We touch your electricity everyday!

CSENEX-I 100-Z1
Intelligent Measuring and Protection Device

CSENEX-I 100

C&S
electric

OVER CURRENT RELAY

TRIP   ON

EARTH

COMM   FACTORY PORT

CSENEX-I D: DRAWOUT

CSENEX
Series

Catalogue

C&S
electric

CE

PMD Division

INDEX

1) Introduction

CSENEX Series offers a compact Multi-functional Over-current protection solution for Feeder, Generator, Motor & Transformer segment.

CSENEX-I Family of protective relays are numeric relays that provides multi protection and monitoring with reliable and fast protection solution in a single unit.

In this family of CSENEX series, the CSENEX-I is an feeder protection solution which has fast, sensitive and secure protection for feeder internal & external faults.

CSENEX-I offers different model based features to cover the wide range of user.

2) Features

❖ 1A or 5A rated CT input

❖ Draw out with self CT shorting

❖ Single Phase Time Over-current protection (Model Dependent)

❖ Earth Time over-current and earth instantaneous over current (Model Dependent)

❖ Trip Counter

❖ Single Phase instantaneous protection (Model Dependent)

❖ Circuit Breaker Failure protection

❖ DO Programmable Matrix

❖ Fault Record

❖ Event Record

❖ Front USB Communication

3) Application

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

4) Hardware

❖ Micro controller based numeric design

❖ Measures true RMS with DFT filter

❖ Single Current analog input

❖ Max. 4 digital outputs

❖ Alpha numeric (12 x 2) LCD

❖ 5 Push button on the front for MMI

❖ USB communication

5) Protection Features

❖ Single phase time over current protection (51)

❖ Single phase instantaneous protection (50)

❖ Earth time over-current (51N)

❖ Earth instantaneous over-current (50N)

❖ Circuit breaker failure protection (50BF)

6) Functional Diagram
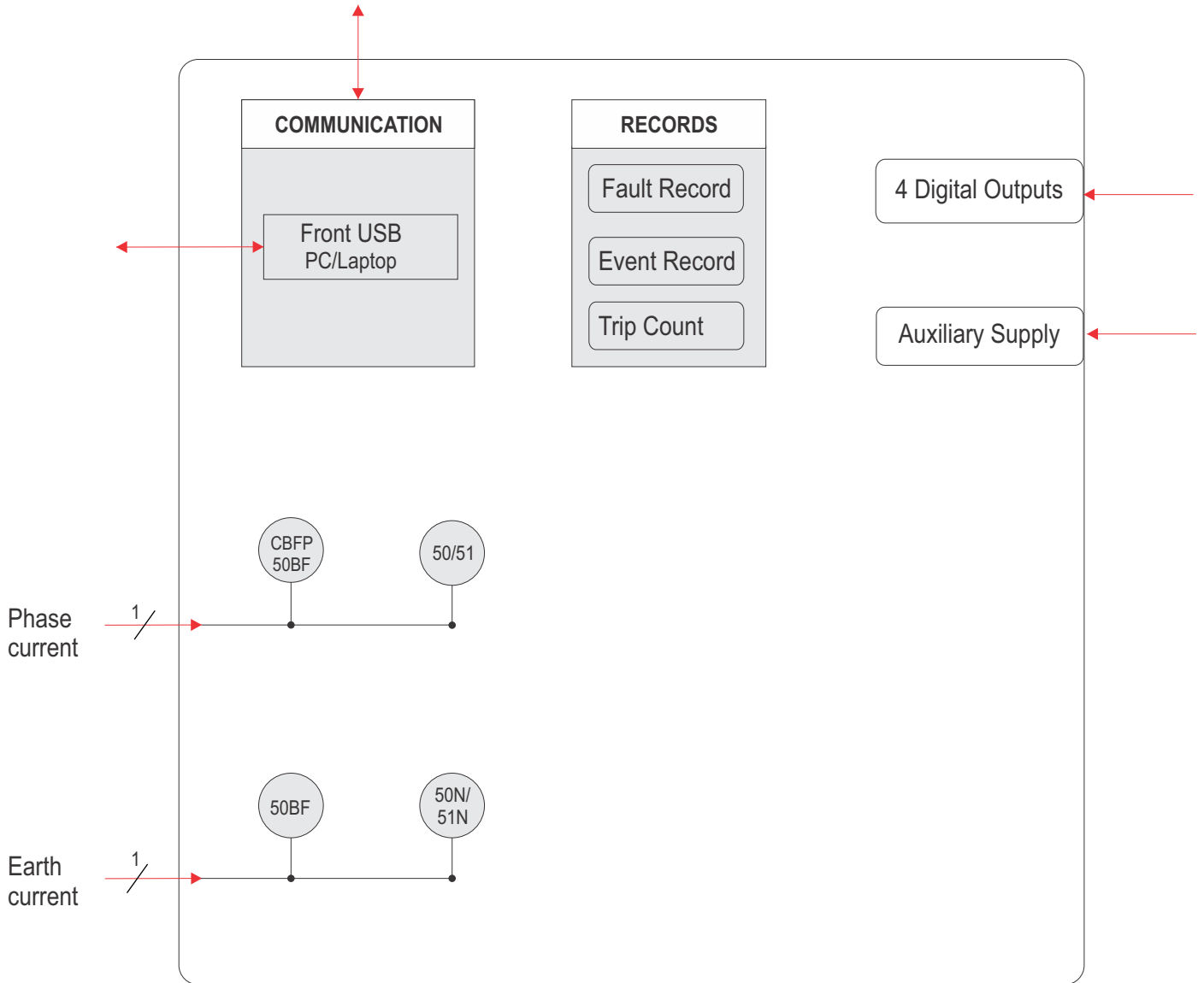
(Figure 1)

