We touch your electricity everyday!

IRIPROx

Over current Protection Relay

Catalog

C&S electric

PMD Division

Contents

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) Application

The IRIPRO 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.

3) Hardware

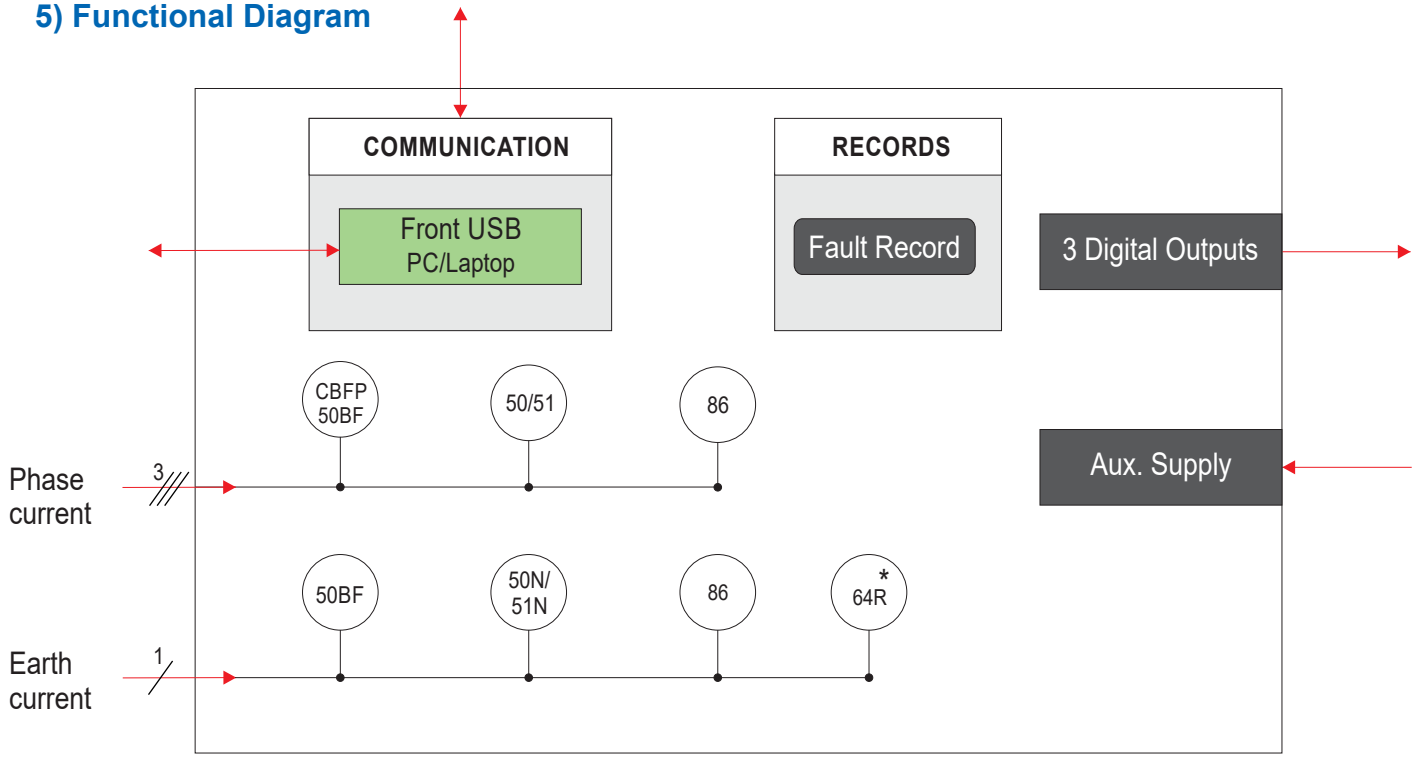
- Measures True RMS with DFT Filter
- 4 CT Inputs
- Bright LCD Display
- 3 Push Button on the Front for HMI
- Front USB Communication
- LEDs for Annunciation

4) Protection Features

- Three Phase Time Over Current Protection
- Three Phase Instantaneous Protection
- Earth Time Over-current
- Earth Instantaneous Over-current
- Circuit Breaker Failure Protection
- In-built Harmonic / Inrush Blocking
- Restricted Earth Fault *

* Model Dependent

5) Functional Diagram



6) Protection Function Description

Three Phase Over-current Protection
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
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 stage (Ie>>) can be configured with definite time only.

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

Circuit Breaker Failure Protection
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.

Restricted Earth Protection
The restricted earth fault relay is high impedance differential scheme which balances zero sequence current flowing in the transformer neutral against zero sequence current flowing in the transformer phase windings. Any unbalance for in-zone fault will result in an increasing voltage on the CT secondary and thus will activate the REF protection.
This scheme is very sensitive and can then protect against low levels of fault current in resistance grounded systems where the earthing impedance and the fault voltage limit the fault current. This feature is available in EOR model and product is supplied with stabilizing resistor (1 kOhm, 150W ±5%).
In addition, this scheme can be used in a solidly grounded system.

Inrush Blocking
Relay is equipped with in-built facility of Inrush blocking to avoid nuisance tripping and stable operations.

7) Fault Recording

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

IL1 / IL2 / IL3 / E	:	Fault Current Amplitude
FLT	:	Fault Type
TIME	:	HH:MM:SEC:mSEC
DATE	:	DD/MM/YY

The user can view the fault record / various parameters via the front USB interface software.

