

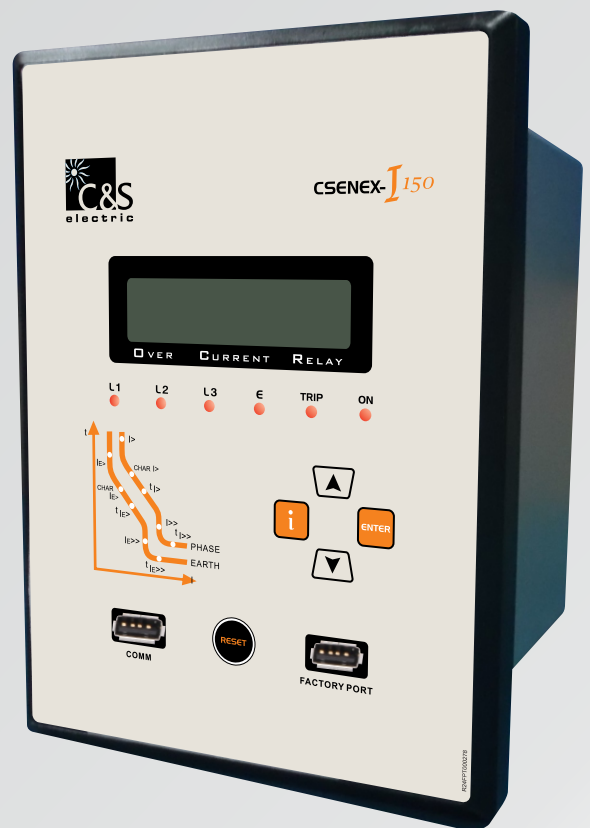
We touch your **electricity** everyday!

CSNEX-I 150

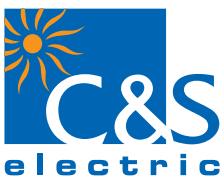
Intelligent Measuring & Protection Device



CSNEX
CSNEX
CSNEX
CSNEX
Series



Catalogue



Over Current Protection Relay

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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 150 is an advanced 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 & 5A rated CT input (programmable)
- ❖ Draw out with self CT shorting
- ❖ DI/DO programmable matrix
- ❖ Protection blocking through DI
- ❖ Three phase time over-current protection
- ❖ Three phase instantaneous protection
- ❖ Earth time over-current and earth instantaneous over current
- ❖ Circuit breaker failure detection
- ❖ Trip circuit supervision
- ❖ Cold Load pickup
- ❖ Harmonic Blocking
- ❖ Two sets of setting groups
- ❖ Fault recorder
- ❖ Event recorder
- ❖ Communication (Local & Remote)

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.

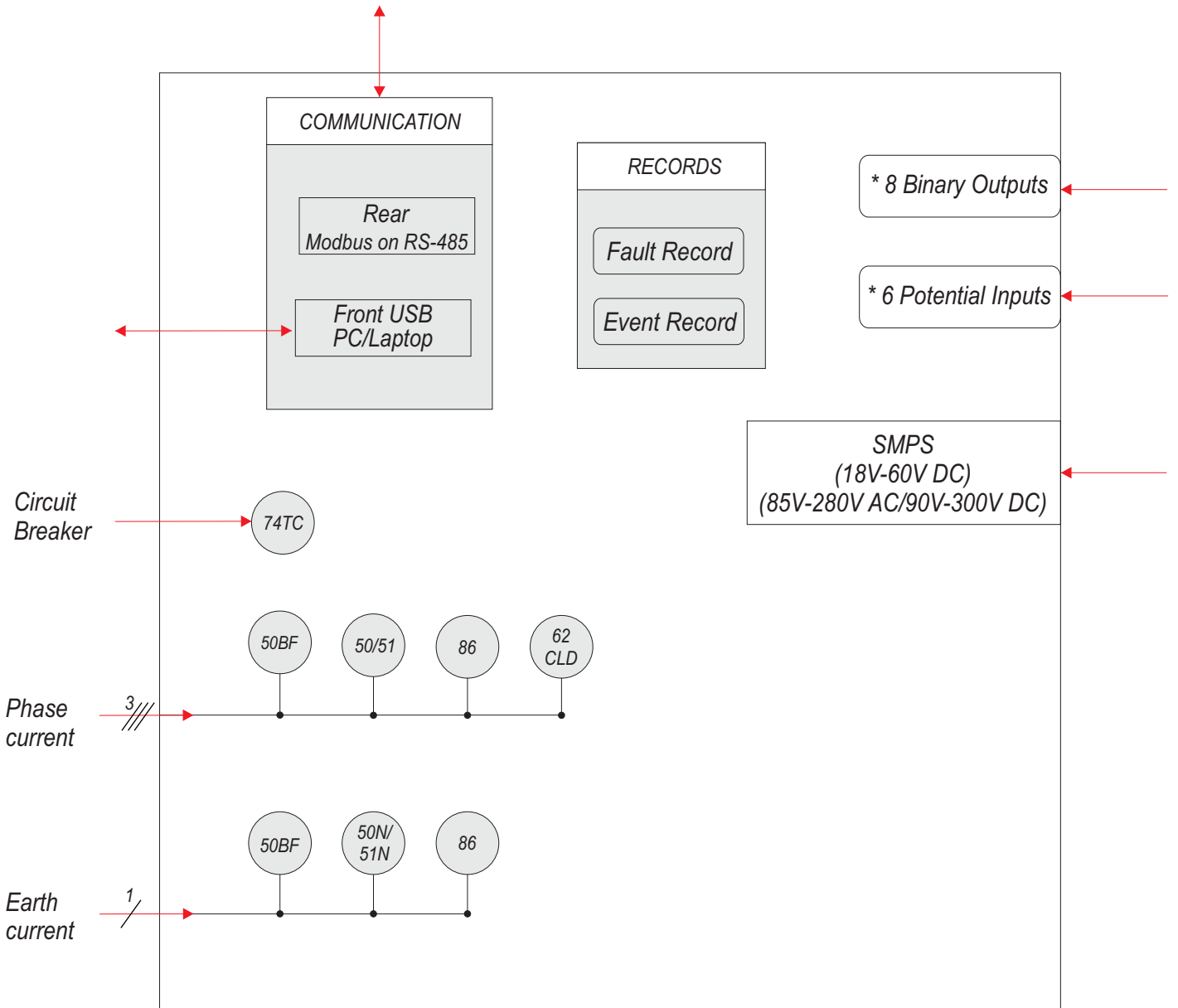
4) Hardware

- ❖ Measures true RMS with DFT filter
- ❖ 4 Current analog inputs for phase & earth fault current
- ❖ Max. 6 Digital Inputs
- ❖ Max. 8 Digital Outputs
- ❖ 16 x 2 Alpha-numeric LCD
- ❖ RS-485 & USB communication
- ❖ 1A & 5A site selectable
- ❖ 16 LEDs for Pickup & fault annunciation
- ❖ CT Terminal with Self shorting