Protection Function

Single Phase Over-current Protection (50/51)

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

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

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

Long time Inverse
$$t = \frac{120}{(I/I_S) - 1} \quad t_i \ [s]$$

Normal Inverse 3.0/1.3 /0.6
$$t = \frac{0.14/0.061/0.028}{(I/I_S)\,0.02 - 1} \quad t_i \ [s]$$

Where t = Tripping time t_i = Time multiplier
           I = Fault current I_S = Setting value of current

For Current Range 0.2 to 20xIn:
Trip timing Accuracy :   VINV / NINV 3.0 / 1.3 : $\pm$5% OR $\pm$30mSec (whichever is higher)
                         EINV / NINV 0.6 / LINV : $\pm$7.5% OR $\pm$30mSec (whichever is higher)
For Current Range 0.05 to 0.2xIn:
Trip timing Accuracy :   VINV / NINV 3.0 / 1.3 : $\pm$20% OR $\pm$40mSec (whichever is higher)
                         EINV / NINV 0.6 / LINV : $\pm$20% OR $\pm$40mSec (whichever is higher)

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.

Restricted Earth Fault

Earth fault relay can be used for restricted earth fault application by using an external stabilizing resistance. The protection relay is connected to the differential circuit of the cts as a current differential protection relay. When used as zero-current differential protection (restricted earth fault), the relay is to be connected according to figure 7.

7) Fault Recording

CSENEX-I records last 10 faults in its non volatile memory with it's time stamp. Each record has the following information:
Fault Format
[F] IL1   :   00.00A
[F] Ie   :   00.00A
HOUR MIN   :   HH:MM
SEC mSEC   :   Sec:mSec
F-TYPE   :   FAULT TYPE
Where
[F][IL1]   Magnitude of phase current's.
[F]Ie   Magnitude earth fault current's
F-TypeOrigin of fault (over current, negative phase sequence, etc.)
whenever the available memory space is exhausted the new fault automatically over writes the oldest fault. When the relay trips the description of fault in the feeder will appears on the LCD screen automatically and by pressing 'i'key one can easily get all the detailed information of that fault.

The user can view the fault record via the front USB interface software.
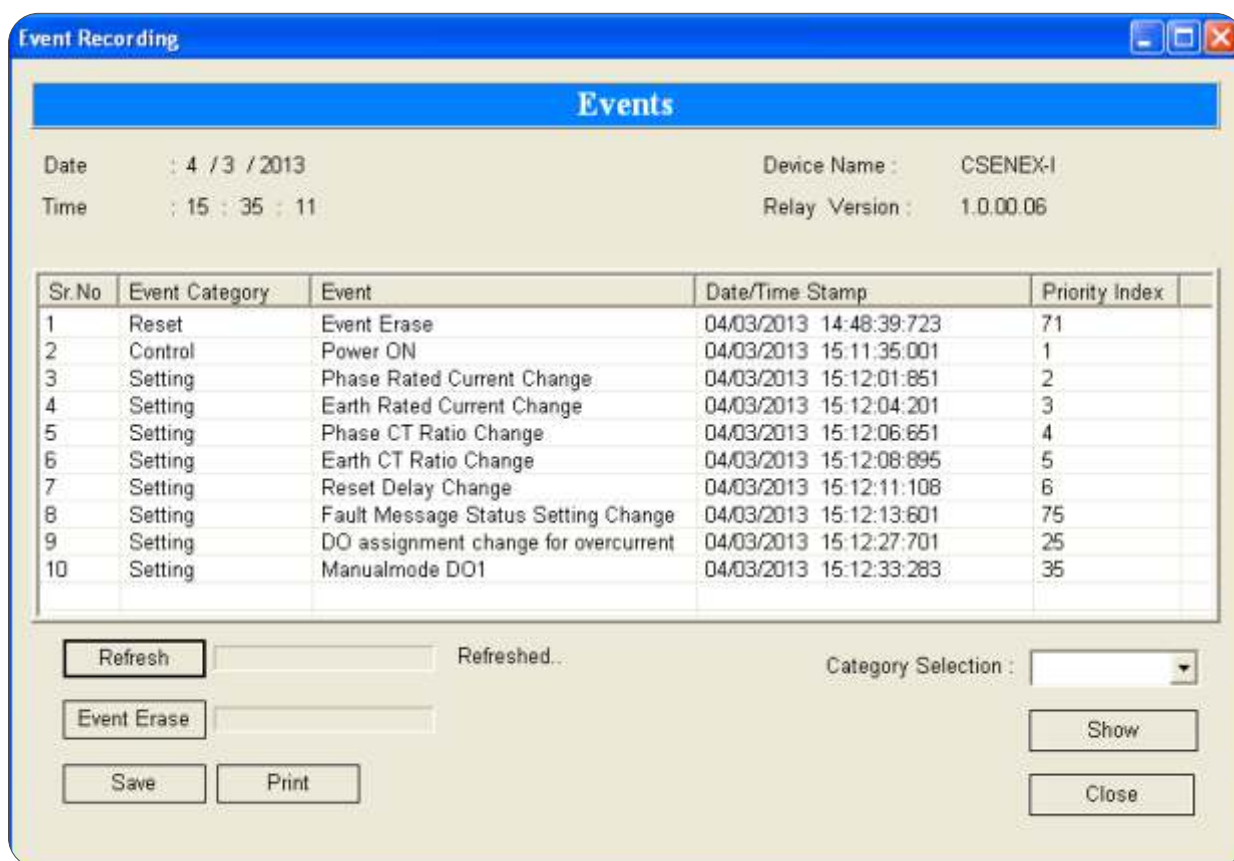
8) Event Recording