IRIPROx-3I-EI || Version 1.0.0.2

Fault Records

Number of Records to Display

5 (Please select a number of your choice)

Proceed | Export To Excel CSV

Synchronized at 07.07.2021 on 02:13:17 PM

Fault No	Fault Date - Phase	Fault Type	IL1-Phase Current [Amp]	IL2-Phase Current [Amp]	IL3-Phase Current [Amp]	Ie-Earth Current [Amp]
1	15 Apr 2021 08:30:32:371 PM	Short circuit	183.7	183.7	0.00	93.5
2	15 Apr 2021 09:45:17:451 PM	Earth Fault Hi-Set	0.00	80.3	0.00	80.7
3	02 Feb 2021 11:30:19:232 AM	Earth Fault	0.00	1.60	14	14.3
4	05, Feb 2021 10:23:11:117 AM	Over current	53.70	54.3	52.7	0.1
5	03 Jan 2021 09:23:32:356 AM	Short Circuit	150.32	147.3	0	53.7

(Fault Data Recording on PC software)

Output Contact

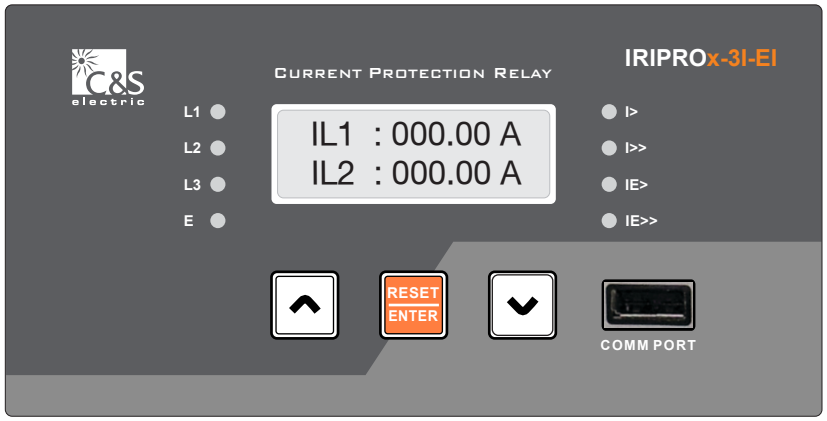
No. of Digital Outputs	:	3 (DO1, DO2, DO3)
Type of Outputs	:	Relay
Programmable (DO Assignment)	:	Yes
Relay Reset Type	:	Programmable (Auto/Manual)

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.
- LEDs for phase availability & fault annunciation

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



9) Communication

The unit has:

Front USB port for direct connection to a PC

The entire setting, Fault is available on 'A to A' type USB (female) interface with saving & printing option.

10) Setting Ranges

Over Current Setting

S. No	Parameter	Display	Setting Range Min.	Setting Range Max.	Step Size	Default Setting
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	Ph. over-current low set pickup Ph. over-current definite timing Ph. over-current inverse timing	I> t> ti>	0.05xIp 0.1 Sec 0.01	2.5xIp 150 Sec 1.500	0.05xIp 0.01Sec 0.005	EXIT 0.10 Sec 0.05
4	Ph. over-current hi-set pickup Ph. over-current hi-set definite timing	I>> t>>	0.5xIp 0.0 Sec	25xIp 20 Sec	0.5xIp 0.01Sec	EXIT 0.10 Sec
5	Earth over-cur. low set pickup Earth over-cur. low set definite timing Earth over-cur. low set inverse timing	Ie> 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-cur. hi-set pickup Earth over-cur. hi-set definite timing	Ie>> te>>	0.5xIn 0.0 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 $t = \frac{13.5}{(I/I_s) - 1}$ ti [s]

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

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

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

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

DO Assignment

S.No	Parameter	Display	DO Assign
1	Phase over-current low set	I>	DO1/DO2/DO3
2	Phase over-current hi-set	I>>	DO1/DO2/DO3
3	Earth over-current low set	Ie>	DO1/DO2/DO3
4	Earth over-current hi-set	Ie>>	DO1/DO2/DO3
5	Self supervision	SlfSup	DO1/DO2/DO3
6	Circuit breaker failure protection	CBFP	DO1/DO2/DO3

NOTE : DO1 is factory programmed on all protections for Trips.

Function Reset Mode

Parameter	Display	Setting Range		Default Setting
		Min	Max	
Phase over-current low set	I>	AUTO	MANUAL	AUTO
Phase over-current hi-set	I>>	AUTO	MANUAL	AUTO
Earth over-current low set	Ie>	AUTO	MANUAL	AUTO
Earth over-current hi-set	Ie>>	AUTO	MANUAL	AUTO

Note: DO assigned to CBFP is always manual reset.

