

We touch your **electricity** everyday!

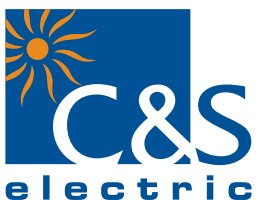
Intelligent Measuring and Protection Device

CSENEX -I

CSENEX
Series



Catalogue



CE

Protection & Control Division

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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 200C2 is an feeder protection solution which has fast, sensitive and secure protection for feeder internal & external faults.

2) Features

- ❖ 1A & 5A rated CT input (site selectable).
- ❖ Three phase time over-current protection.
- ❖ Draw out with self CT shorting (Depend upon the Model).
- ❖ Three phase instantaneous protection.
- ❖ Earth time over-current and earth instantaneous over current.
- ❖ Circuit breaker failure detection.
- ❖ Trip circuit supervision.
- ❖ Event recorder.
- ❖ Fault recorder.
- ❖ DI/DO programmable matrix.
- ❖ 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.

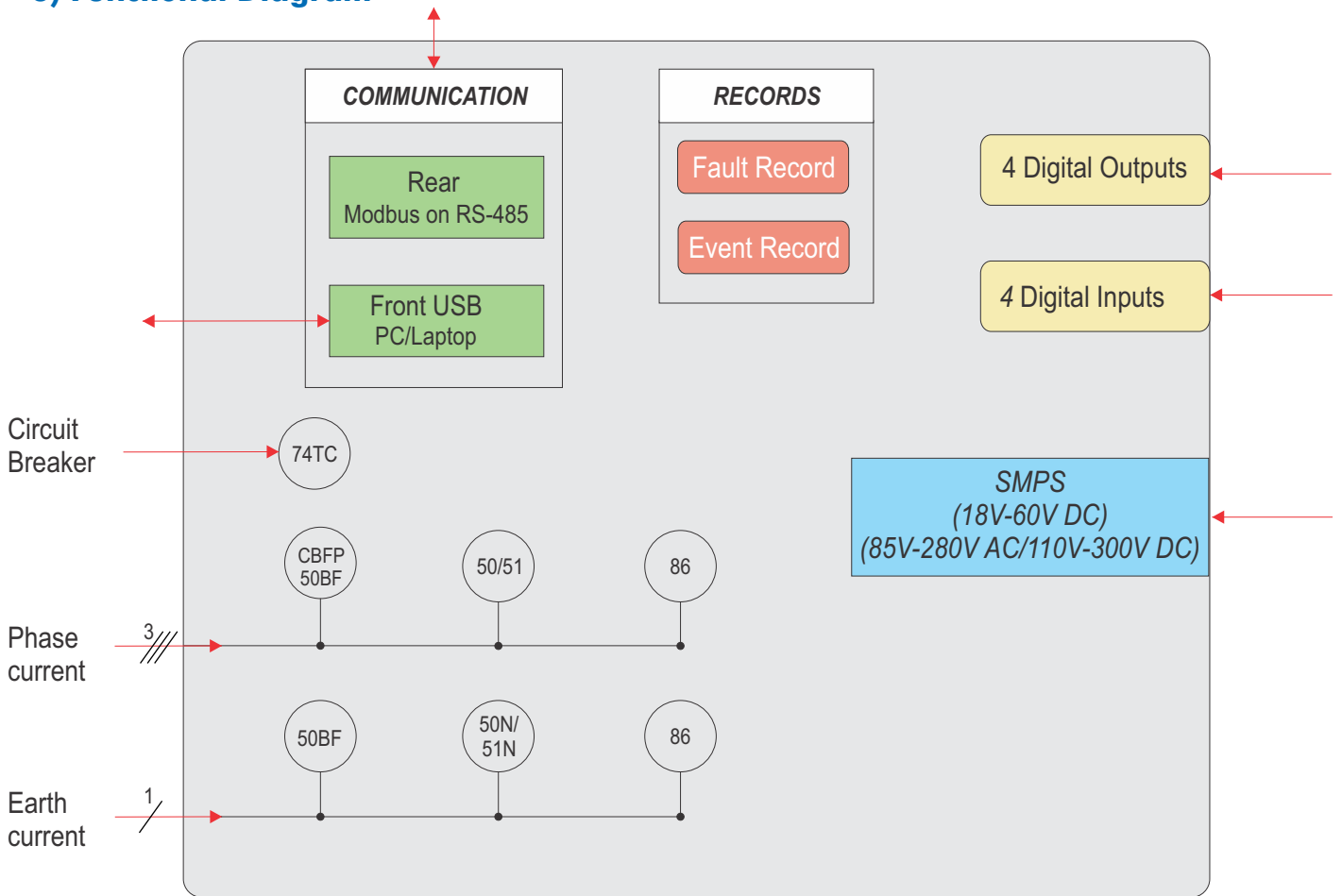
4) Hardware

- ❖ Digital Signal Processor based numeric design.
- ❖ Measures true RMS with DFT filter .
- ❖ 4 Current analog inputs.
- ❖ 4 Digital Inputs.
- ❖ 4 Digital Outputs.