The unit stores in non volatile memory the last 16 events. When the available memory space is exhausted, the new event automatically overwrites the oldest event which can be retrieved from a PC, with the following format:

EVENT	:	EVENT NUMBER
HOUR	:	HH:MM
SEC mSEC	:	SEC:mSEC
DATE	:	DD/MM/YY

The user can view event records via the front USB interface software.

* Description of event number available in event list or in front end software

Event Recording

Events

Date   : 4 / 3 / 2013   Device Name :   CSENEX-I
Time   : 15 : 35 : 11   Relay Version :   1.0.00.06

Sr.No	Event Category	Event	Date/Time Stamp	Priority Index
1	Reset	Event Erase	04/03/2013 14:48:39:723	71
2	Control	Power ON	04/03/2013 15:11:35:001	1
3	Setting	Phase Rated Current Change	04/03/2013 15:12:01:851	2
4	Setting	Earth Rated Current Change	04/03/2013 15:12:04:201	3
5	Setting	Phase CT Ratio Change	04/03/2013 15:12:06:651	4
6	Setting	Earth CT Ratio Change	04/03/2013 15:12:08:895	5
7	Setting	Reset Delay Change	04/03/2013 15:12:11:108	6
8	Setting	Fault Message Status Setting Change	04/03/2013 15:12:13:601	75
9	Setting	DO assignment change for overcurrent	04/03/2013 15:12:27:701	25
10	Setting	Manualmode DO1	04/03/2013 15:12:33:283	35

Refresh   Refreshed..   Category Selection :

Event Erase   Show

Save   Print   Close

(Figure 2) (Event Data Recording on PC Software)

9) Human Machine Interface

It comprises of bright LCD display

- ❖ Four push switches for setting values of normal tripping characteristics and other operations for local access.
- ❖ One 'RESET' push switch.
- ❖ One push switch for the functions assigned in the 'HMI'.
- ❖ LEDs for pickup or tripping on Fault.

Keys	Manual Key
i	is used as intelligent key to see the details of last fault and Relay status.
↵	is used as a "ENTER" key.
R	is used to manual reset (after pressing for 2 sec)
▼	is used to scroll in downward direction.
▲	is used to scroll in upward direction.

(Fig-3) HMI with Earth option
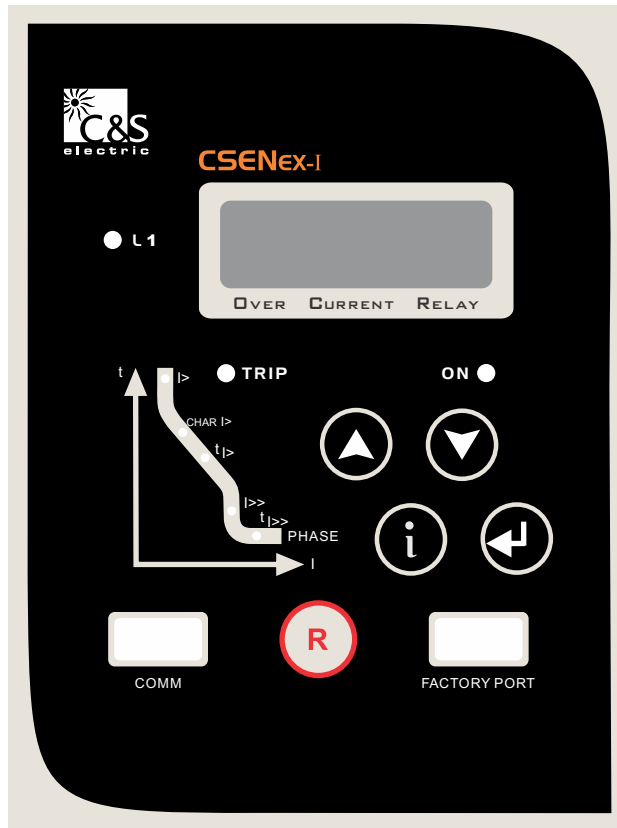
(Fig-4 HMI with Phase option)

Output Contacts

No. of digital outputs	:	4 (DO1, DO2, DO3, Do4)
		[2 Change Over, 2 Normal Open]
Type of outputs	:	Relay
Programmable (DO Assignment)	:	Yes
Relay reset type	:	Programmable (Auto/Manual)

10) Communication

Front Communication

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

Rear Communication * (Model dependent)

The protocol for the rear port is IEC-60870-5-103.

