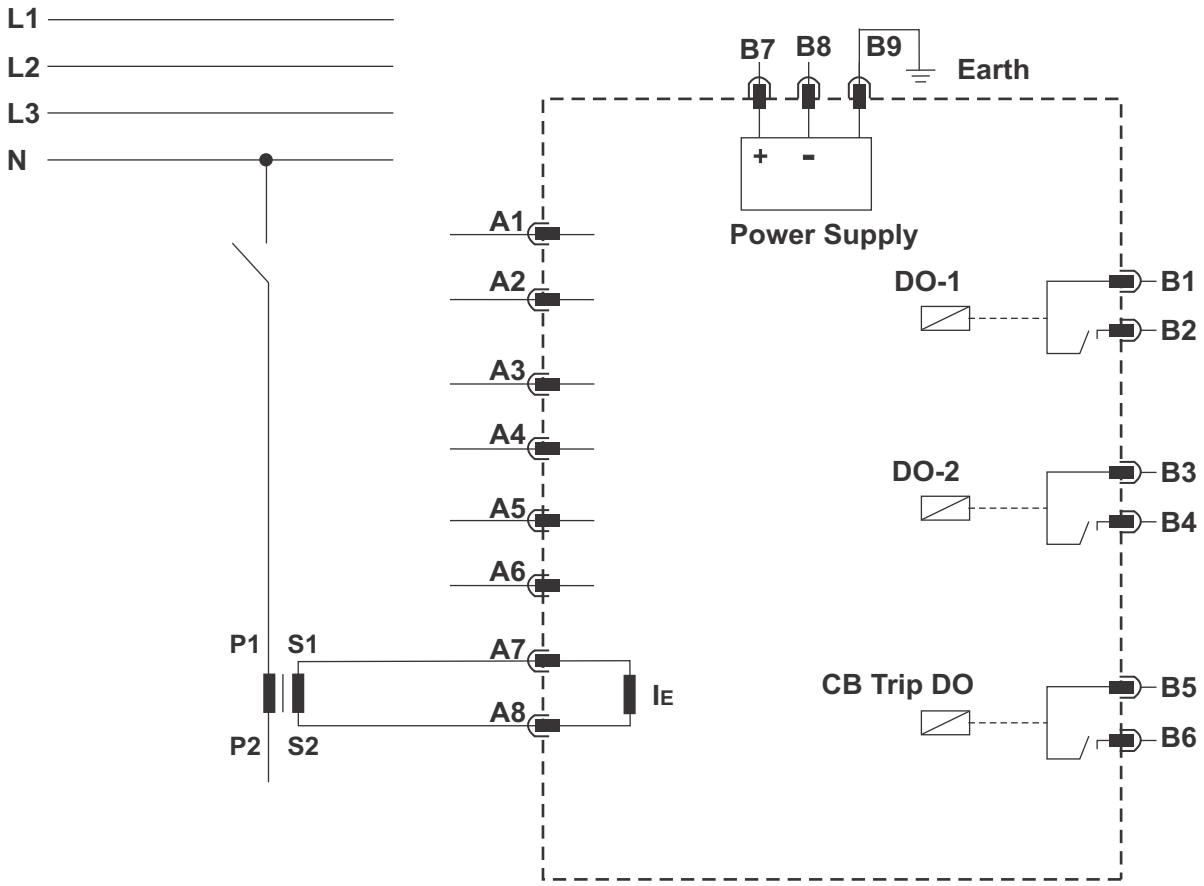
IRIPro-V3-3I-EI



(Figure 5)