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

Parameter	Display	Setting Range		Step Size	Default Setting
		Min.	Max.		
Phase CT ratio	P-CTR	1	9999	1	1
Earth CT ratio	E-CTR	1	9999	1	1
Reset Delay	R_dly	0	20 Sec	0.1 Sec	0 Sec
Fault popup	FltPop	Enable	Disable	1	Enable

Auxiliary Supply

Auxiliary voltage range	18-300V DC / 60-280V AC
Power consumption	Quiescent approx. 3W, Operating <7W

Front (USB) Communication

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

Measurement Accuracy

Quantity	Range	Frequency Range	Accuracy
Current	1-20 x Ip	50 Hz	±2%

Environmental conditions

(Recommended ambient temperature range)	
Operating temperature range	Continuous withstand -25°C to +60°C
Storage temperature Range	-25°C to +70°C

Measuring Input

Rated Data	Rated current Ip :1A or 5A Rated frequency Fn : 50 Hz
Drop out to Pickup Ratio	>96%
DC Current Carrying Capacity	8A@30VDC / 0.3A@110VDC/ 0.2A@220VDC
Power consumption in current circuit	At Ip=1A 0.2 VA At Ip=5A 0.4 VA
Thermal withstand capacity in current circuit	Dynamic current withstand for 1 Sec : 100 x Ip for 10 Sec : 30 x Ip continuously : 4 x Ip
Protection-Front Panel	IP-54
Weight	Approx. 700 gms

Trip Contact Rating

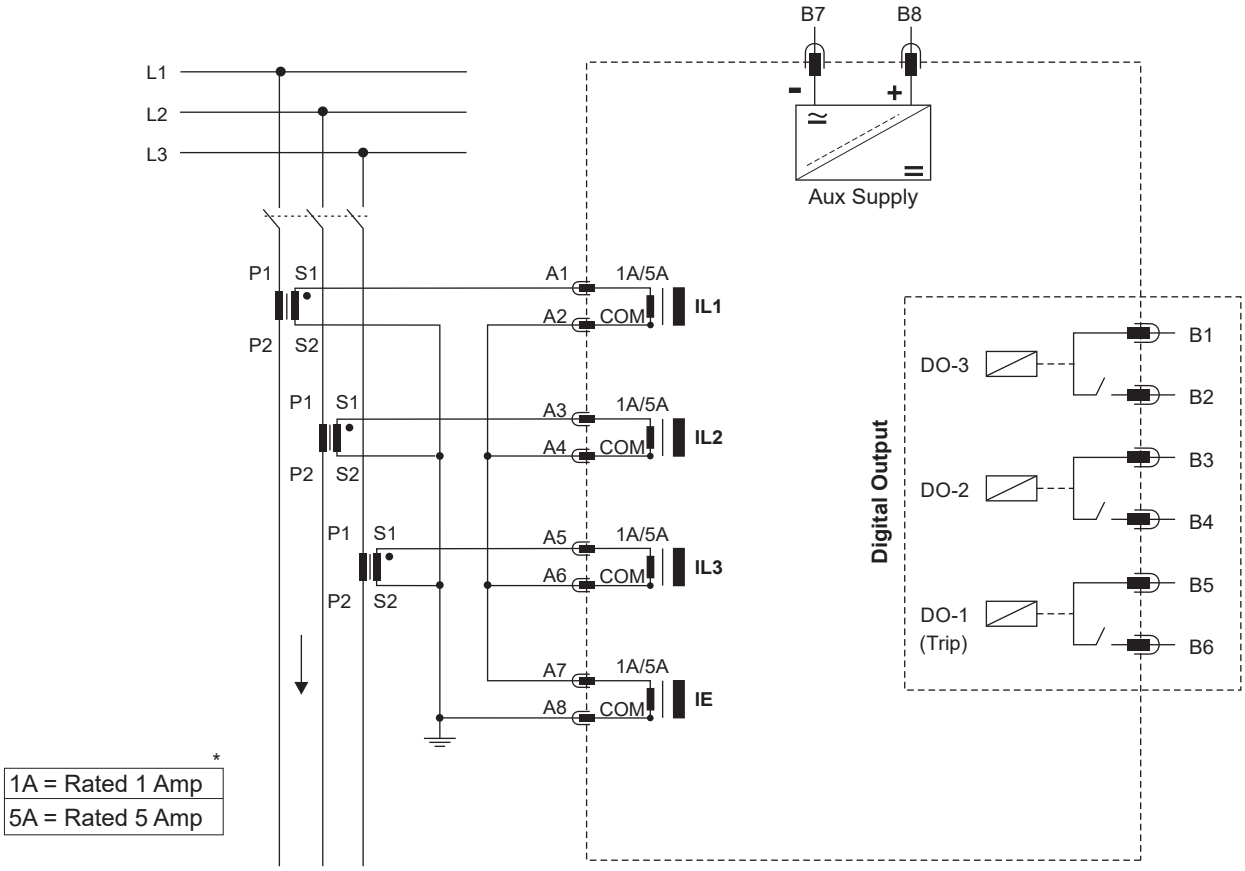
Mechanical Life	Min. 10,000,000 operations (at 36,000 operation/Hr.)
Di-electric Strength (Initial)	
between Contacts of the same polarity	1000 VAC, 50/60Hz for 1 minute
between Contacts & Coil	4000 VAC, 50/60Hz for 1 minute
Surge withstand capacity	
between Contacts & Coil	10,000 V (1.2 x 50 us)
Contact current rating (trip)	8A
Switching voltage	250VAC
Output contact type	Ag Alloy + gold plating (Cd free)

