



Data Sheet

Earth Leakage Relay

RISH ELR/ELR+/ELR VI/ELR VI(NE)



Measure



Control



Record



Analyze



Optimize

Applications:

- ▶ Protection for Control panels and switch boards.
- ▶ Protection for Sensitive environment like chemical plants, Oil refiners.
- ▶ Protection for Mining and control Engineering.
- ▶ Earth Leakage Protection for Generators, Feeders, utility power monitoring, Transformers, Motor



Product Features:

▶ Leakage current monitoring in 1 & 3 phase system

▶ User selectable trip setting

Programmable trip setting from 30mA to 30A

▶ CBCT Open Detection

▶ Inverse Curve for higher Earth Leakage current protection.

▶ Multi Load Protection:

A single ELR+ can Protect two different Loads at a time with two CBCT input.

▶ Over Voltage Protection

▶ Under Voltage Protection

▶ Over Current Protection

▶ Under Current Protection

▶ Reverse Power Protection (3P4W balanced load, 3P3W balanced load, 1P2W)

▶ Earth to Neutral voltage measurement and Protection in RISH ELR VI (NE) model.

▶ True RMS measurement

The instrument measures distorted waveform up to 15th Harmonic.

▶ Auto re-closure / Manual reset

In auto re-closure mode instrument automatically tries to re-connect load within a programmable specified time. If the fault persists it disconnects the load. If device set into manual mode, then device must be reset manually by push button.

▶ Adjustable set point & set delay for

- Leakage Current
- Pre alarm
- Over Voltage
- Under Voltage
- Over Current
- Under Current
- Reverse Power

▶ 4 digits ultra bright LED display

▶ User selectable password protection

▶ Previous fault storage

Instrument memorizes the last 15 faults occurred.

▶ Trip relay cum DPM

▶ Test and reset key on front Panel display.

▶ Multi Parameter Protection:

Model Available with measurement and Protection of Multiple parameters like Voltage, Current and Leakage current of load in a single Device i.e ELR -VI.

▶ LED indication

- LED indication for relay-1, relay-2 status.
- LED indication EL for one CBCT model, EL1, EL2 for two CBCT model and V (Voltage), I (Current) and k for ELR VI Model.
- Trip indication are displayed on 4 Digit display.

▶ Device Configuration with PRKAB

Simply configure the RISH ELR using PRKAB interface.

▶ Compliance to International Safety standards

Compliance to International Safety standard IEC 61010 - 1 - 2010

▶ EMC Compatibility

Compliance to International standard IEC 61326



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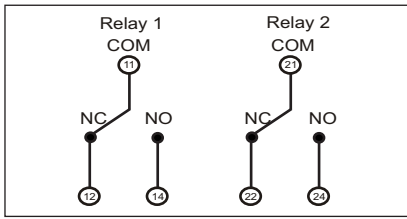


Analyze



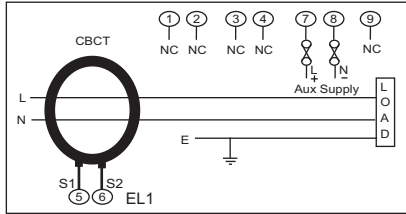
Optimize

Electrical Connection:

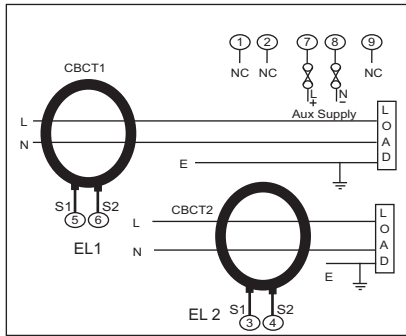


Relay Terminals for All Models

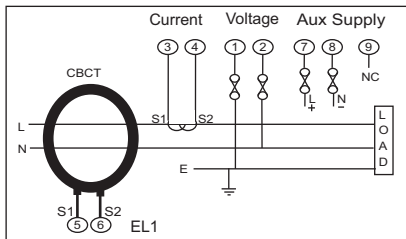
A) DIN RAIL MOUNTABLE ELR:



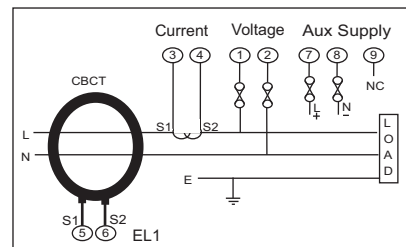
RISH ELR



RISH ELR+



RISH ELR - VI (For Earth to Neutral Voltage Measurement)



RISH ELR-VI

Technical Specifications:

Input

Leakage current ($I_{\Delta n}$)	30 mA to 30A
Tripping Range	80% to 100% of $I_{\Delta n}$

ELR - VI model

Nominal Input Voltage (AC RMS)	5 V AC (for Earth to Neutral Voltage measurement), 500 (V AC).
Max Continuous Input Voltage (OL Indication)	127% of PT Secondary
System PT Secondary range	1V to 5 VAC, 50V to 500 V programmable on site (as per resp. model).
System PT Primary range	50 to 1200 kV programmable on site. (Note: - Not applicable for 1 to 5V AC input).
Nominal Input Current (AC RMS)	5 A
Max Continuous Input Current (OL Indication)	145% of CT Secondary
System CT Secondary Values	1 A to 5 A programmable on site
System CT Primary Values	1A to 999 kA programmable on site
Operating Frequency Range	45 to 66 Hz

Auxiliary Supply:

Higher Aux	60 V – 300V AC-DC
Lower Aux	20-60VDC / 20-40 VAC
Aux supply frequency	45 to 66 Hz range

Accuracy :

Leakage Current	$\pm 5\%$ of Full Scale
Voltage	$\pm 1\%$ of nominal value
Input Current	$\pm 1\%$ of nominal value
Power	$\pm 2\%$ of nominal value
Trip, Pre Alarm time delays (for Leakage Current)	$\pm 5\%$ of Set Delay or ± 50 msec. (whichever is greater).
Power ON ,Reset, Trip (for Voltage & Current) time delays	$\pm 5\%$ of Set Delay or ± 140 msec. (whichever is greater).
Instantaneous tripping (Applicable for Leakage tripping)	<25msec for leakage current greater than $5 \times I_{\Delta n}$

Reference condition for Accuracy :

Reference Condition	23°C +/- 2°C
Input waveform	Sinusoidal (distortion factor 0.005)
Input Frequency	50 or 60 Hz $\pm 2\%$
Auxiliary supply voltage	230 VAC / DC $\pm 1\%$
Auxiliary supply frequency	50 or 60 Hz $\pm 1\%$
Input Voltage Range	50% to 125% of Pt Secondary
Input Current Range	20% to 140% of Ct Secondary



Measure



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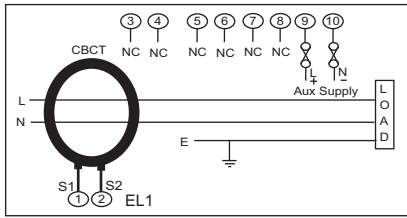
Analyze



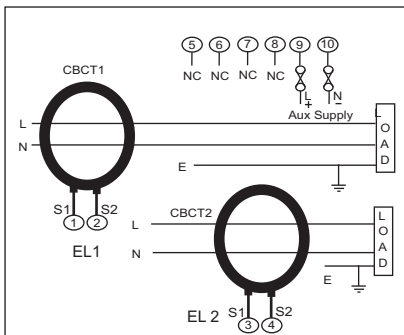
Optimize

Electrical Connection:

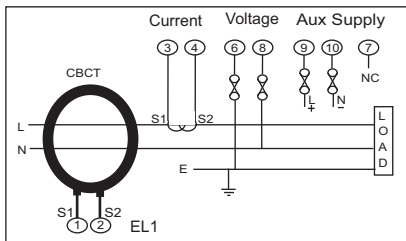
A) PANEL MOUNTABLE ELR:



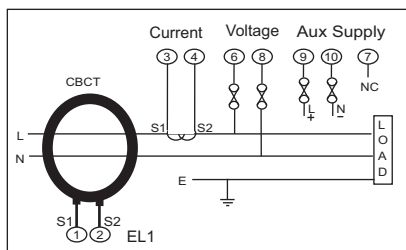
RISH ELR



RISH ELR+



RISH ELR - VI (For Earth to Neutral Voltage Measurement)



RISH ELR-VI

VA Burden

Input voltage burden	< 0.6 VA approx.
Input current burden	< 0.25 VA approx. per phase
Auxiliary supply burden	< 4 VA approx for AC aux.