- ❖ 16 x 2 Alpha-numeric LCD.
- ❖ RS-485 & USB communication.
- ❖ 1 A & 5A common current terminal and programmable.
- ❖ 8 LEDs at pickup and trip on fault + 3 LEDs with special function of 3 control keys.

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)
- ❖ Trip Circuit Supervision (74TC)

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 $I >$ 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 ($I_e >$) 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.

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.

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 I_n within t_{CBFP} . 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.

Relay Latching (86)

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

Harmonic Restrain (51H)

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 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.

7) Fault Recording

CSENE-X records last 10 faults in its non volatile memory with its 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 : FAULT TYPE

Where

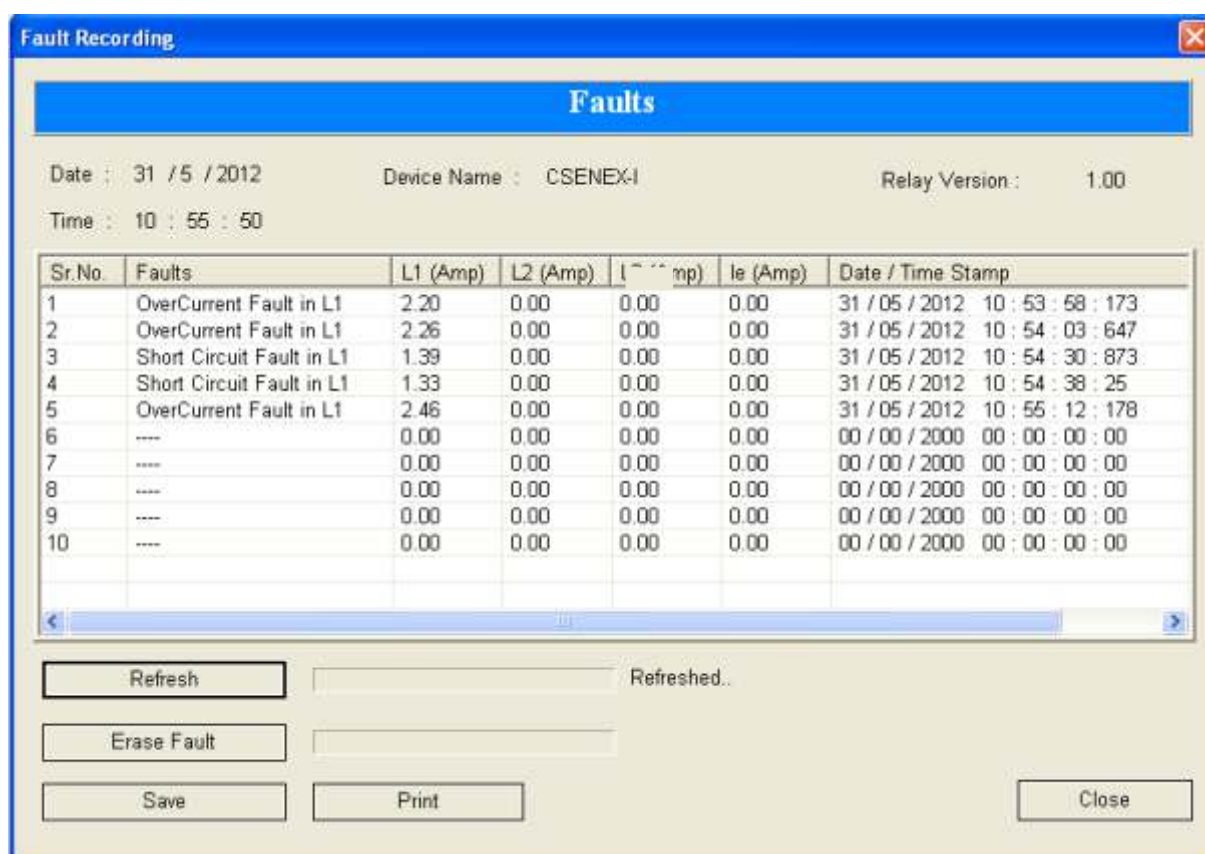
[F][ILx] Magnitude of phase current's.