12) Model Selection Table

Particular Details	IRIPROx-3I-EI	IRIPROx-EO/R
PROTECTION		
Three Phase Time Over Current	✓	x
Three Phase Instantaneous (50)	✓	x
Earth Time Over-current (51N) / REF (64R) *	✓	✓
Earth Instantaneous Over-current (50N) / REF (64R) *	✓	✓
Circuit Breaker Failure Protection (50BF)	✓	✓
Digital Output	3	3
CT Input	4	1
RECORD		
Fault record / Trip history	5	5
DISPLAY / HMI	LCD-12x2	LCD-12x2
LEDs	8	4
Setting	Fine setting with keypad	Fine setting with keypad
MEASUREMENT		
Current	IL1, IL2, IL3, IE	IE
COMMUNICATION		
USB port for PC/Laptop communication	✓	✓
MOUNTING TYPE	**ordering based**	

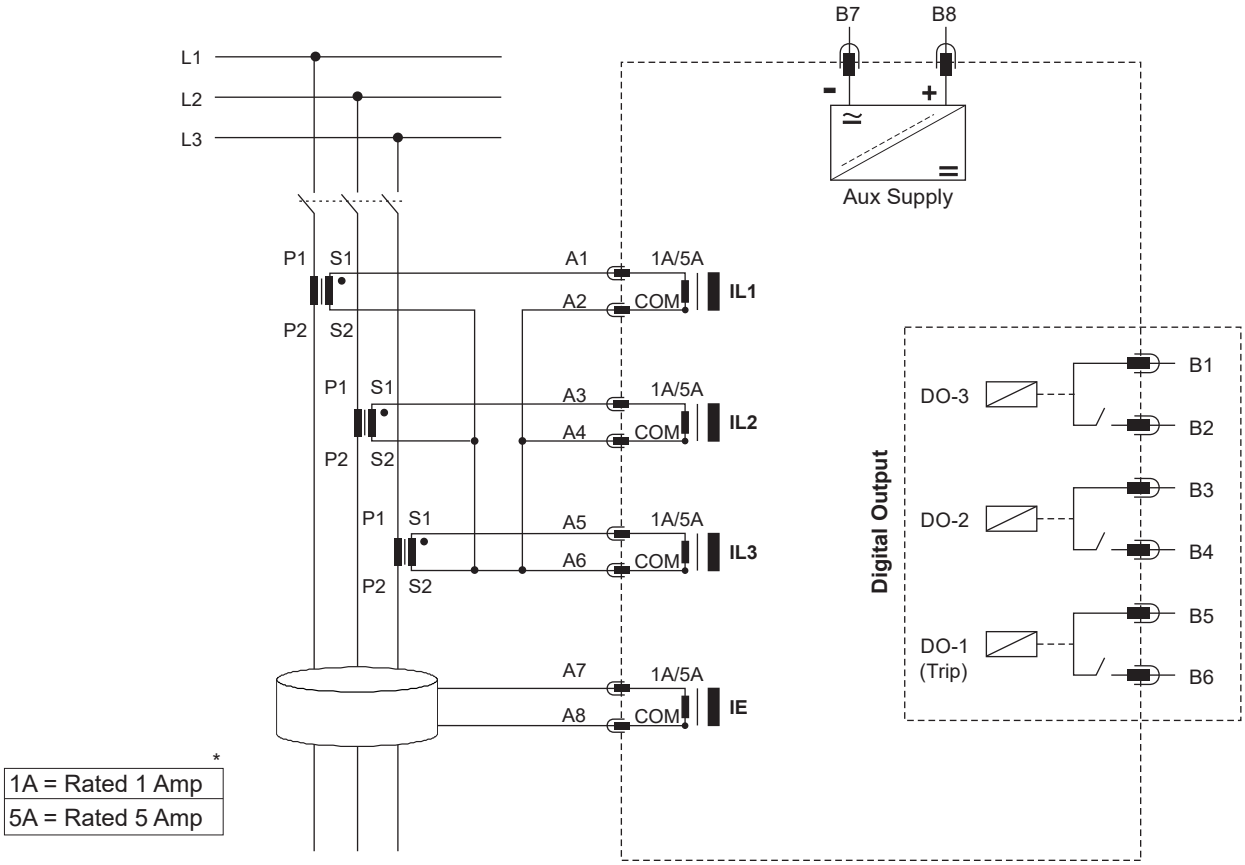
x : **Not Available in this model** ✓ : **Available in this model**

13a) Connection Diagram IRIPROx-3I-EI (Three Phase Over Current & Earth Fault with Residual Connection)