11) Setting Ranges
CSENEX-Ixxx Setting
Over Current & Earth Protection *

S. No	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	Phase over-current characteristics	PCh			DEFT/EINV/VINV /LINV/NINV1.3/ NINV3.0/NINV0.6	DEFT
2	Earth over-current Characteristics	ECh			DEFT/EINV/VINV /LINV/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>	$0.05xI_p$ 0.1 Sec 0.01	$4.0xI_p$ 150 Sec 1.50	$0.01xI_p$ 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>>	$0.5xI_p$ 0.03 Sec	$30xI_p$ 20 Sec	$0.1xI_p$ 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	Ie> te> tie>	$0.05xI_n$ 0.03 Sec 0.01	$2.5xI_n$ 150 Sec 1.50	$0.01xI_n$ 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	Ie>> te>>	$0.5xI_n$ 0.03 Sec	$8xI_n$ 20 Sec	$0.05xI_n$ 0.01 Sec	EXIT 0.10 Sec

Note = * Availability as per model selection.

Circuit Breaker Failure Protection

S.No.	Parameter	Display	Min	Max	Step Size	Default
1	CBFP	t_CBFP	0.03	2	0.01	EXIT

DO Reset

S.No.	Display	Setting	Default
1	DO-1	Auto/Manual	Auto
2	DO-2	Auto/Manual	Auto
3	DO-3	Auto/Manual	Auto
4	DO-4	Auto/Manual	Auto

Erase Record

S.No.	Parameter	Display	Min	Max	Step Size	Default
1	Event Erase	Events	NO	YES	-----	NO
2	Fault Erase	Faults	NO	YES	-----	NO
3	Trip Counter Erase	TRP_CNT	NO	YES	-----	NO

DO Assignment *

S.No	Parameter	Display	Min	Max	Default
1	Phase over-current low set	I>	1	1234	----
2	Phase over-current hi-set	I>>	1	1234	----
3	Earth over-current low set	E>	1	1234	----
4	Earth over-current hi-set	E>>	1	1234	----
5	Self supervision	Slfsup	1	1234	----
6	Circuit breaker failure protection	CBFP	1	1234	----

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

S.No.	Parameter	Display	Setting Range		Step Size	Default
			Min.	Max.		
1	Rated phase current *	Ip	-----	-----	-----	1/5 A
2	Rated earth current *	In	-----	-----	-----	1/5 A
3	Phase CT ratio	P-CTR	1	9999	1	1
4	Earth CT ratio	E-CTR	1	9999	1	1
5	Reset Delay	Rstdl	0 Sec	20 Sec	0.1 Sec	0
6	Fault Message Status	F-Stats	NO	YES	-----	NO

Note = * Availability as per model selection.

USB Communication	
Protocol	CSE proprietary protocol: available with front software
Baud rate	19200 bps
Cable required for interface	USB cable type (A to A)

Auxiliary Supply

Auxiliary Voltage Range	For 'W1' Model	18V-150V DC
	For 'H' Model	85V-280V AC / 100V-300V DC
Power Consumption	Quiescent approx. 3W	Operating approx. <7W

Measurement Accuracy

S.No	Quantity	Range	Frequency Range	Accuracy
1	Current	1.0 - 30 xI_p (for Phase) 1.0 - 15 xI_n (for Earth)	50 Hz	$\pm$2%

12) Technical Data

Measuring Inputs

Rated Data	Rated current I_p :1A or 5A Rated frequency F_n : 50 Hz/60Hz
Drop out to Pickup Ratio	>96%
Power consumption in current circuit	At I_p=1A 0.2 VA At I_p=5A 0.4 VA
Thermal withstand capability 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

13) Mechanical Test

| Shock	As per DIN IEC 41 B (CO) 38: class 1
Vibration	As per DIN IEC 41 B (CO) 35: class 1
Protection-Front Panel	IP-54
Protection-Rear Panel	IP-00
Weight	Approx. 1.5 Kg

14) Type Test

DESIGN STANDARD		
Specified ambient setvice temp. range	:	VDE 04355 part 303, IEC 255-4, BS 142
For storage	:	40^{0}C to + 85^{0}C
For operation	:	-20^{0}C to 70^{0}C
Environmental protection class 'F' as per DIN 40040 and per DIN IEC 68, part 2.3	:	relative humidity 95% at 40^{0}C for 56 days.
Isolation test voltage, inputs and outputs between themselves and to the relay frame as per VDE 0435, part 303	:	2.5 KV (eff. / 50 Hz, 1 min.)
Impulse test voltage, inputs and outputs between themselves and to the relay frame as per VDE IEC 0435, part 303	:	5 KV, 1.2/50ms, 0.5J
High frequency interference test voltage, inputs and outputs between themselves and to the relay frame as per DIN IEC 255, part 22-1	:	2.5 KV/1MHz
Electrical fast transient (burst) test as per DIN VDE 0843 part 4	:	4KV / 2.5 kHz, 15ms
Radio interference suppression test as per DIN VDE 57 871	:	Limit value class 'B'
Electrostatic discharge (ESD) test as per DIN VDE 0843 part 2	:	8 KV
Radiated electromagnetic field test as per VDE 0843 part2	:	10 V/m