[F]Ie Magnitude earth fault current's

F-Type Origin of fault (over current, negative phase sequence, etc.) (See Figure 2)

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)



The screenshot shows a software window titled "Fault Recording" with a sub-header "Faults". It displays the following information:

- Date : 31 / 5 / 2012
- Device Name : CSENE-X
- Relay Version : 1.00
- Time : 10 : 55 : 50

Sr.No	Faults	L1 (Amp)	L2 (Amp)	L3 (Amp)	Ie (Amp)	Date / Time Stamp
1	OverCurrent Fault in L1	2.20	0.00	0.00	0.00	31 / 05 / 2012 10 : 53 : 58 : 173
2	OverCurrent Fault in L1	2.26	0.00	0.00	0.00	31 / 05 / 2012 10 : 54 : 03 : 647
3	Short Circuit Fault in L1	1.39	0.00	0.00	0.00	31 / 05 / 2012 10 : 54 : 30 : 873
4	Short Circuit Fault in L1	1.33	0.00	0.00	0.00	31 / 05 / 2012 10 : 54 : 38 : 25
5	OverCurrent Fault in L1	2.46	0.00	0.00	0.00	31 / 05 / 2012 10 : 55 : 12 : 178
6	----	0.00	0.00	0.00	0.00	00 / 00 / 2000 00 : 00 : 00 : 00
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

Below the table, there are several control buttons: "Refresh", "Erase Fault", "Save", "Print", and "Close". A "Refreshed.." status indicator is also present.