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)
- ❖ Harmonic Blocking
- ❖ Cold Load Pickup (62 CLD)
- ❖ Trip Circuit Supervision (74TC)

6) Functional Diagram



(Figure 1)

* Based on Ordering Information

Protection Function

Three 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.

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, earth fault, earth high set etc. This parameter will not work when manual reset mode is selected.

Trip Circuit Supervision (74TC)

This feature continuously supervises trip circuit of both pre closing and post closing conditions in circuit breaker. It detects tripping mechanism failure like circuit breakage contact degeneration in wires, contacts and coils.

Note: Trip counter is incremented on the basis of getting trip command from relay and not on the basis of external mechanism (circuit breaker) operation.

Very Inverse	t=	$\frac{13.5}{(I/IS) - 1}$	ti [s]
Extremely Inverse	t =	$\frac{80}{(I/IS)^2 - 1}$	ti [s]
Long time Inverse	t=	$\frac{120}{(I/IS) - 1}$	ti [s]
Normal Inverse 3.0/1.3/0.6 t=	t=	$\frac{0.14/0.061/0.028}{(I/IS)^{0.02} - 1}$	ti [s]

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

Trip timing Accuracy : DEFT/ NINV 0.6 / NINV 3.0 / 1.3 : ±5% OR ±30mSec (whichever is higher)
 EINV / VINV / LINV : ±7.5% OR ±40mSec (whichever is higher)

Cold Load Pickup (62 CLD)

This function aims to avoid non-desired trips in the following situation: after being the line de-energized for a period of time and re-energized later, the load can exceed the protection setting without the presence of a fault. This may be due to the accumulative inrush current caused when connecting all the loads (furnaces, heaters, coolers etc.) at the same time.

CSENEX relay is detecting when those conditions are given and replacing the active group setting during a programmable time by other group settings.

Harmonic Blocking

Harmonic setting is by default 20% of injected current. Phase/Earth Harmonics can be Blocked/Unblocked & time setting can also be edited through MMI. If the Pickup current has %harmonics above 20%, the protection will be blocked for the harmonics blocking time. Tripping occurs according to the higher time setting i.e. if the harmonics time setting is greater it will trip according to the harmonics time setting otherwise according to the fault time setting.

NOTE: Trip Test is available in HMI to check all LEDs and Digital Output (Relay)

7) Fault Recording

CSENE-X-I records last 10 faults in its non volatile memory with it's Date & time stamp. Each record has the following information:

fault Format

[F]IL1 : 00.00A
 [F]IL2 : 00.00A
 [F]IL3 : 00.00A
 [F]Ie : 00.00A
 HOUR MIN : HH:MM
 SEC mSEC : Sec:mSec
 F-TYPE : FAULTTYPE

Where

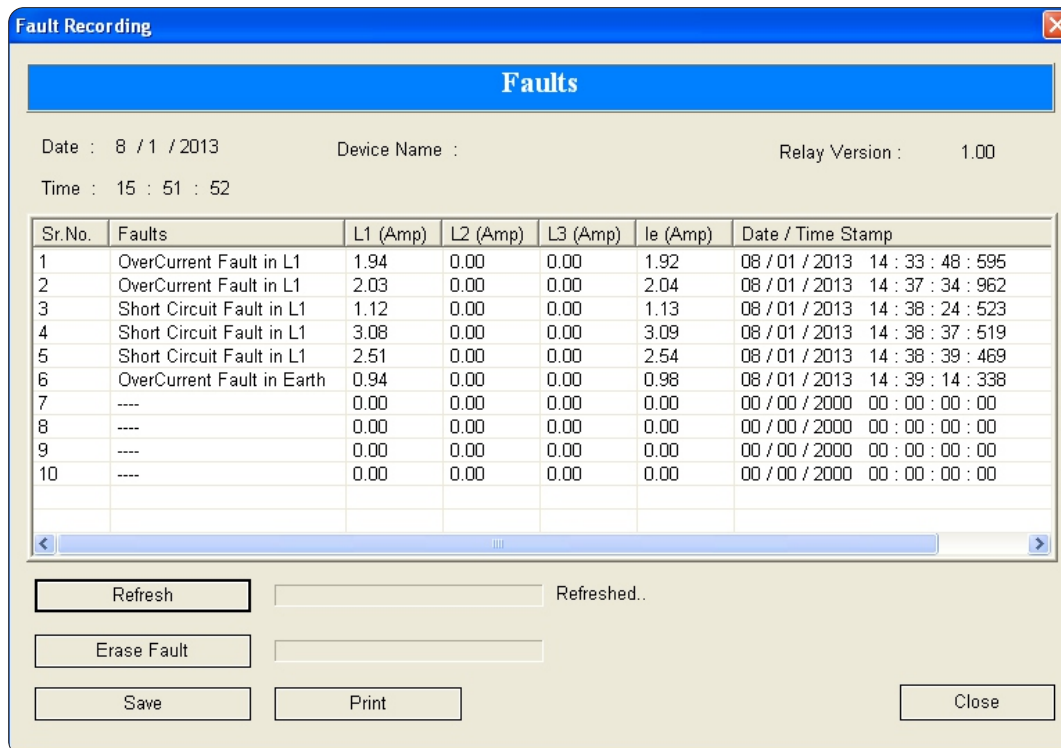
[F][ILx] Magnitude of phase current's.