15) Relay Contact Rating

Contact rating	
Contact relay	Dry contact Ag Ni
Make current	Max. 30A & carry for 1S
Carry capacity	6A continuous for All contacts
	Rated voltage： 300V AC/ 30V DC
Breaking characteristics	
Breaking capacity AC	1500VA resistive
	1500VA inductive (PF=0.5)
	220V AC, 6A (cos Ø <=0.6)
Breaking capacity DC	135V DC, 0.3A (L/R=30ms)
	250V DC, 50W resistive or
	25W inductive (L/R=40ms)
Operation time	<10ms
Durability	
Loaded contact	30000 operation minimum
Unloaded contact	10000 operation minimum

Over-voltage category : II
Insulation voltage : 300V
Pollution Degree : 2
IP 54 from Front

16) Connection Diagram
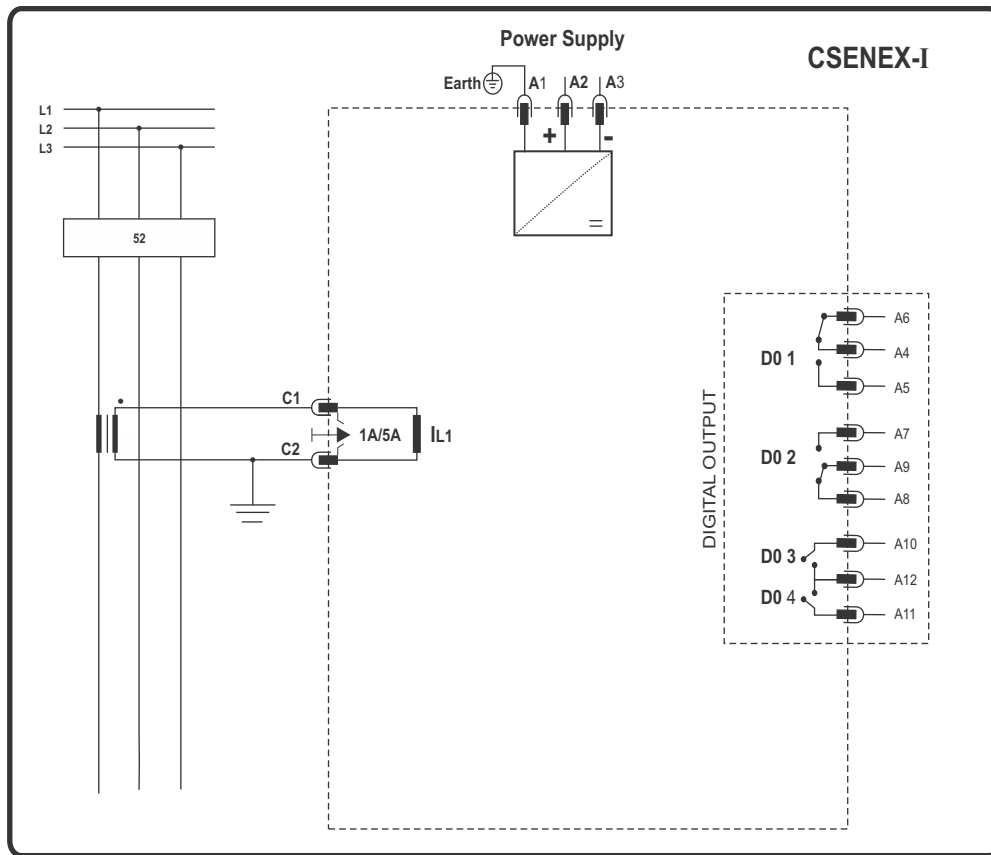
(1A or 5A Phase model)

(Figure 5)

Terminal Description

Terminal Name		Terminal Description
A1	:	Auxiliary Supply Earth
A2-A3	:	Auxiliary Supply (A2: + & A3: -)
A12-A11	:	Potential free Digital Output 4
A12-A10	:	Potential free Digital Output 3
A7-A9-A8	:	Potential free Digital Output 2 (change over)
A6-A4-A5	:	Potential free Digital Output 1 (change over)
C1-C2	:	CT Terminal for Phase or Earth current input (1A or 5A)