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

8) Event Recording

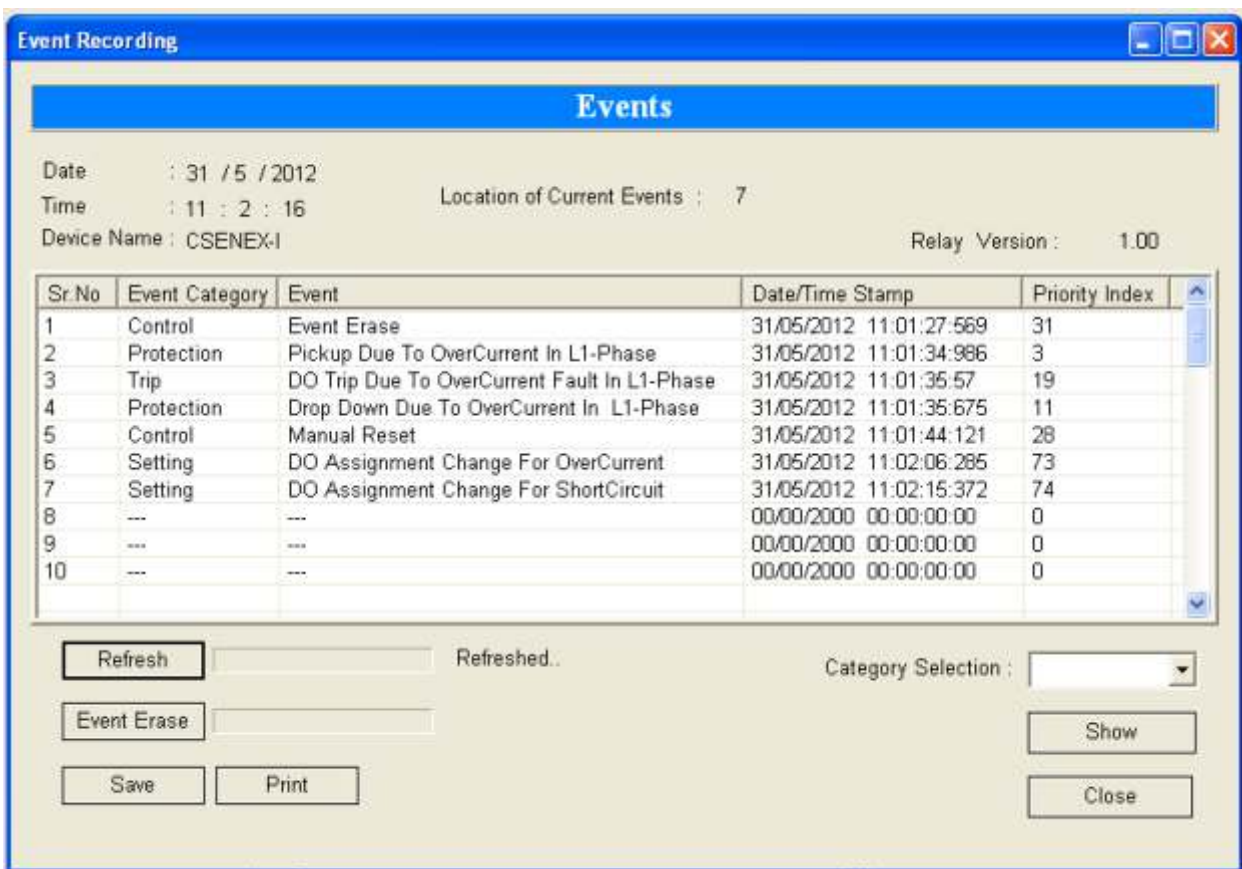
The unit stores in non volatile memory the last 16 events. When the available memory space is exhausted, the new event automatically overwrites the oldest event which can be retrieved from a PC, with the following format:

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

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

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



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

Output Contacts

No. of digital outputs : 4 (DO1, DO2, DO3, DO4)
 [2 Change over (DO1, DO2), 2 Normal open (DO3, DO4)]
 Type of outputs : Relay
 Programmable (DO Assignment) : Yes
 Relay reset type : Programmable (Auto/Manual)









Input Contacts

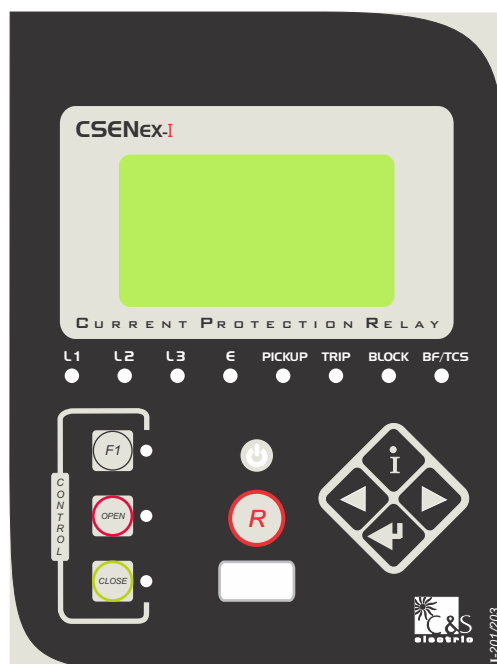
No of digital inputs : 6 (DI1, DI2, DI3, DI4, DI5, DI6) for CSENEX-I 202 & 203 model
 : 4 (DI1, DI2, DI3, DI4) for 201 model
 Type of inputs : Depends upon the version
 Programmable (DI Assignment) : Programmable

10) 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' to 'F1' key, 2 push switch to open or close circuit breaker
- ❖ Eight LEDs for pickup or tripping on fault and event in any phase.