Mechanical Attributes:

Weight	< 300g Aprox
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Applicable Standards:

Testing as per	IEC 60947- 2, Annex - M
EMC	IEC 61326-1:2012, Table 2
Immunity	IEC 61000-4-3. 10V/m min – Level 3

Safety use	IEC 61010-1-2010 , Permanently connected
IP for water & dust	IEC 60529
Pollution degree:	2
Installation category:	300 V CAT III / 600 V CAT II
High Voltage Test	2.2 KV AC, 50Hz for 1 minute between all

Environmental:

Operating temperature	-10 to + 55°C
Storage temperature	-25 to + 70°C
Relative humidity	0... 95% non condensing
Shock	15g in 3 planes
Vibration	10... 55 Hz, 0.15mm amplitude
Enclosure	IP20 (front face only)

Relay Contacts:

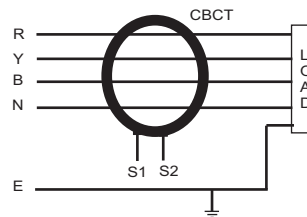
Types of output	1CO, 2CO, 1CO+1CO
Contact Ratings (Res. Load)	5A/250VAC/30VDC
Mechanical Endurance	1x10 ⁷ OPS
Electrical Endurance	NO- 3x10 ⁴ OPS

Maximum Cable Length for connection between Meter and CBCT : <1 Mtr

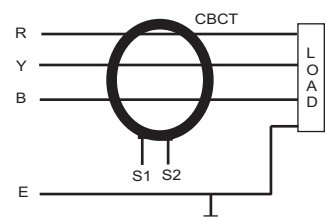
Note: - Use Twisted pair shielded cable. (Not to be run parallel to power cables).

Different Load Type CBCT connection Diagram:

3 Phase 4 wire connection



3 Phase 3 wire connection



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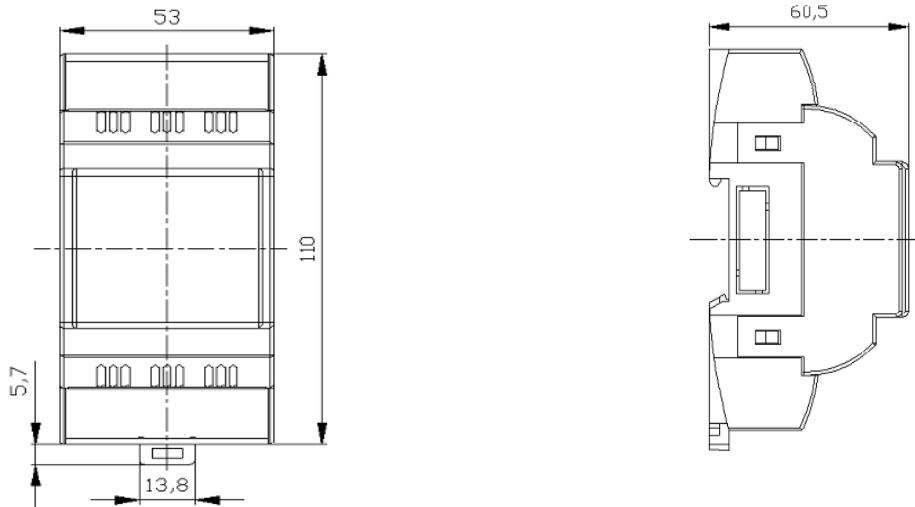
Analyze