*
1A = Rated 1 Amp
5A = Rated 5 Amp

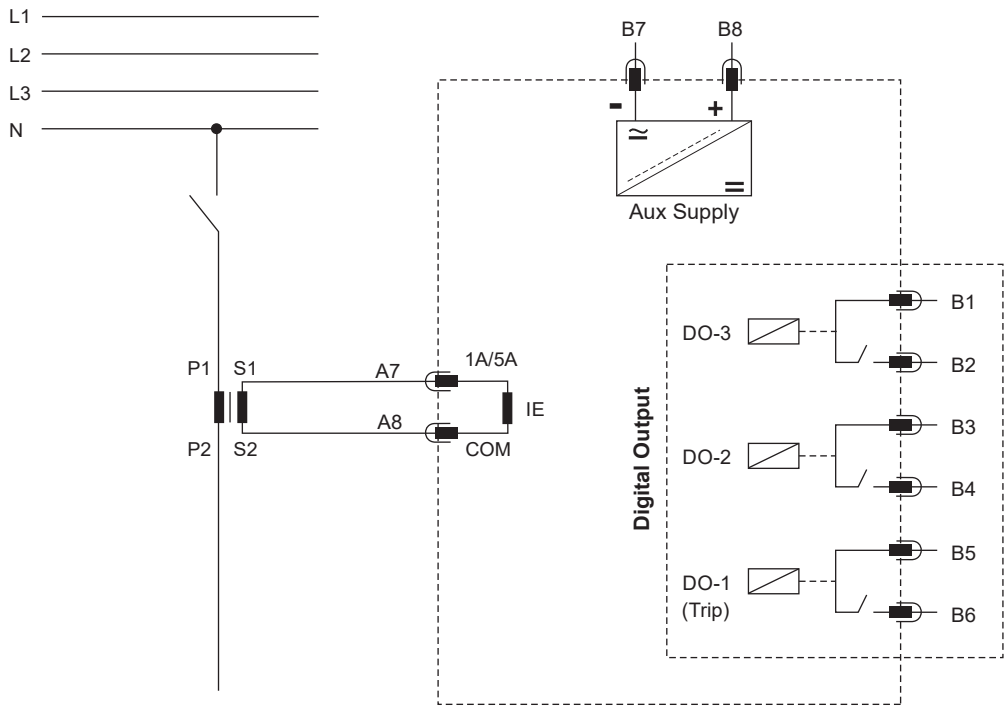
13b) Connection Diagram (Three Phase & Earth Fault with CBCT)



*
1A = Rated 1 Amp
5A = Rated 5 Amp

* Model Dependent

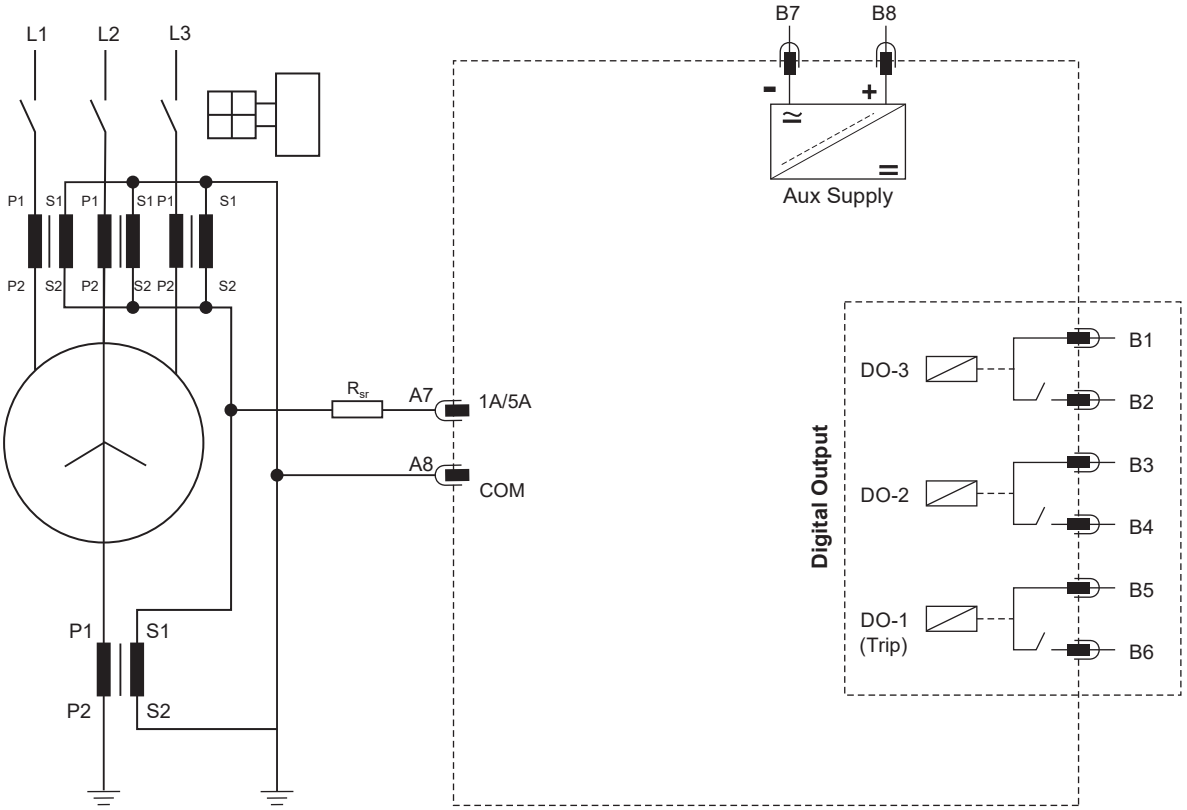
13c) Connection Diagram IRIPROx-EO (Stand-by Earth Fault Connection)



*

1A = Rated 1 Amp
5A = Rated 5 Amp

13d) Connection Diagram (Restricted Earth Fault Scheme) available in EOR model only.