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 backward direction.
	is used to scroll in forward direction.
	To perform the assigned task either DO trip or Relay reset.
	To open the circuit breaker.
	To close the circuit breaker.



(Figure 4) (HMI)

10) Communication (Local & Remote)

The unit has:

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

10.1) Rear Communication * (Model dependent)

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

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

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	P-Char			DEFT/EINV/VINV /LINV/NINV1.3/ NINV3.0/NINV0.6	DEFT
2	Earth over-current Characteristics	E-Char			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>	0.20xI _p 0.05 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 0.02 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 0.02 Sec	8xI _n 20 Sec	0.05xI _n 0.01 Sec	EXIT 0.10 Sec

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

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

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

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

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

For Current Range 0.2 to 20xI_n:

Trip timing Accuracy : VINV / NINV 3.0 / 1.3 : $\pm 5\%$ OR $\pm 30\text{mSec}$ (whichever is higher)

EINV / NINV 0.6 / LINV : $\pm 7.5\%$ OR $\pm 30\text{mSec}$ (whichever is higher)

For Current Range 0.05 to 0.2xI_n:

Trip timing Accuracy : VINV / NINV 3.0 / 1.3 : $\pm 20\%$ OR $\pm 40\text{mSec}$ (whichever is higher)

EINV / NINV 0.6 / LINV : $\pm 20\%$ OR $\pm 40\text{mSec}$ (whichever is higher)

Trip Circuit Supervision Protection

S.No.	Parameter	Display	Setting Range		Step Size	Default Setting
			Min.	Max.		
1	TCS	t_TCS	0.03 Sec	2 Sec	0.01	EXIT

Circuit Breaker Failure Protection

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

Function Reset

S.No.	Parameter	Display	Setting Range
1	Phase over-current low set	I>	Auto/Manual
2	Phase over-current hi set	I>>	Auto/Manual
3	Earth over-current low set	Ie>	Auto/Manual
4	Earth over-current hi set	Ie>>	Auto/Manual
5	Trip Circuit Supervision	TCS	Auto/Manual

DI Assignment

Parameter	Display
Digital Input 1	DI-1
Digital Input 2	DI-2
Digital Input 3	DI-3
Digital Input 4	DI-4

Following functions can be assigned to the 4 DIs

S.No.	I 201 (Configurable)
1	CB Close
2	CB Open
3	Protection Block
4	Remote Reset
5	Remote Trip 1
6	Remote Trip 2
7	Remote Trip 3

DO Assignment

S.No	Parameter	Display
1	Phase over-current low set	I>
2	Phase over-current hi-set	I>>
3	Earth over-current low set	Ie>
4	Earth over-current hi-set	Ie>>
5	Self supervision	SELF SUP
6	Circuit breaker failure protection	CBFP
7	Trip circuit supervision	TCS

Key Assignment

S.No.	Parameter	Display	Setting
1	Function key	F1	DO1/DO2/DO3 DO4/Relay Reset

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	I _p	1.00 Amp	5.00 Amp	-----	1.00 Amp
2.	Rated earth current	I _n	1.00 Amp	5.00 Amp	-----	1.00 Amp
3.	Phase CT ratio	P-CTR	1	9999	1	1
4.	Earth CT ratio	E-CTR	1	9999	1	1
5.	Nominal frequency	FREQ	50 Hz	60 Hz	-----	50 Hz

Rear port communication setting

(*Availability as per model selection)

RS-485 Communication		
Protocol	:	MODBUS RTU, IEC-60870-5-103
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 / 110V-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	1.0 - 30 xI _p	50 - 60 Hz	±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) Type Test

DESIGN STANDARD	
Specified ambient service temp. range	: VDE 04355 part 303, IEC 255-4, BS 142
For storage	: 40°C to + 85°C
For operation	: -20°C to 70°C
Environmental protection class 'F' as per DIN 40040 and per DIN IEC 68, part 2.3	: relative humidity 95% at 40°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.0 / 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 s, 0.5
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

14) Technical 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

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 ϕ \leq 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