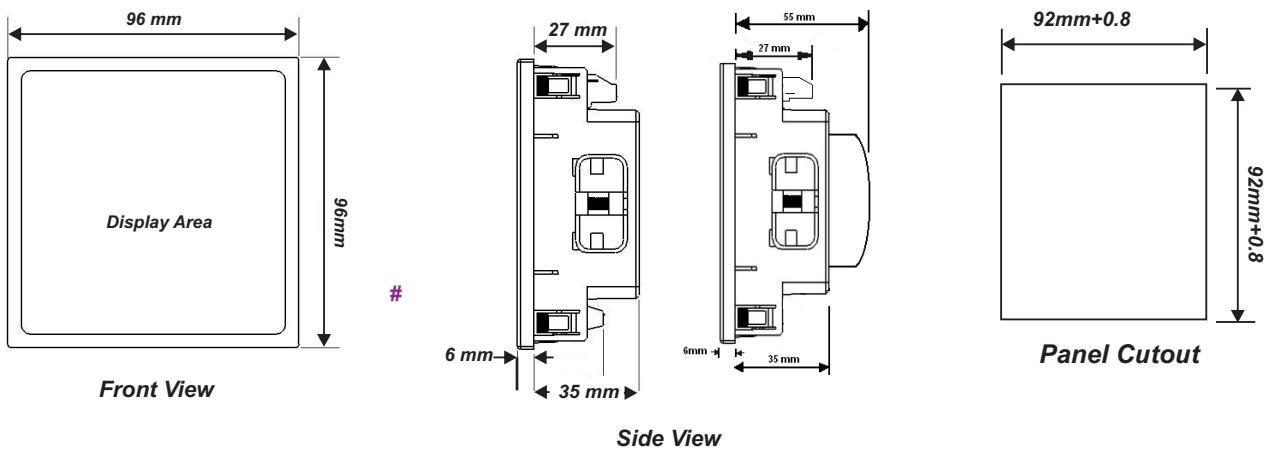
Optimize

Dimensions Details:

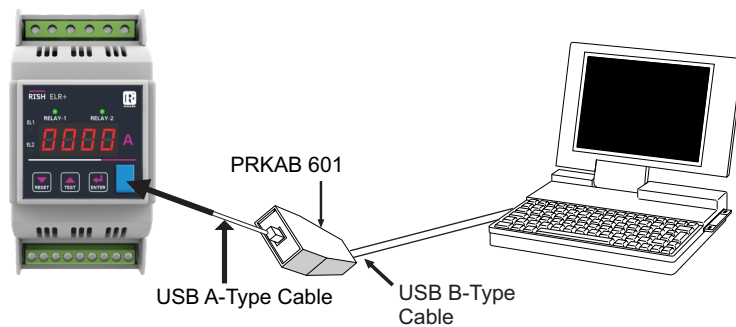
DIN RAIL MOUNTING:



PANEL MOUNTING:



USB Configuration with PRKAB:



Note: - ELR can be configured through PRKAB using standard Modbus protocol. Refer manual for details.
Note: - ELR 96x96 can be configured through PRKAB .USB Connector is at the back side of the housing.



Measure



Control



Record

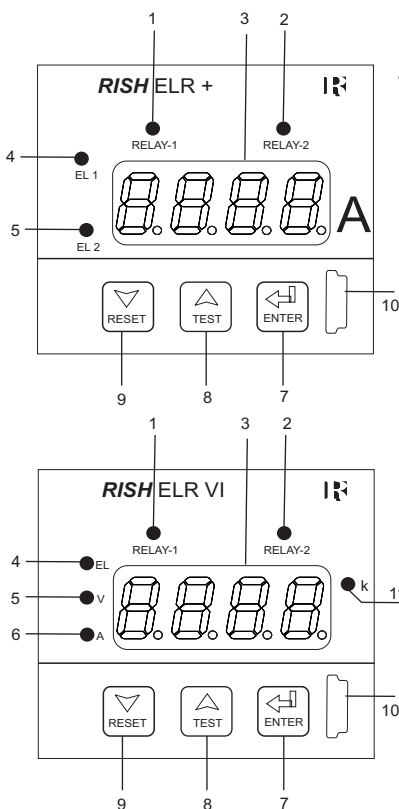


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Operating elements:



- 1/2 - Relay-1 and Relay-2 status LED : Indicates status of relay-1 and relay-2 respectively. Green Indicates Healthy condition & Red Indicates Faulty condition.
- 3 - 4 Digit ultra bright 7 seg LED Display.
- 4 - Indicates status of ELC1 (Earth Leakage Current 1).
- 5 - Indicates the status of voltage input.
(In case of model with two CBCTs (5) indicates status of ELC2 (2nd CBCT)).
- 6 - Indicates the status of current input
(Case (6) is only applicable to model with CBCT, current and voltage input.)
- 7 - Enter Key : Confirms changes of parameter setting. When on the measurement screen, holding for 3 sec enters in setup menu.
- 8 - Test Key : Increments setting value, move upwards in the menu or change parameter. It is also used to test operation of relay. Continuous holding of test key changes relay position and when release it resets the relay position (Only in healthy condition).
- 9 - Reset Key : Decrements setting value, move downwards in the menu or change parameter. It is also used to reset relay when manual reset mode is selected.
- 10 - USB configuration with PRKAB
(For Panel mounting model USB connector is at the back side).
- 11 - K LED : It is used to show Current, Voltage in kilo A, V (respectively for ELR VI Model).

Parameter Settings:

Parameters	RISH ELR	Factory Default Setting
Leakage current	30 mA to 30 A	30 mA
Hysteresis setting for (Leakage Current, Alarm)	5 - 40% [#]	15%
Hysteresis setting for (Voltage, Current)	3 - 15%	15%
Trip setting for pre alarm	50% to 80% of I _{Δn}	60%
Programmable Trip Delay (all parameters)	0 - 30 Sec	0 Sec
Programmable Delay for Power On	0.5 - 30 Sec	1 Sec
Programmable Delay for Auto reclosure	1 - 30 Sec	10 Sec
Programmable re-closure attempts	1 to 5	3
Relay Reset option	Auto-recloser / Manual	Auto-recloser
Relay configuration mode	Energize / De-energize	De-energize
Trip setting for over voltage *	101 - 125%	110%
Trip setting for under voltage *	70 - 99%	80%
Trip setting for over current *	101 - 140%	110%
Trip setting for under current *	20 - 99%	80%
Trip setting for Reverse power *	2 to 20%	10%
Hysteresis setting for (Reverse Power) *	5 - 15%	15%

Note: - Above mentioned Parameter settings are applicable as per feature available in the model.

* Only Applicable to ELR - VI Model.

Hysteresis Set point or 12mA whichever greater is applicable.

Instantaneous tripping is applicable only to Earth Leakage Current protection, not for Alarm.



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Inverse Curve Formula: $\text{Relay Operating Time} = \text{Set Trip Delay} \times \frac{\text{Trip Set value}}{\text{Measured value}}$

Hysteresis Calculation Method:

Example: -

A) For "OV" (Over Voltage)
 PT Secondary = 100 V
 Trip point = 105% of PT Secondary = 105 V
 Hysteresis = 3% of PT Secondary = 3 V
 Relay Reset point = Trip point - Hysteresis
 = 105 - 3
 = 102 V

Example: -

B) For Leakage Current
 Leakage Current setting = 10 A
 Tripping point = 80% to 100% of set Leakage Current = 8 - 10 A
 Hysteresis = 10% of set Leakage Current = 1 A
 Relay Reset point = Tripping point - Hysteresis
 = 8 - 1
 = 7 A

ELR Ordering Information:

Model Name	Description
RISH ELR	RISH ELR with single CBCT input
RISH ELR +	RISH ELR with two CBCT inputs
RISH ELR VI	RISH ELR with CBCT, current and voltage input(one each)

Model Name	1 CO	1 CO + 1CO	2 CO
RISH ELR	4000	4001	4002
RISH ELR +	×	4011	×
RISH ELR VI	×	4021	×
RISH ELR VI (NE)	×	4031	×
Auxiliary supply voltage	Description		
60 - 300V AC DC	HA		
20 - 60V DC / 20 - 40V AC	LA		
Size	Description		
DIN Rail Mount TS35	TS 35		
Panel mount 96X96	96		

× : Not Applicable

Note: - No need to specify secondary current as it is programmable from 1A to 5A for ELR - VI model.