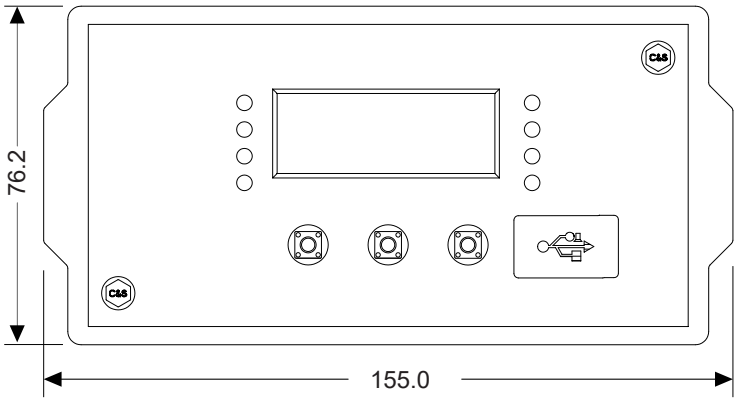


(All the dimensions are in mm, Gen. Tol. : ±1.0 mm)

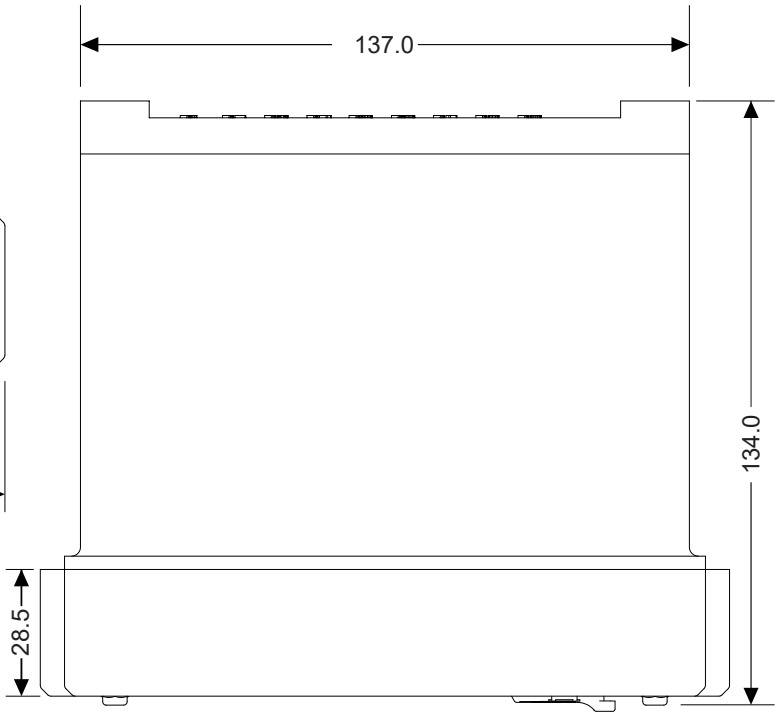
14a) Dimensional Details

(HORIZONTAL MODEL - H)