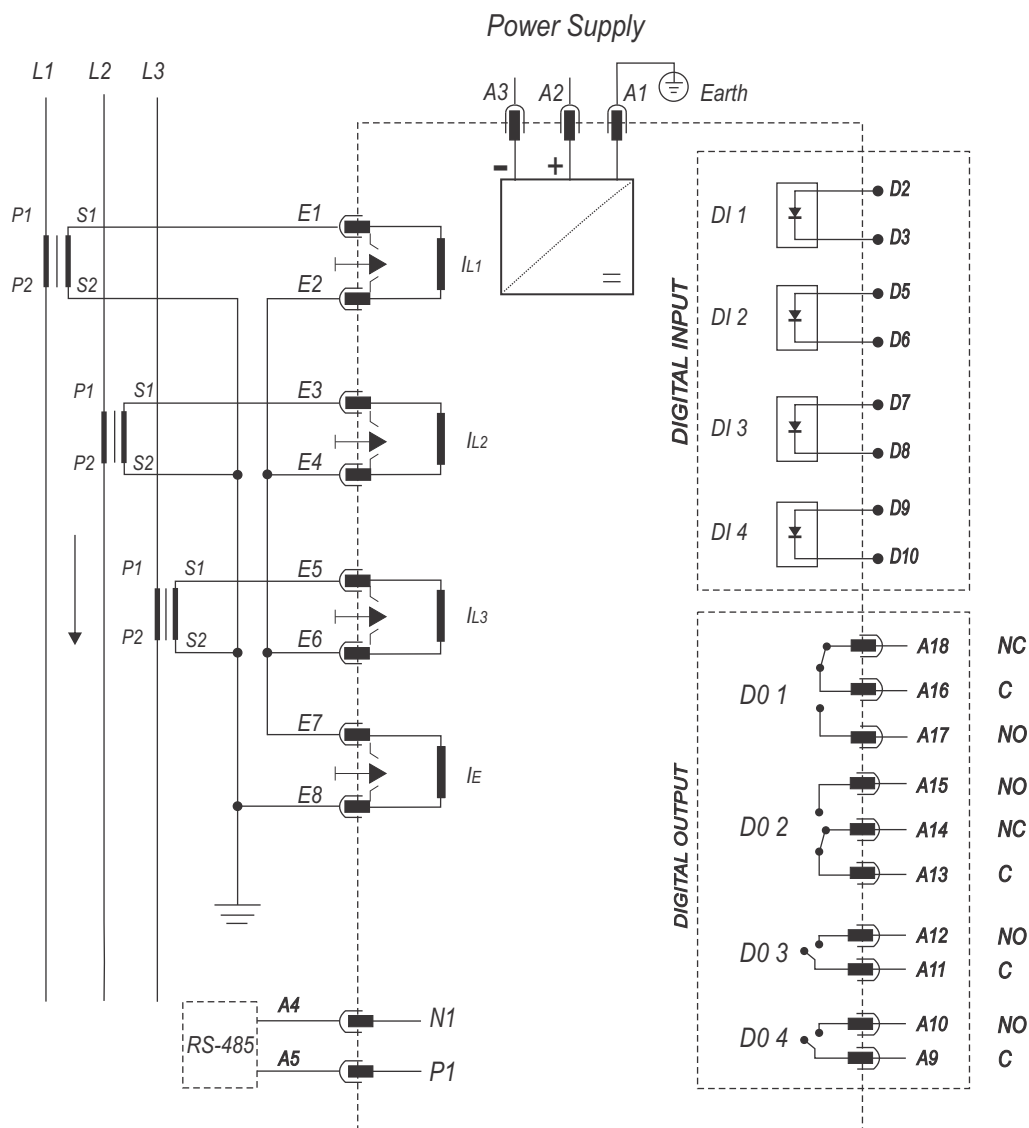
15) Model Description Table

Function	NEX-I 200C2
CT inputs	4
Over current (50/51)	✓
Earth Fault (50N/51N)	✓
CBFP (50BF)	✓
Inrush blocking (51H)	✓
Trip circuit (74TC)	✓
Digital input	4
Digital output	4
Fault record	10
Event record	10
Selection of 1/5A	Site selectable
Enclosure type	Draw out with CT shorting
Enclosure size (WxHxD)	(112x145x145)mm
Front communication	✓
Rear comm. (RS-485)	✓