[F]Ie Magnitude earth fault current's

F-Type Origin of fault (over current 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 either via the front USB interface software or remotely via the RS-485 communication. (See figure-2)



Sr.No.	Faults	L1 (Amp)	L2 (Amp)	L3 (Amp)	Ie (Amp)	Date / Time Stamp
1	OverCurrent Fault in L1	1.94	0.00	0.00	1.92	08 / 01 / 2013 14 : 33 : 48 : 595
2	OverCurrent Fault in L1	2.03	0.00	0.00	2.04	08 / 01 / 2013 14 : 37 : 34 : 962
3	Short Circuit Fault in L1	1.12	0.00	0.00	1.13	08 / 01 / 2013 14 : 38 : 24 : 523
4	Short Circuit Fault in L1	3.08	0.00	0.00	3.09	08 / 01 / 2013 14 : 38 : 37 : 519
5	Short Circuit Fault in L1	2.51	0.00	0.00	2.54	08 / 01 / 2013 14 : 38 : 39 : 469
6	OverCurrent Fault in Earth	0.94	0.00	0.00	0.98	08 / 01 / 2013 14 : 39 : 14 : 338
7	----	0.00	0.00	0.00	0.00	00 / 00 / 2000 00 : 00 : 00 : 00
8	----	0.00	0.00	0.00	0.00	00 / 00 / 2000 00 : 00 : 00 : 00
9	----	0.00	0.00	0.00	0.00	00 / 00 / 2000 00 : 00 : 00 : 00
10	----	0.00	0.00	0.00	0.00	00 / 00 / 2000 00 : 00 : 00 : 00

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

8) Event Recording

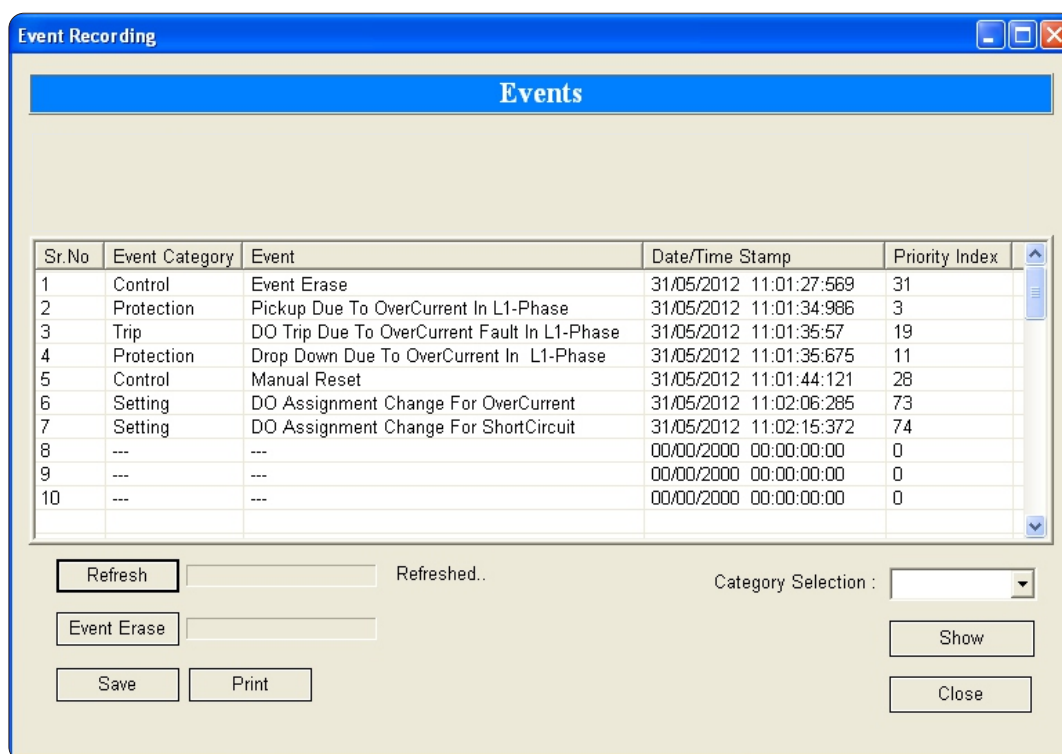
The unit stores in non volatile memory the last 100 events. When the available memory space is exhausted, the new event automatically overwrites the oldest event which can be retrieved from a PC, with the following format:

EVENT : EVENT NUMBER
 HOUR : HH:MM
 SEC mSEC : SEC:mSEC
 DATE : DD/MM/YY
 E-TYPE : TYPE OF EVENT

- ❖ Date and time of the event
- ❖ Descriptive text of the even

The user can view event records via the front USB interface software (See Figure-3)

*Description of event number available in event list or in front end software, Pickup & Trip events are recorded.



(Figure 3) (Event Data Recording on PC Software)

Output Contacts

No. of digital outputs : 08 Nos. (configurable)
 Type of outputs : Relay
 Programmable (DO Assignment) : Yes
 Relay reset type : Programmable (Auto/Manual)