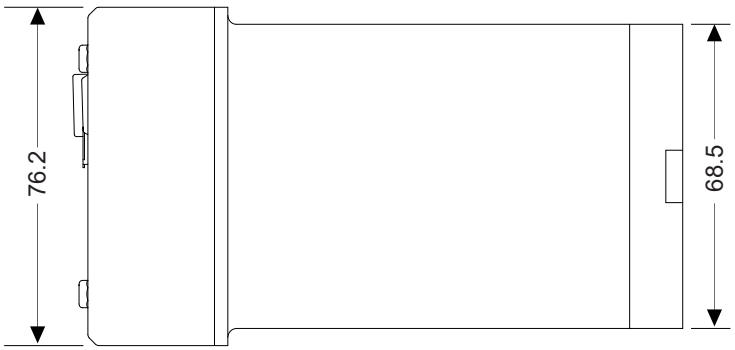
Front View



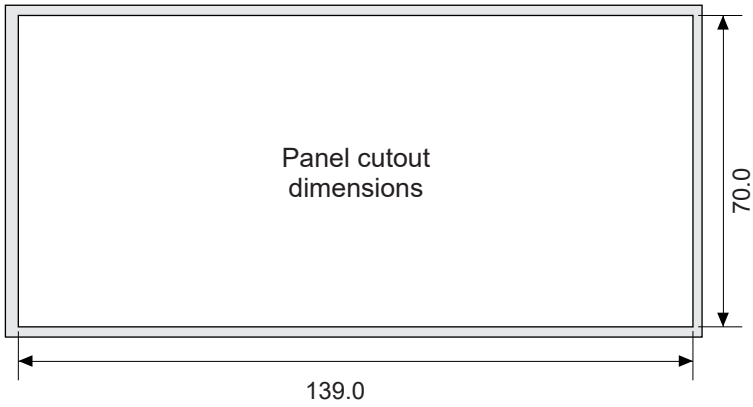
Top View

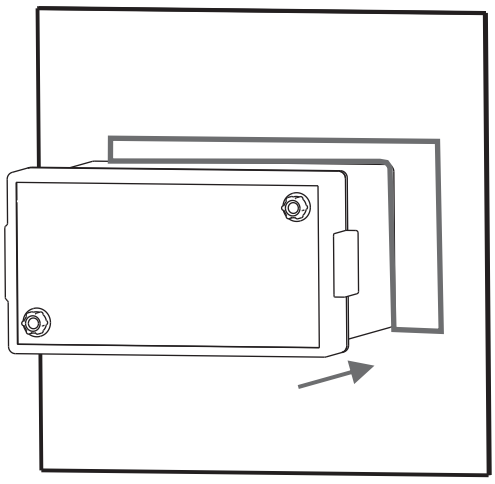


Side View



Panel Cut out Details



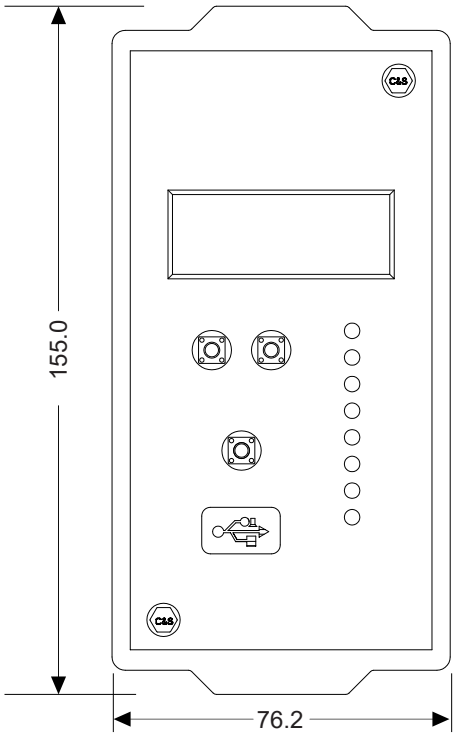


(All the dimensions are in mm, Gen. Tol. : ±1.0 mm)

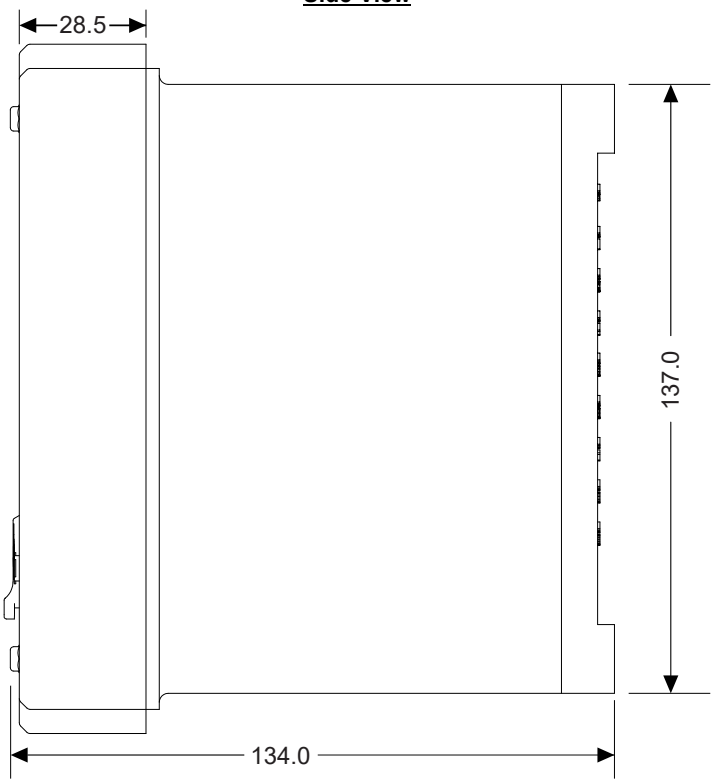
14b) Dimensional Details

(VERTICAL MODEL - V)