RISH ELR VI (NE) can be used for Earth to Neutral Voltage measurement (Voltage Measurement range is 1 to 5 VAC).

ELR Order Code Example:

- 1] RISH ELR VI - 4021 - HA - TS35:-
 RISH ELR VI, 1CO + 1CO, higher auxiliary supply, DIN rail mounting.
- 2] RISH ELR+ - 4011 - LA -96:-
 RISH ELR+, 1CO + 1CO, lower auxiliary supply Panel Mount 96X96.
- 3] RISH ELR VI - 4031 - HA-TS35 :-
 RISH ELR VI (NE), 1CO + 1CO, higher auxiliary supply, DIN rail mounting.



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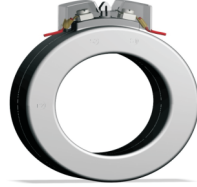
Core Balance Current Transformer (CBCT):-



RISH TWE - 73/30(50)



RISH TWE - 95/50(40)



RISH TWE - 135/85(30)

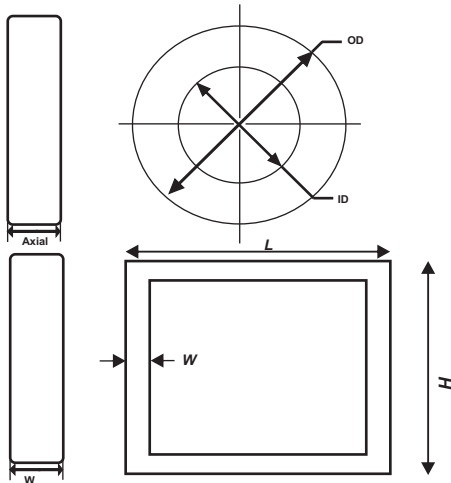


RISH TWE - 165/130(30)



RISH TWE - 260/200(22)

Dimensions :-



CBCT	Dimensions (in mm)			Current Ranges
	OD	ID	Axial	
RISH TWE - 73/30(50)	73	30	50	30mA to 30A
RISH TWE - 95/50(40)	95	50	40	30mA to 30A
RISH TWE - 135/85(30)	135	85	30	30mA to 30A
RISH TWE - 165/130(30)	165	130	30	500mA to 30A

CBCT	L	H	W	Current Ranges
RISH TWE - 260/200(22)	260	200	22	30mA to 30A

Models :-

- > RISH TWE - 73/30(50)
- > RISH TWE - 95/50(40)
- > RISH TWE - 135/85(30)
- > RISH TWE - 165/130(30)
- > RISH TWE - 260/200(22)

Features: -

- > Slim Design
- > Encapsulated CBCT
- > Compact in size
- > Light in Weight

CBCT Specifications: -

CBCT Type	: Closed Toroid
Turns Ratio	: 600 / 1A
Rated Current	: 30A
System Voltage	: 720 V maximum

System Frequency	: 50 Hz or 60 Hz
Insulation Voltage	: 3kV for 1 minute
Distance Between CBCT and ELR	: < 1 meters
Operating Temperature	: -10°C to +55°C

CBCT Ordering Information:

CBCT	Description
CBCT 73	RISH TWE - 73/30(50)
CBCT 95	RISH TWE - 95/50(40)
CBCT 135	RISH TWE - 135/85(30)
CBCT 165	RISH TWE - 165/130(30)
CBCT 260	RISH TWE - 260/200(22)

CBCT Order Code Example:

- 1] RISH CBCT 73 -2 :-
RISH CBCT TWE - 73/30(50), Quantity Two.
- 2] RISH CBCT 165 -1 :-
RISH CBCT TWE - 165/130(30), Quantity One.



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