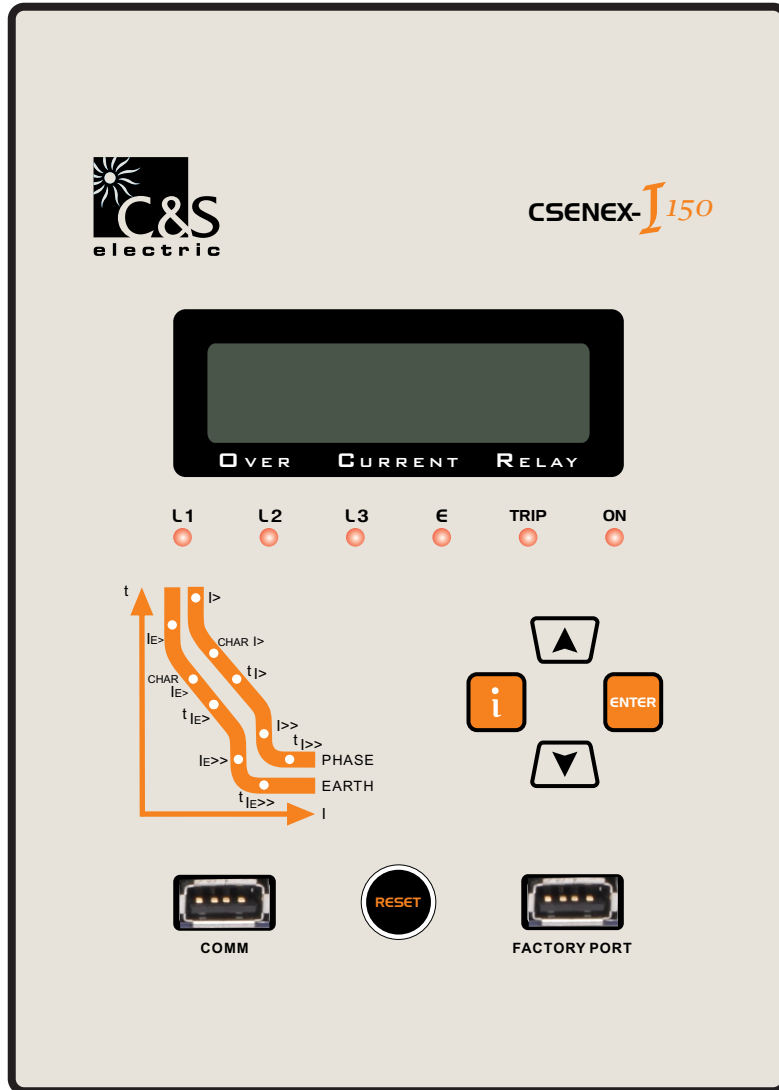
Input Contacts

No of digital inputs : 06 Nos.
 Programmable (DI Assignment) : Yes

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
- ❖ LEDs for pickup or tripping on fault and event in any phase



(Figure 4)

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

10) Communication (Local and Remote)

The unit has:

- ❖ 1 Front USB port for direct connection to a PC
- ❖ 1 Rear RS-485 communication port

10.1) Rear Communication

The protocol for the rear port is MODBUS-RTU.

10.2) 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.

11) Setting Ranges

Over Current and Earth Protection

S. No	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	Phase characteristics	P-Char			DEFT/EINV/VINV /LINV/NINV1.3/ NINV3.0/NINV0.6	DEFT
2	Earth Characteristics	E-Char			DEFT/EINV/VINV /LINV/NINV1.3/ NINV3.0/NINV0.6	DEFT
3	Phase over-current low set pickup setting	l>	0.05xlp	2.5xlp	0.01xlp	EXIT
	Phase over-current definite timing	t>	0.05 Sec	150 Sec	0.01Sec	0.10 Sec
	Phase over-current inverse timing	ti>	0.01	1.50	0.005	0.05
4	Phase over-current hi-set pickup setting	l>>	0.05xlp	25xlp	0.1xlp	EXIT
	Phase over-current hi-set definite timing	t>>	0.02 Sec	20 Sec	0.01Sec	0.10 Sec
5	Earth over-current low set pickup setting	le>	0.05xln	2.5xln	0.01xln	EXIT
	Earth over-current low set definite timing	te>	0.03 Sec	150 Sec	0.01Sec	0.10 Sec
	Earth over-current low set inverse timing	tie>	0.01	1.50	0.005	0.05
6	Earth over-current hi-set pickup setting	le>>	0.05xln	25xln	0.01xln	EXIT
	Earth over-current hi-set definite timing	te>>	0.02 Sec	20 Sec	0.01 Sec	0.10 Sec

Note: All parameters are Password protected

Trip Circuit Supervision Protection

S.No.	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	Enable TCS	Enable	NO	YES	-----	NO
2	TCS	t_TCS	0.05 Sec	2 Sec	0.01	0.05 Sec

Circuit Breaker Failure Protection

S.No.	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	Enable CBFP	Enable	NO	YES	-----	NO
2	CBFP	t_CBFP	0.05 Sec	2 Sec	0.01	0.05 Sec

Cold Load Protection Setting

Parameter	Display	Setting Range	Step Size	Unit
Selection of Cold Load Protection	CldLdPr	DISABLE/ENABLE	-	-
Cold Load Active Time	tCdLd	0.1-20	0.01	Sec

Harmonic Setting

S.No.	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	Enable Phase block	PH Block	NO	YES	-----	NO
2	Phase Blocking time	tPHASE	0.0 Sec	20 Sec	0.1	0.0 Sec
3	Enable Earth block	E Block	NO	YES	-----	NO
4	Earth Blocking time	tEARTH	0.0 Sec	20 Sec	0.1	0.0 Sec

DI Blocking

S.No.	Parameter	Display	Setting Range		Size	Step Default Setting
			Min.	Max.		
1	Phase over-current low set	I>	Unblock	Block	-----	Unblock
2	Phase over-current hi-set	I>>	Unblock	Block	-----	Unblock
3	Earth over-current low set	Ie>	Unblock	Block	-----	Unblock
4	Earth over-current hi-set	Ie>>	Unblock	Block	-----	Unblock

DI Assignment

S.No.	Parameter	Display
1	Digital Input 1	DI-1
2	Digital Input 2	DI-2
3	Digital Input 3	DI-3
4	Digital Input 4	DI-4
5	Digital Input 5	DI-5
6	Digital Input 6	DI-6

Following functions can be assigned to the 6 DIs

S.No.	(Configurable)
1	CB Close
2	CB Open
3	CB Ready
4	Remote Trip 1
5	Remote Trip 2
6	Remote Trip 3
7	Protection Block
8	Remote Reset

DO Assignment

S.No	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	Phase over-current low set	I>	---	---	DO1/DO2.....DO8	---
2	Phase over-current hi-set	I>>	---	---	DO1/DO2.....DO8	---
3	Earth over-current low set	Ie>	---	---	DO1/DO2.....DO8	---
4	Earth over-current hi-set	Ie>>	---	---	DO1/DO2.....DO8	---
5	Self supervision	SELF SUP	---	---	DO1/DO2.....DO8	---
6	Circuit breaker failure protection	CBFP	---	---	DO1/DO2.....DO8	---
7	Trip circuit supervision	TCS	---	---	DO1/DO2.....DO8	---
8	Circuit breaker open	CB_Open	---	---	DO1/DO2.....DO8	---
9	Circuit breaker close	CB_Close	---	---	DO1/DO2.....DO8	---
10	Lockout relay	AR Lockout	---	---	DO1/DO2.....DO8	---