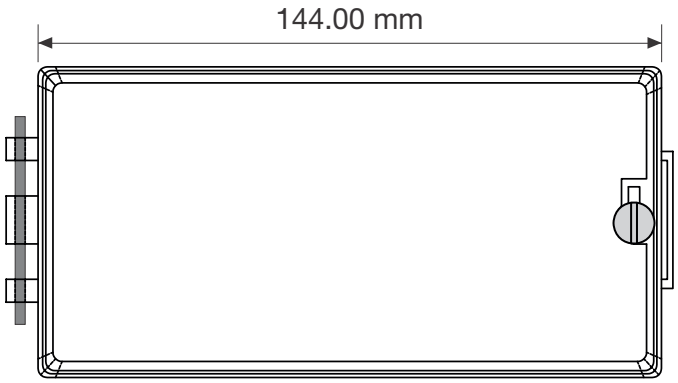
Terminal Connection Details

IRI-Pro-V3-EO



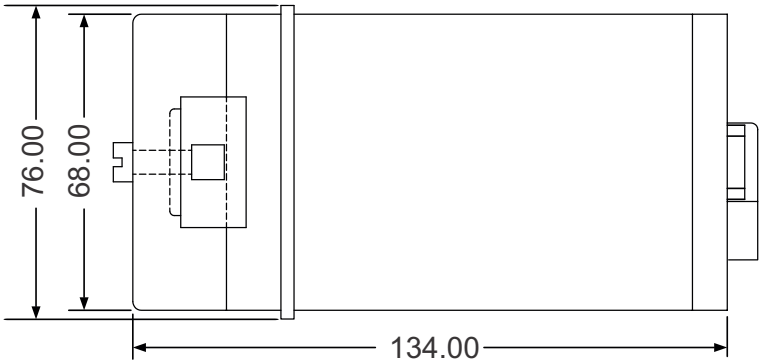
14) Dimensional Details

Front View



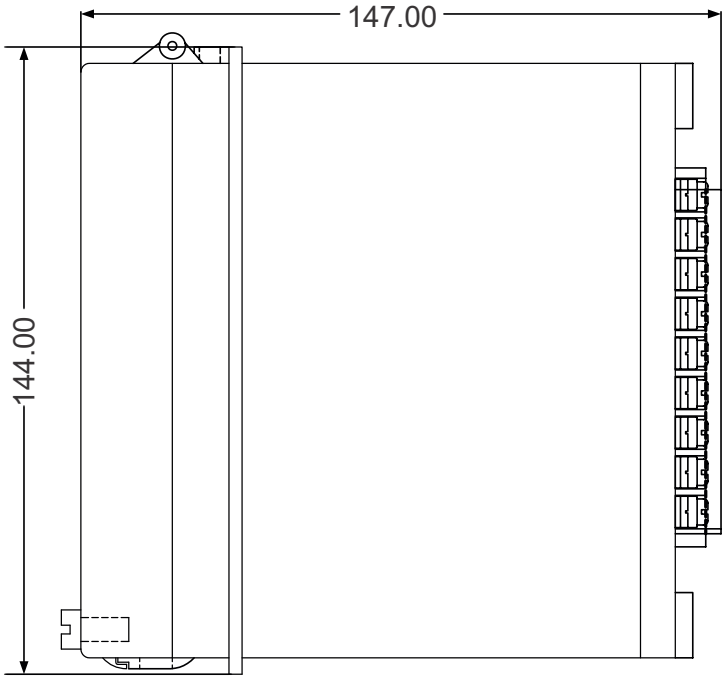
(Figure 6)

Side View



(Figure 7)

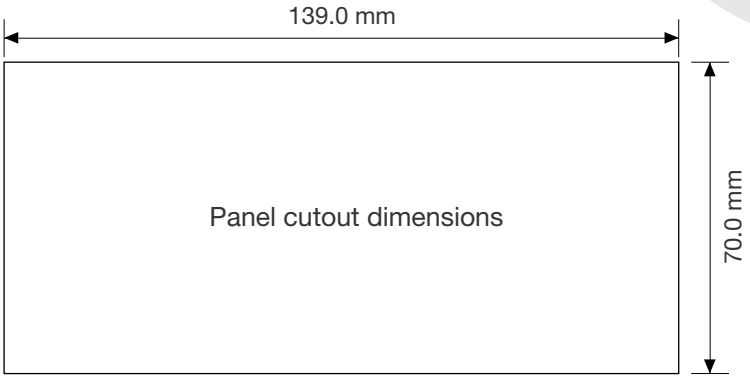
Top View



(Figure 8)