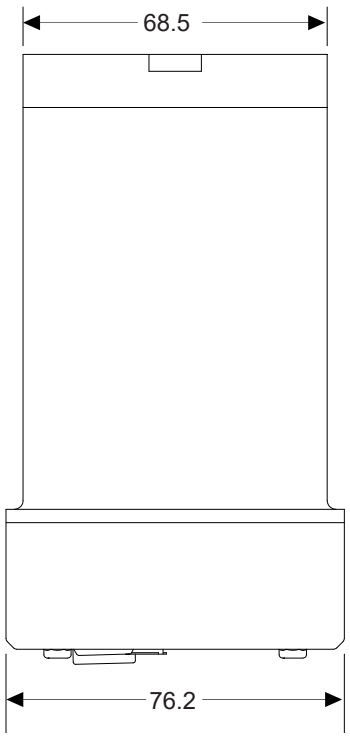
Front View

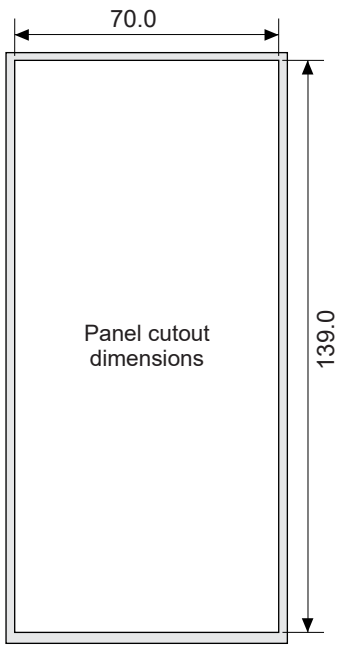


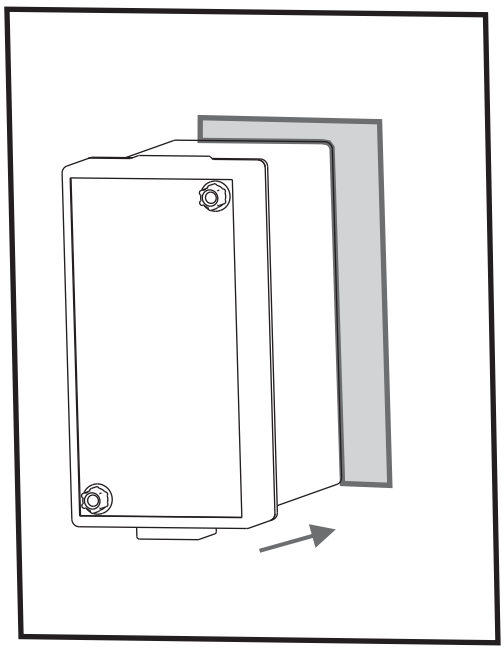
Side View



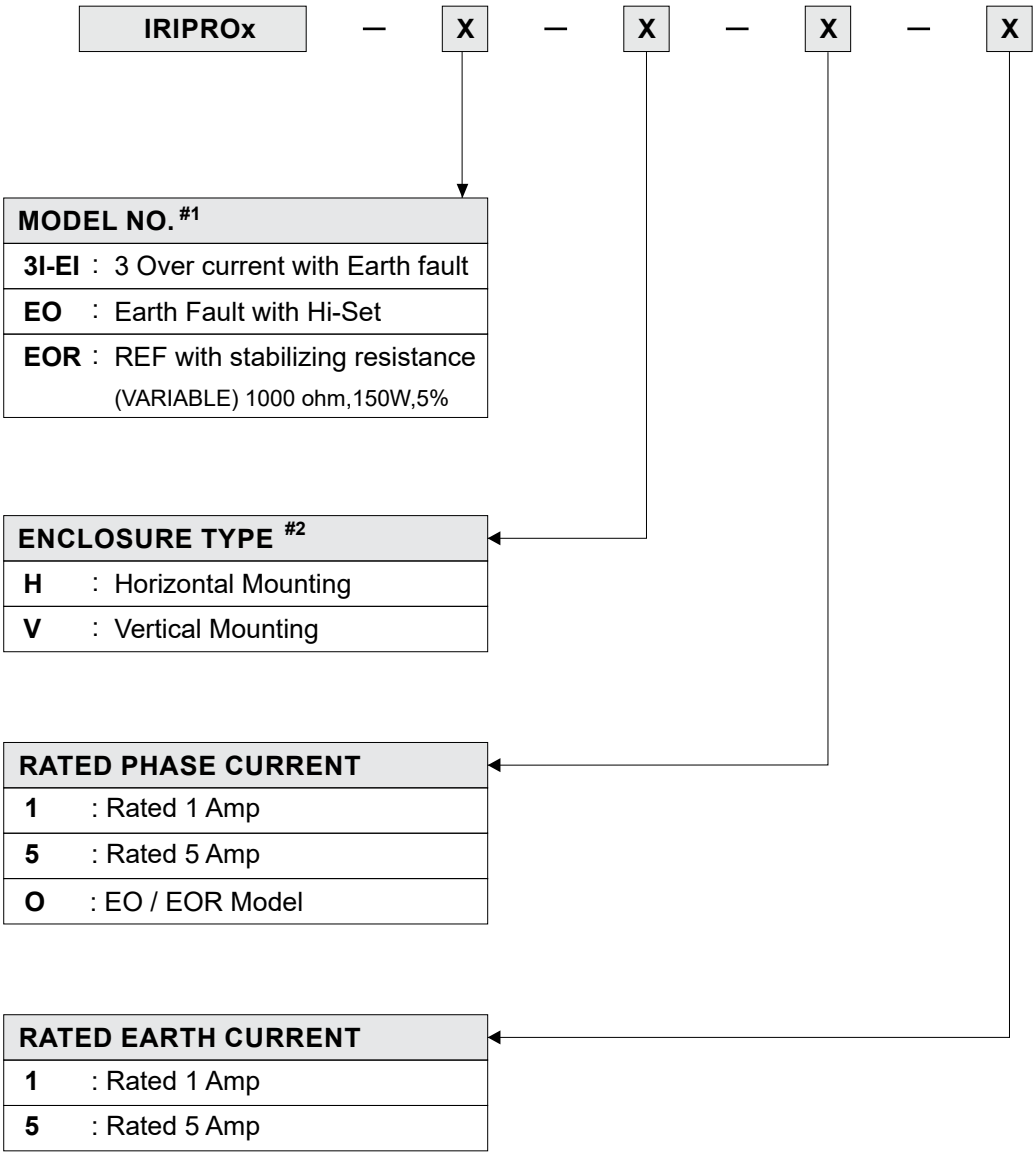
Top View







15) Ordering Information



NOTE :

#1) Refer Model Selection Table (S.No. 12) for different model.

#2) Refer Dimension detail / Panel cutout dimension (S.No. 14a & 14b).

Revision Number

S.No.	Rev.No.	Details	Date
01	01	In Ordering Information (S.No 15) : O option (Rated Phase current) for EO/EOR model included	22.10.21
02	01	In Ordering Information (S.No 15) : Model Number EOR details change	22.10.21
03	02	In Setting Ranges (S.No 10) : Tol range change for NINV1.3 & NINV3.0	25.10.21
04	03	In Setting Ranges (S.No 10) : Tol range change for NINV1.3 & NINV3.0	01.11.21
05	04	Include Environmental condition Table on Page 8	16.05.23
06	05	Removed ROHS compliance option from ordering information on page-14	22.11.23

NOTE

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