Function Reset

S.No.	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	Phase over-current low set	I>	Auto	Manual	-----	Auto
2	Phase over-current hi set	I>>	Auto	Manual	-----	Auto
3	Earth over-current low set	Ie>	Auto	Manual	-----	Auto
4	Earth over-current hi set	Ie>>	Auto	Manual	-----	Auto

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

S.No.	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	Rated Phase Current	Ip	1.00 Amp	5.00 Amp	-----	1.00 Amp
2	Rated Earth Current	In	1.00 Amp	5.00 Amp	-----	1.00 Amp
3	Phase CT Ratio	PCTRATIO	1	7000	1	1
4	Earth CT Ratio	ECTRATIO	1	7000	1	1
5	Nominal Frequency	RATDFREQ	50 Hz	60 Hz	-----	50 Hz
6	Reset Delay	ResetDly	0	20 Sec	0.1 Sec	0 Sec

Rear port communication setting

RS-485 Communication		
Protocol	:	MODBUS RTU
Baud rate selection (programmable)	:	4800/9600/19200/38400/57600bps
Parity selection (programmable)	:	Even / Odd / None
Stop bit	:	1 Bit
Data bit	:	8 Bit data
Remote Address (programmable)	:	(1 to 247)
Cable required for interface	:	Two wire twisted shielded cable

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 'L' Model	18V-60V DC
	For 'H' Model	85V-280V AC / 90V-300V DC
Supply Range for Digital Input	For 'L & H' Model	Above 24V AC/DC
Power Consumption		Quiescent approx. 3W Operating approx. <7W

Measurement Accuracy

S.No	Quantity	Range	Frequency Range	Accuracy
1	Current	1 - 30 xIp	50 - 60 Hz	±2%

Pickup Accuracy

S.No	Quantity	Range	Frequency Range	Accuracy
1	Current	1 - 30 xIp	50 - 60 Hz	+5% of Pickup setting

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%
Reset Time	30mSec
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 for 1 Sec : $100 \times I_p$ for 10 Sec : $30 \times I_p$ continuously : $4 \times I_p$

Relay Contact Rating

Contact Rating	
Contact relay	Dry contact Ag Ni
Make current	Max. 30A & carry for 3S
Carry capacity	8A continuous : Relay 1, Relay 2
	5A continuous : Relay 3, 4, 5, 6, 7, 8
Rated voltage	250V AC/ 30V DC
Breaking Characteristics	
Breaking capacity AC	1500VA resistive 1500VA inductive (PF=0.5)
	220V AC, 5A ($\cos\theta \leq 0.6$) 135V DC, 0.3A (L/R=30ms) 250V DC, 50W resistive or 25W inductive (L/R=40ms)
Breaking capacity DC	
Operation time	<10ms
Durability	
Loaded contact	10000 operation minimum
Unloaded contact	30000 operation minimum