17) Connection Diagram
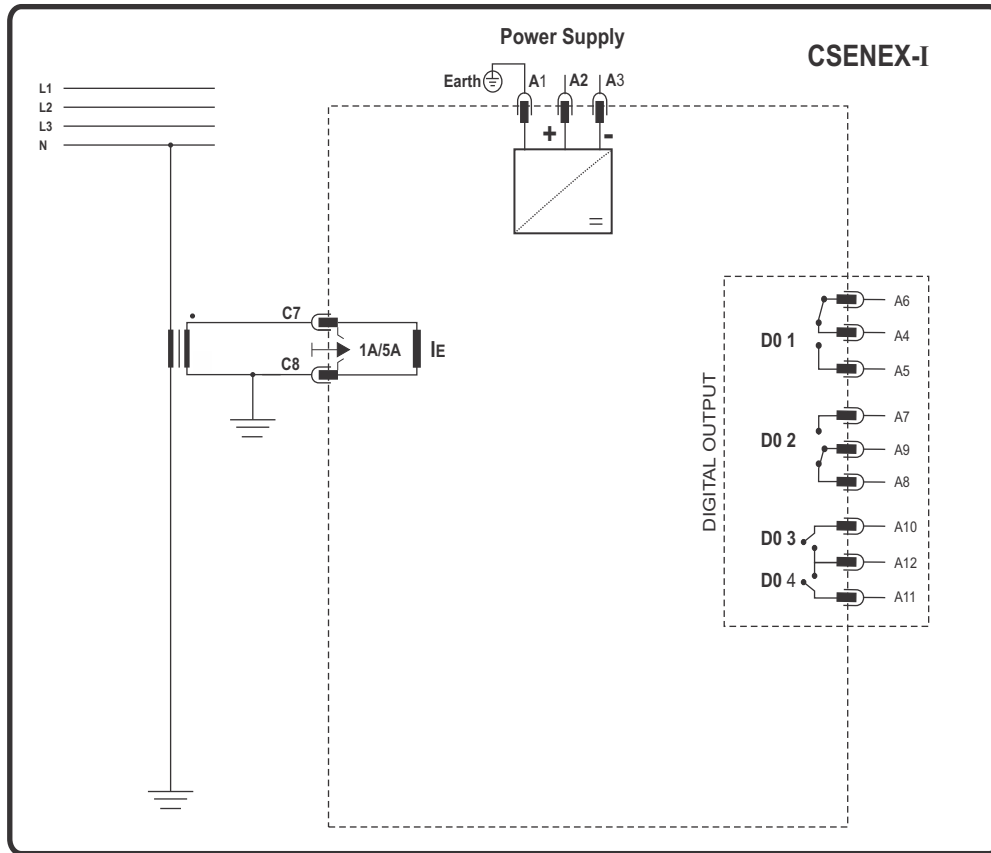
(1A or 5A Earth model)

(Figure 6)

Terminal Description

Terminal Name		Terminal Description
A1	:	Auxiliary Supply Earth
A2-A3	:	Auxiliary Supply (A2: + & A3: -)
A12-A11	:	Potential free Digital Output 4
A12-A10	:	Potential free Digital Output 3
A7-A9-A8	:	Potential free Digital Output 2 (change over)
A6-A4-A5	:	Potential free Digital Output 1 (change over)
C7-C8	:	CT Terminal for Phase or Earth current input (1A or 5A)

18) Restricted Earth Fault Connection Diagram
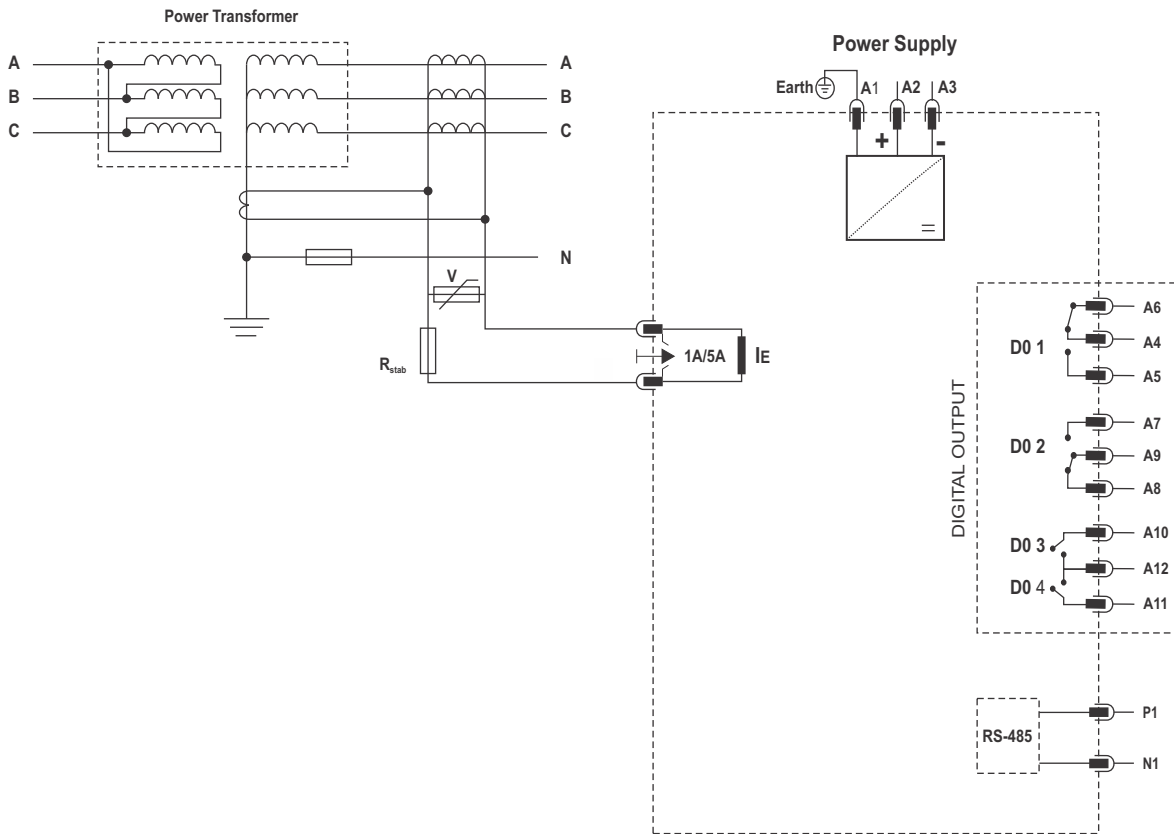
(Figure 7)