16) Connection Diagram

Terminal Connection Details

CSENEX-I 200C2



(Figure 5)

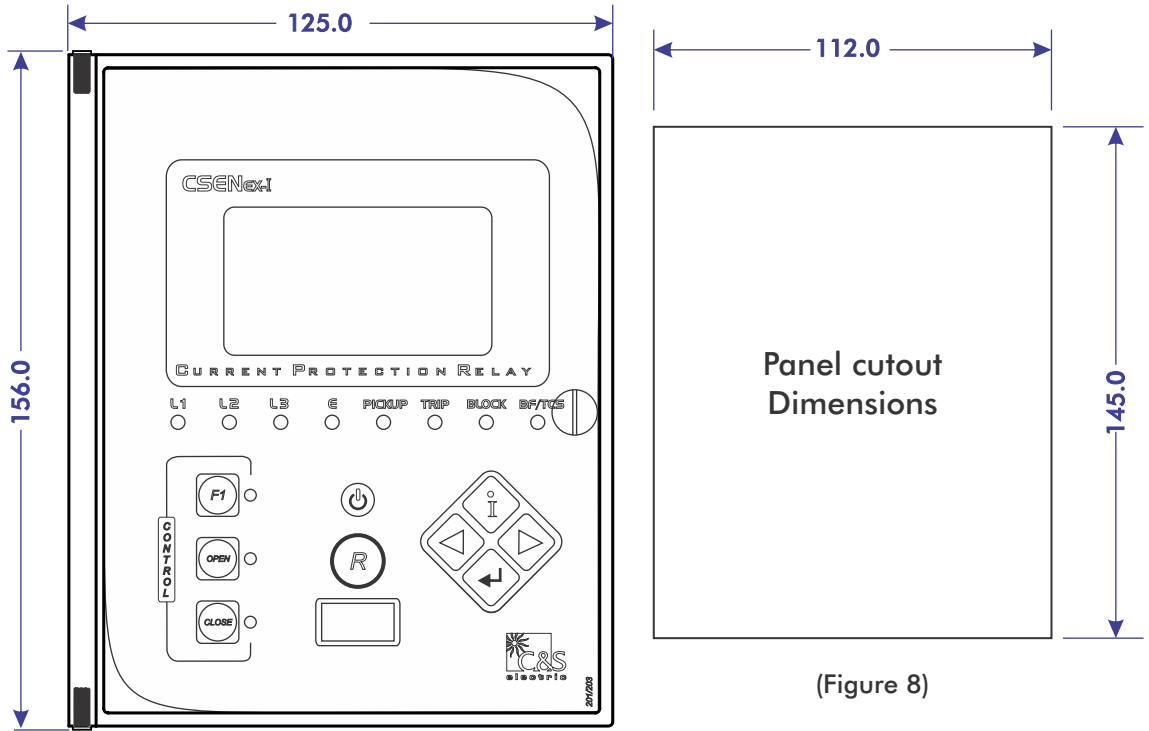
Terminal Description

Terminal Name	Terminal Description
A1	: Auxiliary Supply Earth
A2-A3	: Auxiliary Supply
A4-A5	: RS-485 Modbus N1(A4), P1(A5)
A9-A10	: Potential free Digital Output 4
A11-A12	: Potential free Digital Output 3
A13-A14-A15	: Potential free Digital Output 2
A16 -A17- A18	: Potential free Digital Output 1
D3-D2	: Potential Digital Input 1
D5-D6	: Potential Digital Input 2
D7-D8	: Potential Digital Input 3
D9-D10	: Potential Digital Input 4
E1-E6	: CT Terminal for Phase current input L1(E1-E2), L2(E3-E4),L3(E5-E6)
E7-E8	: CT Terminal for Earth current input