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. 1.0 Kg

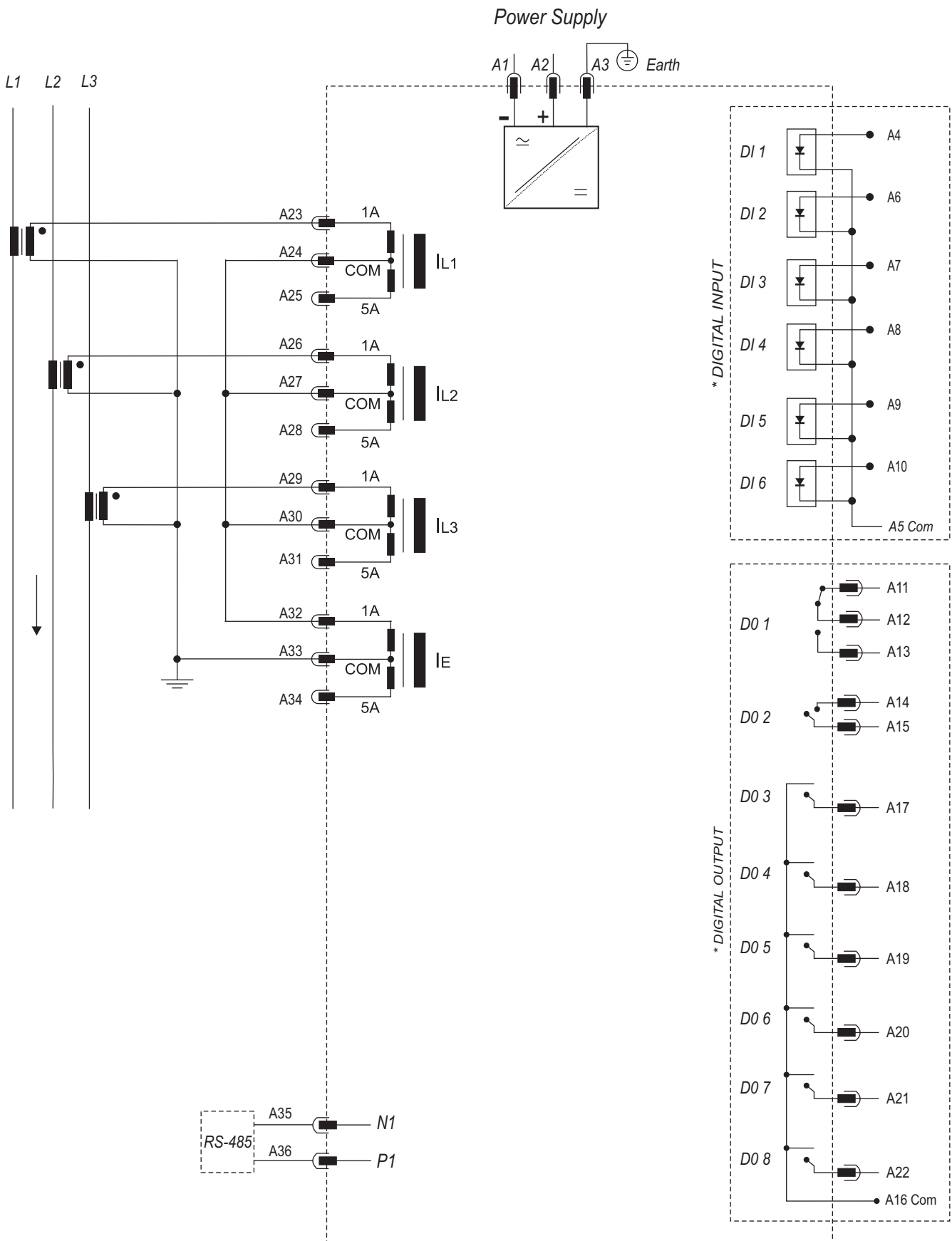
14) Type Test

DESIGN STANDARD		
Specified ambient setvice temp. range	:	VDE 04355 part 303, IEC 255-4, BS 142
For storage	:	40 deg C to + 85 deg C
For operation	:	-20 deg C to 70 deg C
Environmental protection class 'F' as per DIN 40040 and per DIN IEC 68, part 2.3	:	relative humidity 95% at 40 deg 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, 1.2/50 μ s, 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) Specification Table of I-150 Model

Function	ANSI	NEX-I 150
CT inputs	–	4
PT inputs	–	x
Over current	50/51	✓
Earth Fault	50N/51N	✓
CBFP	50BF	✓
Trip circuit	74TC	✓
Cold Load Pickup	62 CLD	✓
Harmonic blocking	–	✓
Fault record	–	10
Event record	–	100
Selection of 1/5A	–	Site selectable
Digital input	–	6
Digital output	–	8
Enclosure type	–	Draw out with CT shorting
Front communication	–	✓
Rear comm. (RS-485)	–	✓

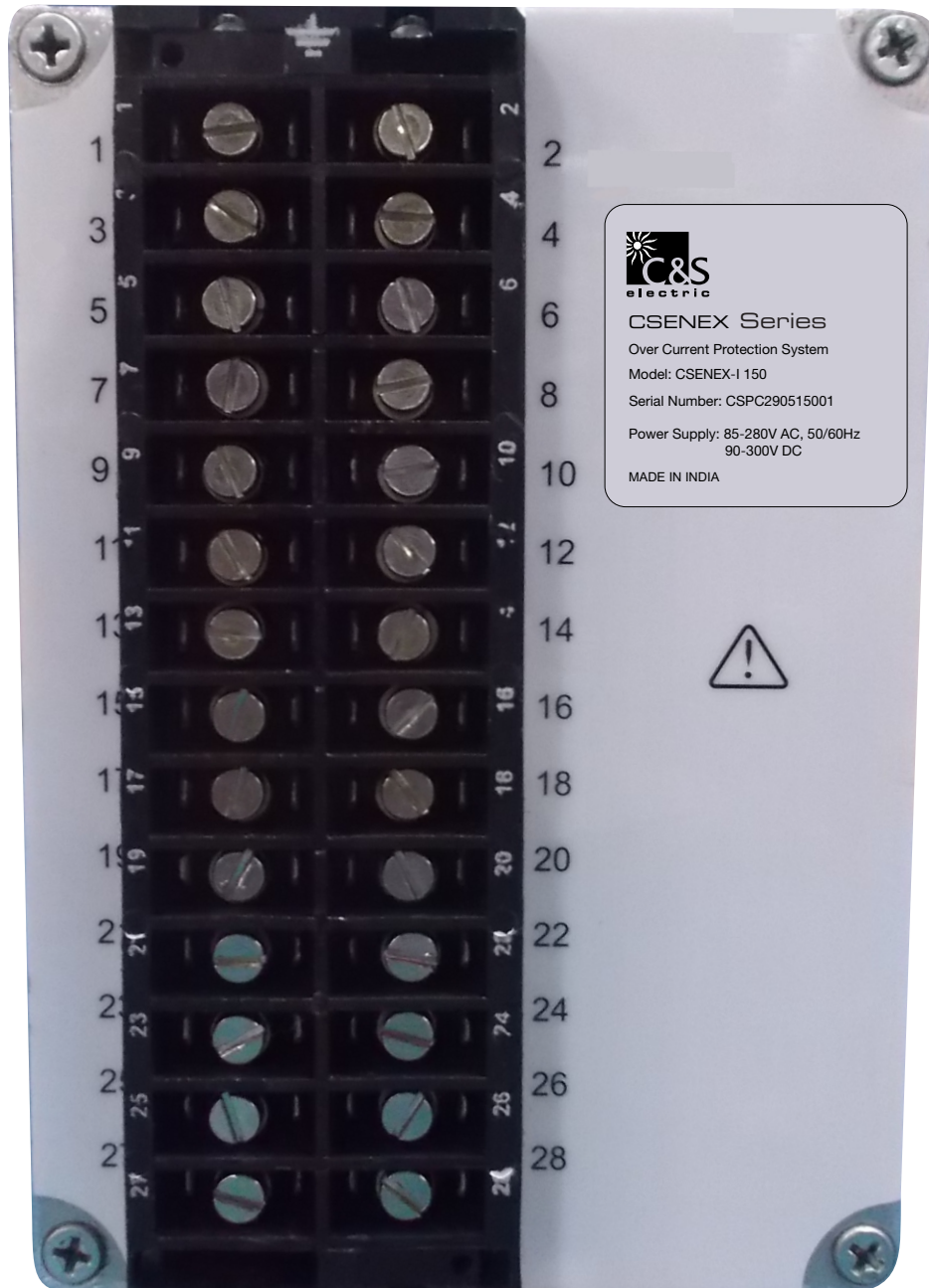
16) Connection Diagram



(Figure 5)