19) Back Terminal Diagram
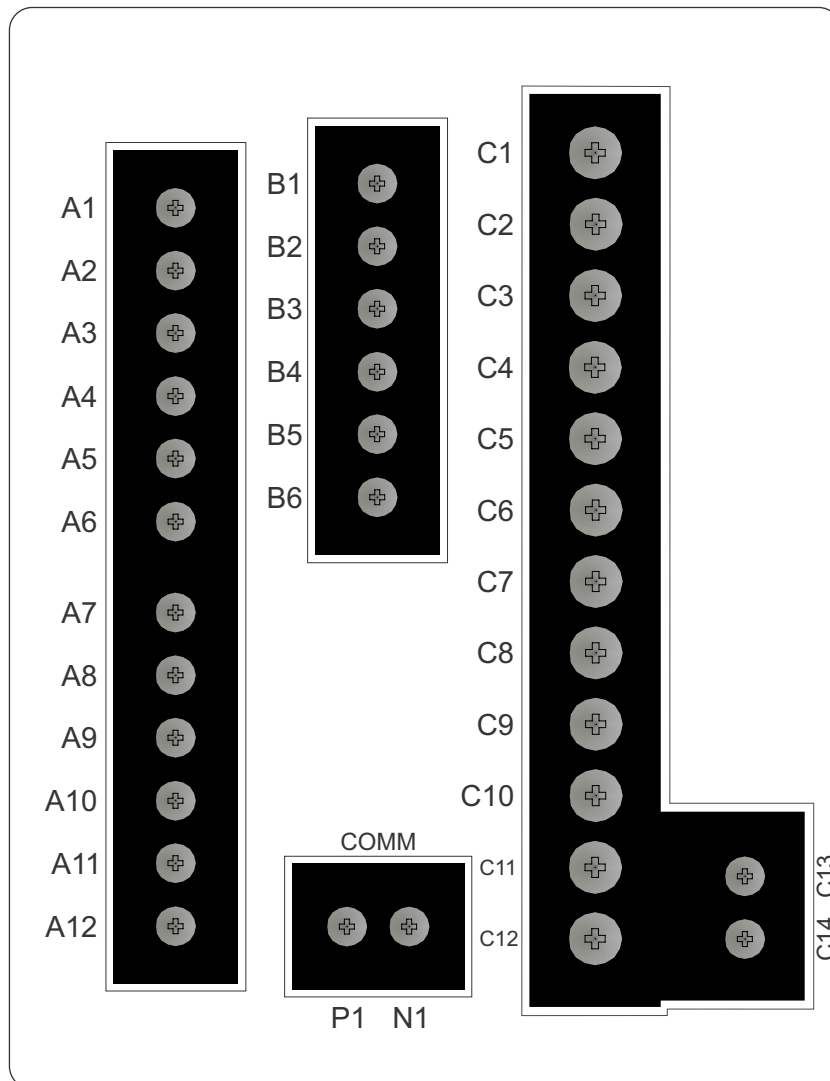
(Figure 8)

20) Model Selection Table

Function	ANSI	NEX-I-100	NEX-I-101
CT inputs	–	4	4
Over current	50/51	✓	✓
Earth fault	50N/51N	✓	✓
CBFP	50BF	✓	✓
Trip circuit	74TC	x	✓
Inrush blocking	51H	x	✓
Digital input	–	x	2
Digital output	–	4	4
Fault record	–	10	10
Event record	–	16	16
Selection of 1/5A	–	○	○
Front communication	–	✓	✓

○ : Optional based on Ordering Information

21) Dimensional Details

Panel cutout dimensions: WxH = 112.0x145.0mm

Front View

125.0

154.0

CSENₑₓ-I

OVER CURRENT RELAY

TRIP   ON

EARTH

COMM   FACTORY PORT

(Figure 9)