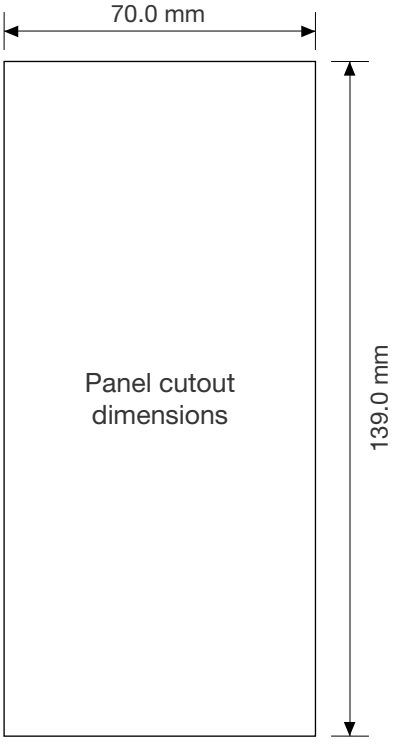
15) Panel Cut out Details

Horizontal Relay



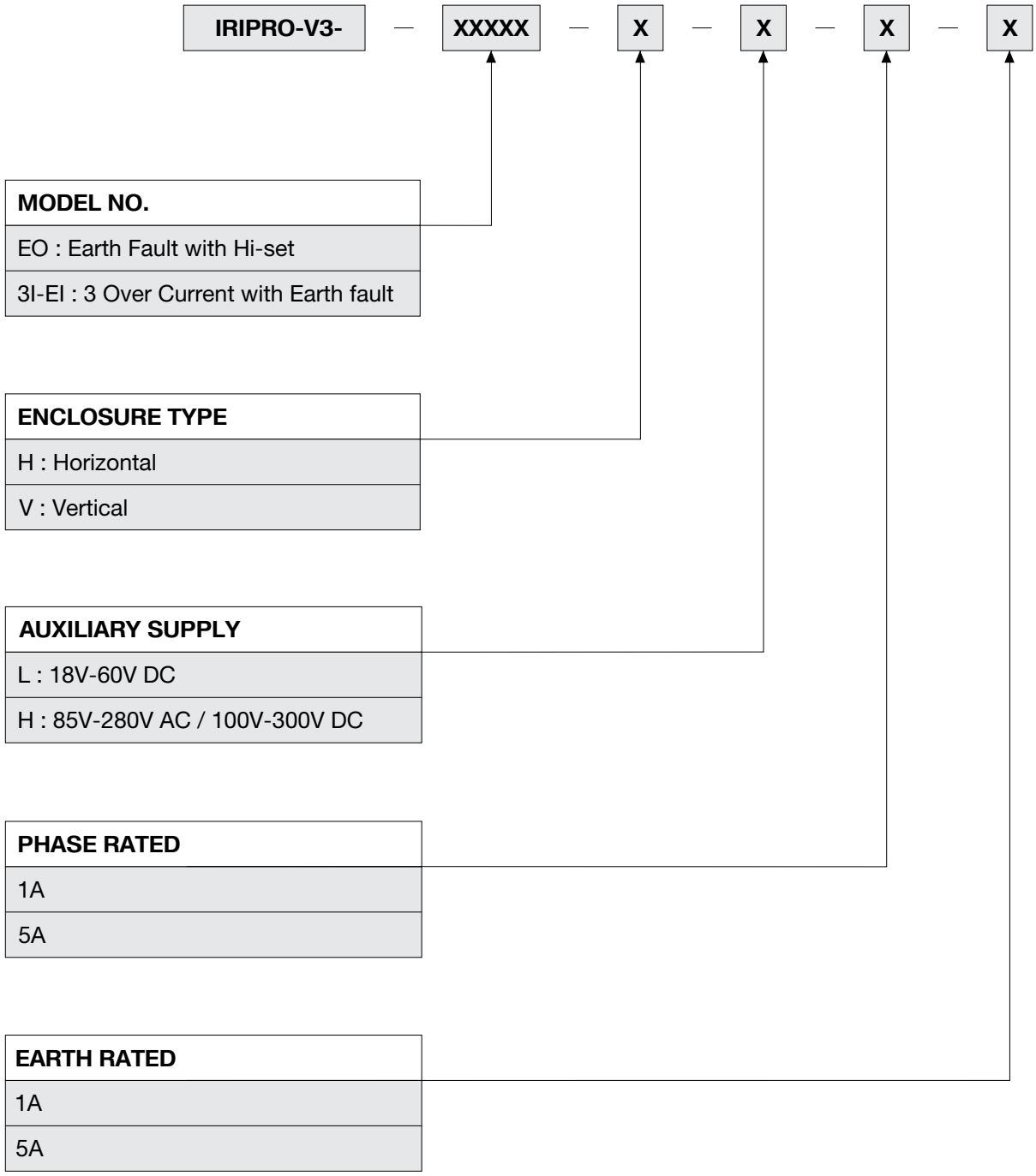
(Figure 9)

Vertical Relay



(Figure 10)

16) Ordering Information



Example: IRIPRO-V3-EO-H-L-1-1

Revision History

S.No.	Rev.No.	Details	Date
01	10	Include connection diagram of IRI-Pro-V3-EO	11.7.15
02	11	Panel cut out dimension changed from 137.5 x 69.5 to 139 x 70 mm	20.8.15

For further information, please contact:

C&S Electric Ltd.

(Protection & Measurement Devices)

C-60, Wing-A, Phase-II, Noida-201 305, District Gautam Budh Nagar (U.P) INDIA

Phone : +91-120-305 7700 / 01, Fax: +91-120-305 7704 E-mail: cspc@cselectric.co.in

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Rev. Date: 20.08.15

Branch office

Branch	Phone	Fax	E-mail
Ahmedabad:	+91 79 30074534/35/36	+91 79 30074519	cspc.ahmedabad@cselectric.co.in
Bangalore:	+91 80 3057 0372/73, 3057 0347	+91 2558 4839	cspc.bangalore@cselectric.co.in
Bhubaneswar:	+91 674 2507265	+91 674 2507265	cspc.bhubaneswar@cselectric.co.in
Chennai:	+91 44 3918 0531-35	+91 44 39180514	cspc.chennai@cselectric.co.in
Cochin:	+91 0484 3071717	+91 0484 3071716	cspc.cochin@cselectric.co.in
Delhi:	+91 11 30838822-25	+91 11 30838826	cspc.delhi@cselectric.co.in
Hyderabad:	+91 40 3918 2496/97	+91 40 3910 3631	cspc.hyderabad@cselectric.co.in
Kolkata:	+91 33 22275850/51	+91 33 2227 5849	cspc.kolkata@cselectric.co.in
Mumbai:	+91 22 30487146/47/48	+91 22 2412 6631	cspc.mumbai@cselectric.co.in
Pune:	+91 20 30283244/45	+91 20 30283244	cspc.pune@cselectric.co.in