* Based on Ordering Information

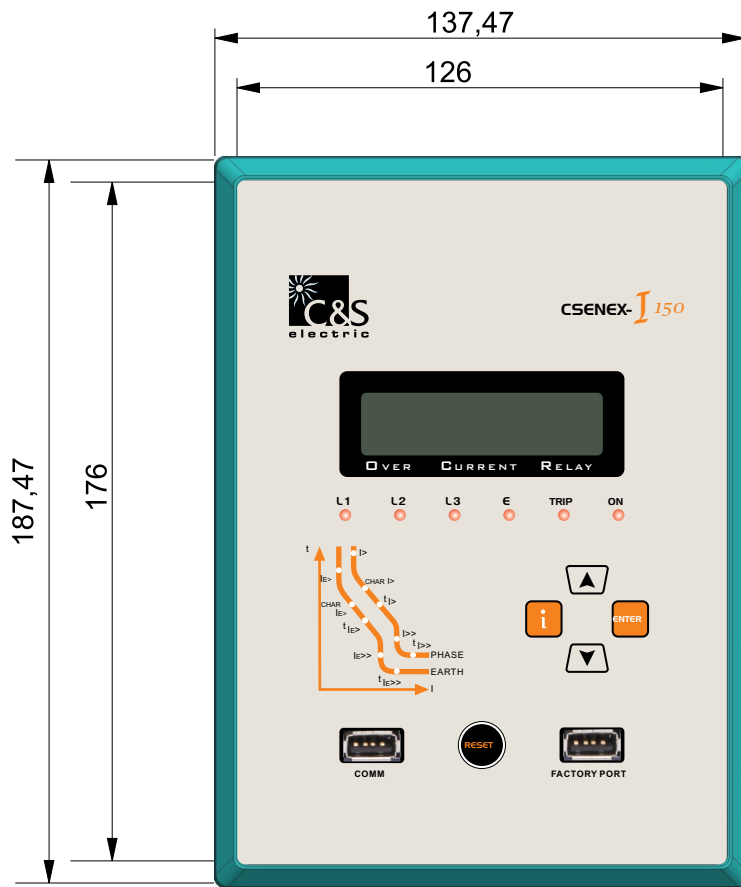
17) Back view of the Relay



(Figure 6)

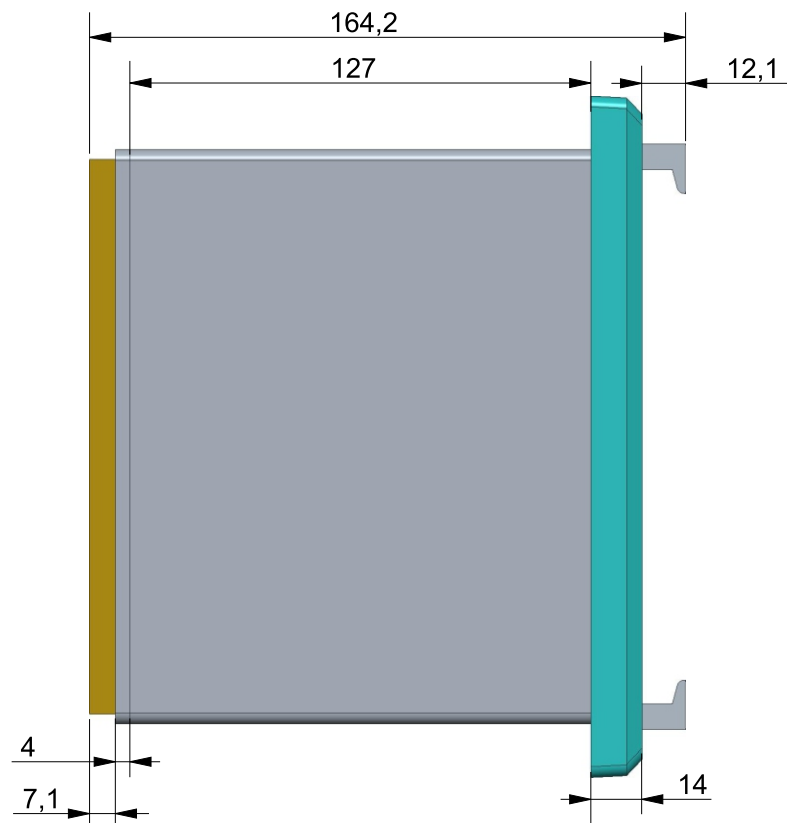
18) Dimensional Details

Front View



(Figure 7)

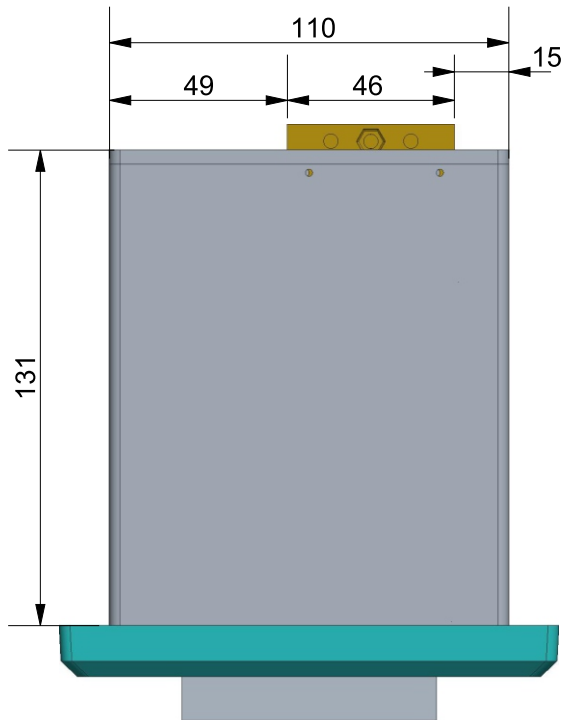
Side View



(Figure 8)