112.0

145.0

Panel cutout
Dimensions
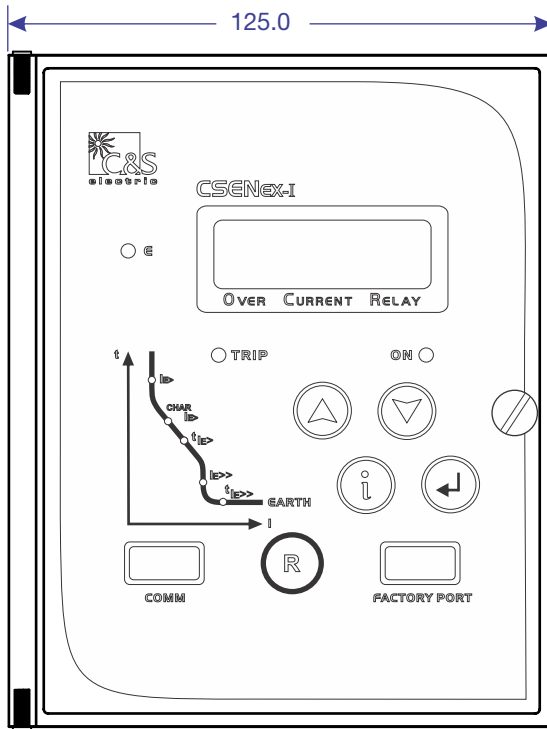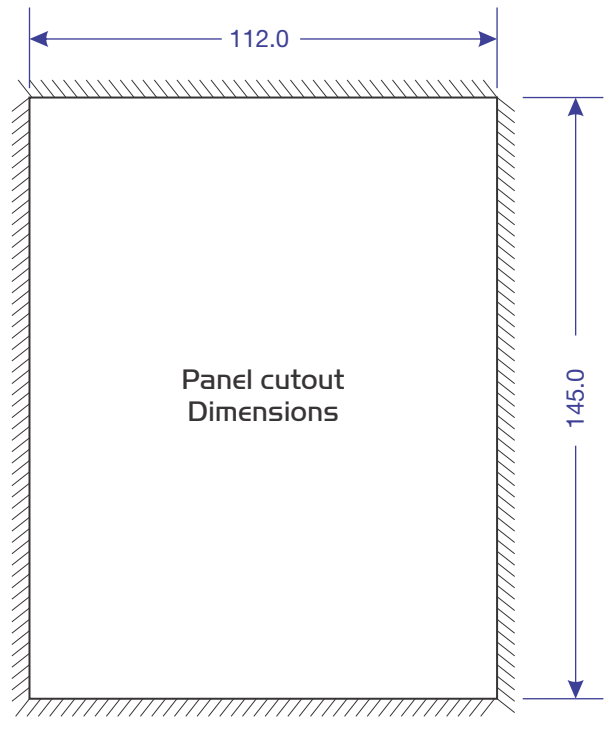
(Figure 10)

Side View

156.0
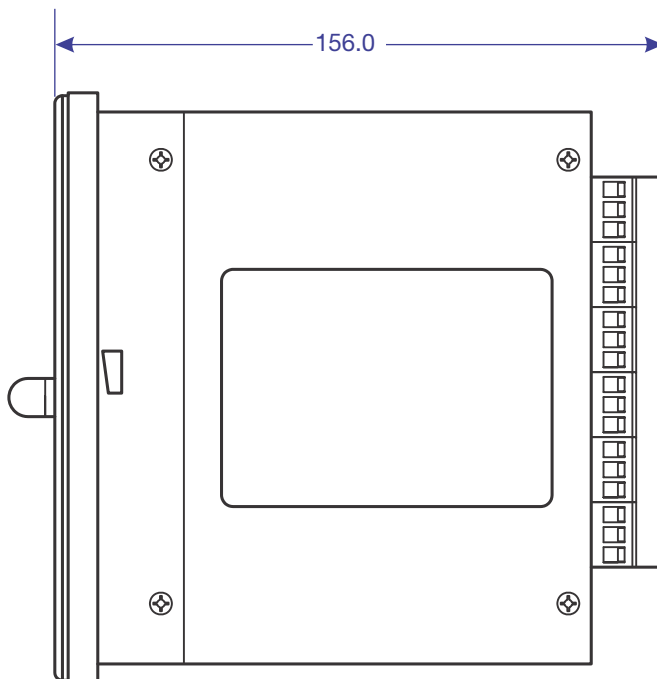
(Figure 11)

22) Ordering Information

CSENEX-I – **X** – **X** – **X** – **X** – **X** – **X** – **X**

Model No.

-100

Element

-P : Phase (Single)

-E : Earth

Rated Current

-1: 1A Rated Phase & Earth Current

-5: 5A Rated Phase & Earth Current

CT Shorting

-D: Draw out (with CT shorting)

Communication

-0 : Without Communication

-I : IEC-103

Aux Supply

-W1: 18V - 150V DC

-H: 85V - 280V AC / 110V - 300V DC

-Z1: Customer specific model

EXAMPLE: CSENEX-I-100-P-1-D-I-W1-Z1

CSENEX-I 100-Z1 Catalogue

Revision History

S.No.	Rev.No.	Details	Date
01	02	Inclusion of Restricted earth Fault Conn. Diagram on page 14	03.06.15
02	03	Change in "Index" on Page 2	06.07.15

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

Issue Date: 04.02.14
Rev.No: 03
Rev. Date: 06.07.15

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

We touch your electricity everyday!