17) Dimensional Details

Panel cutout dimensions: WxH = 112.0x145.0mm

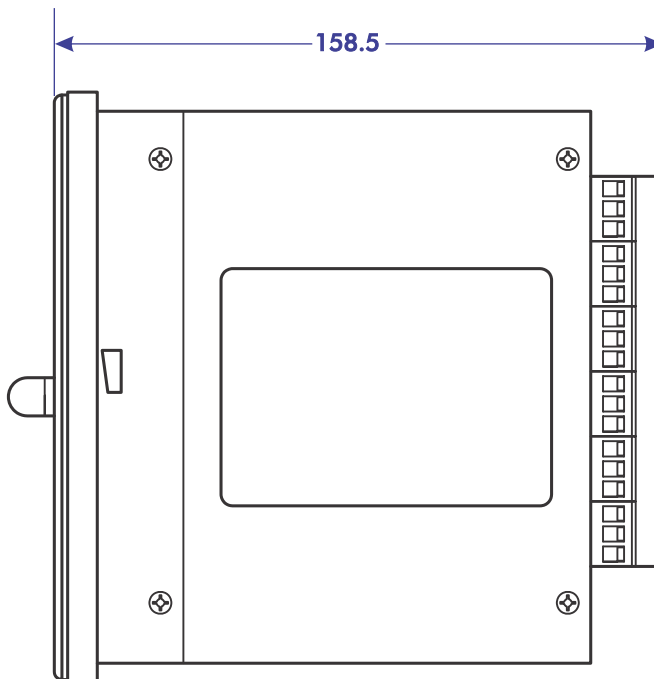
Front View



(Figure 7)

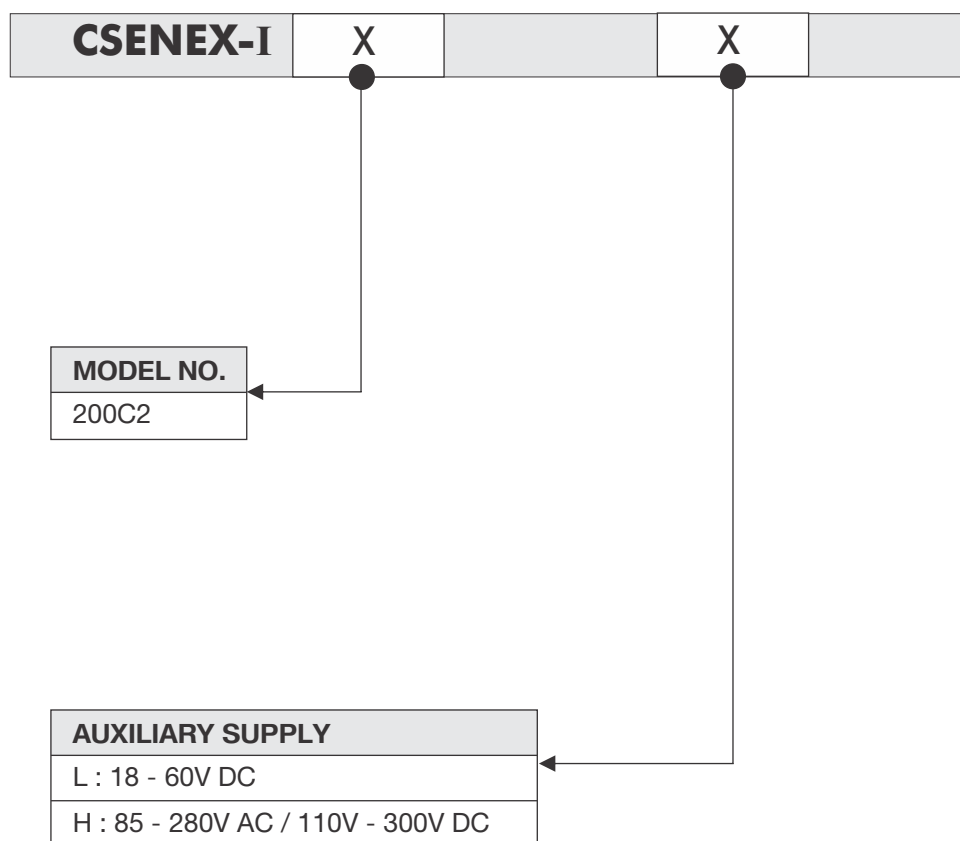
(Figure 8)

Side View



(Figure 9)

18) Ordering Information



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