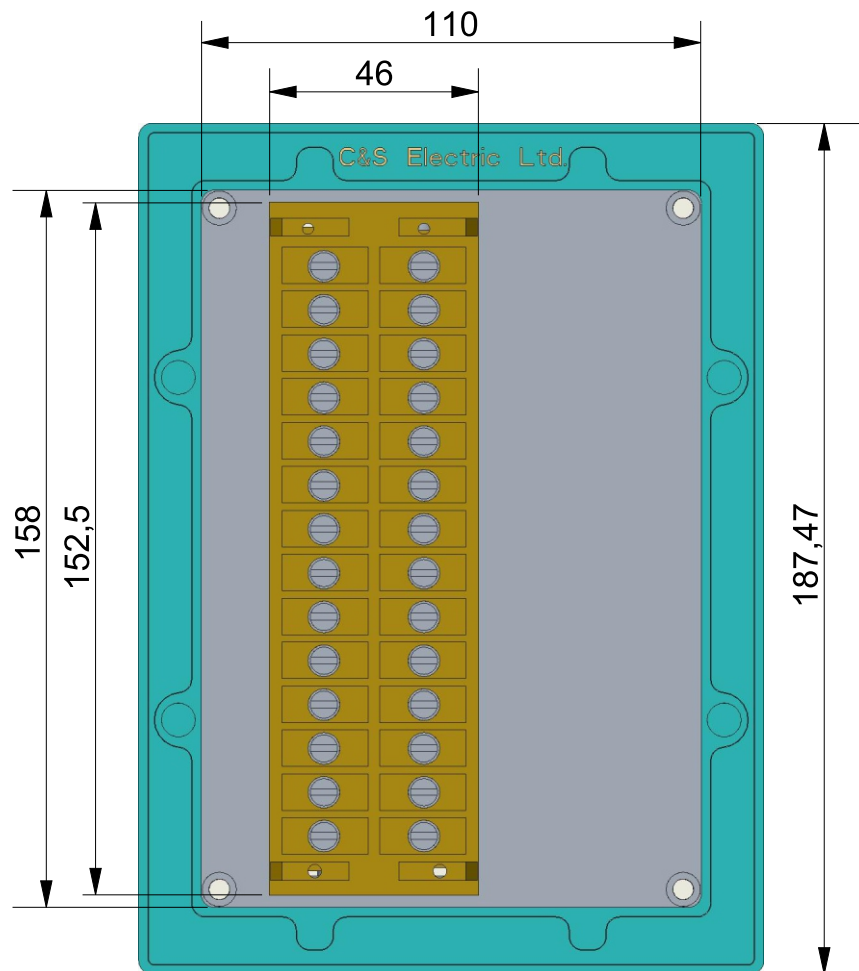
Dimensional Details contd..

Top View



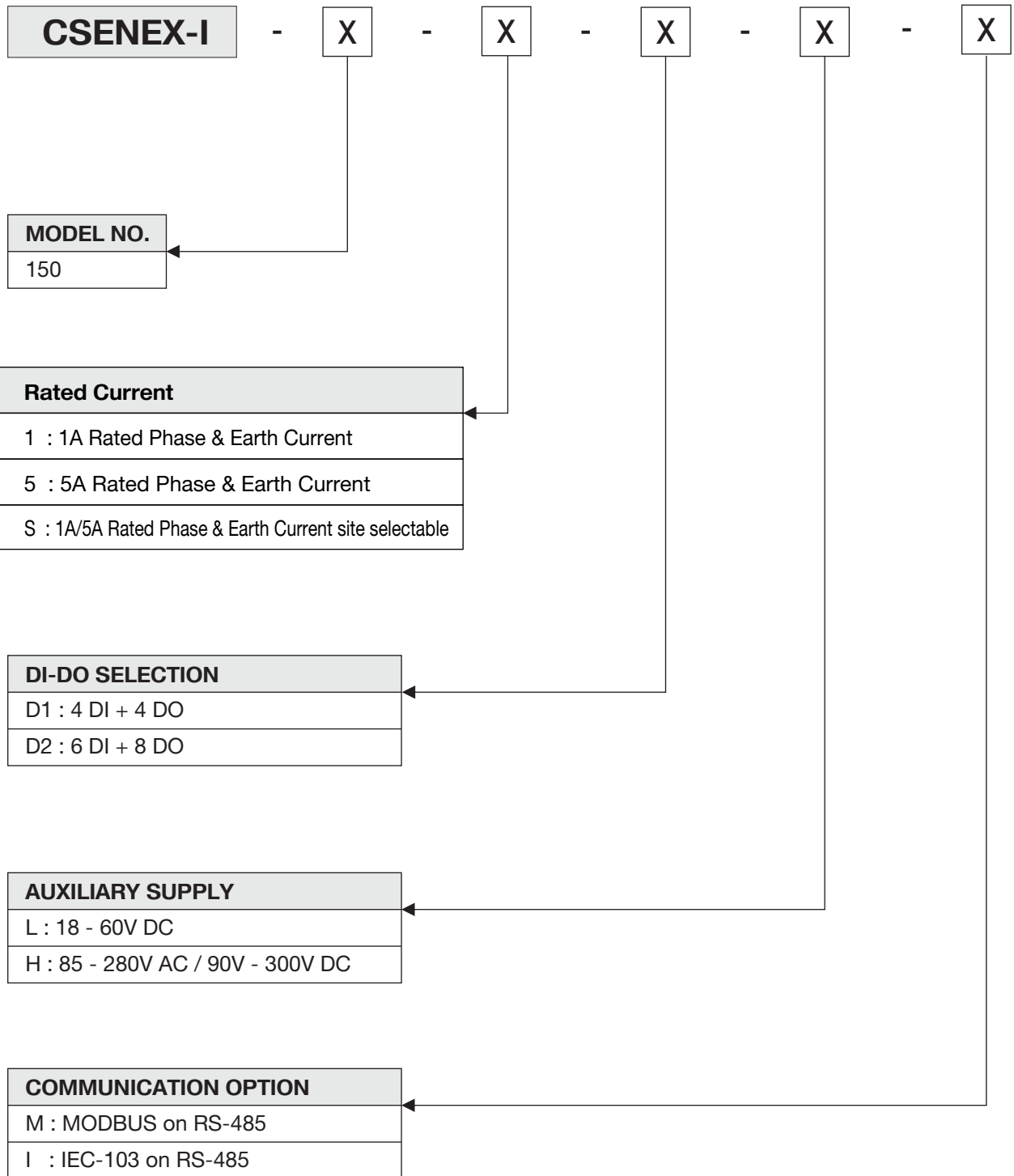
(Figure 9)

Back View



(Figure 10)

19) Ordering Information



Revision History

S.No.	Rev.No.	Details	Date
01	01	Inclusion of 'Reset Time' in Measuring Input Technical Data clause 12	20.07.15

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