

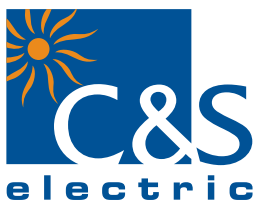
We touch your **electricity** everyday!

CSEnEX-I 101-C1
Intelligent Measuring and Protection Device

CSEnEX
Series



Catalogue



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 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 & 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.
- ❖ Fault recorder.
- ❖ Trip Counter.
- ❖ 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.

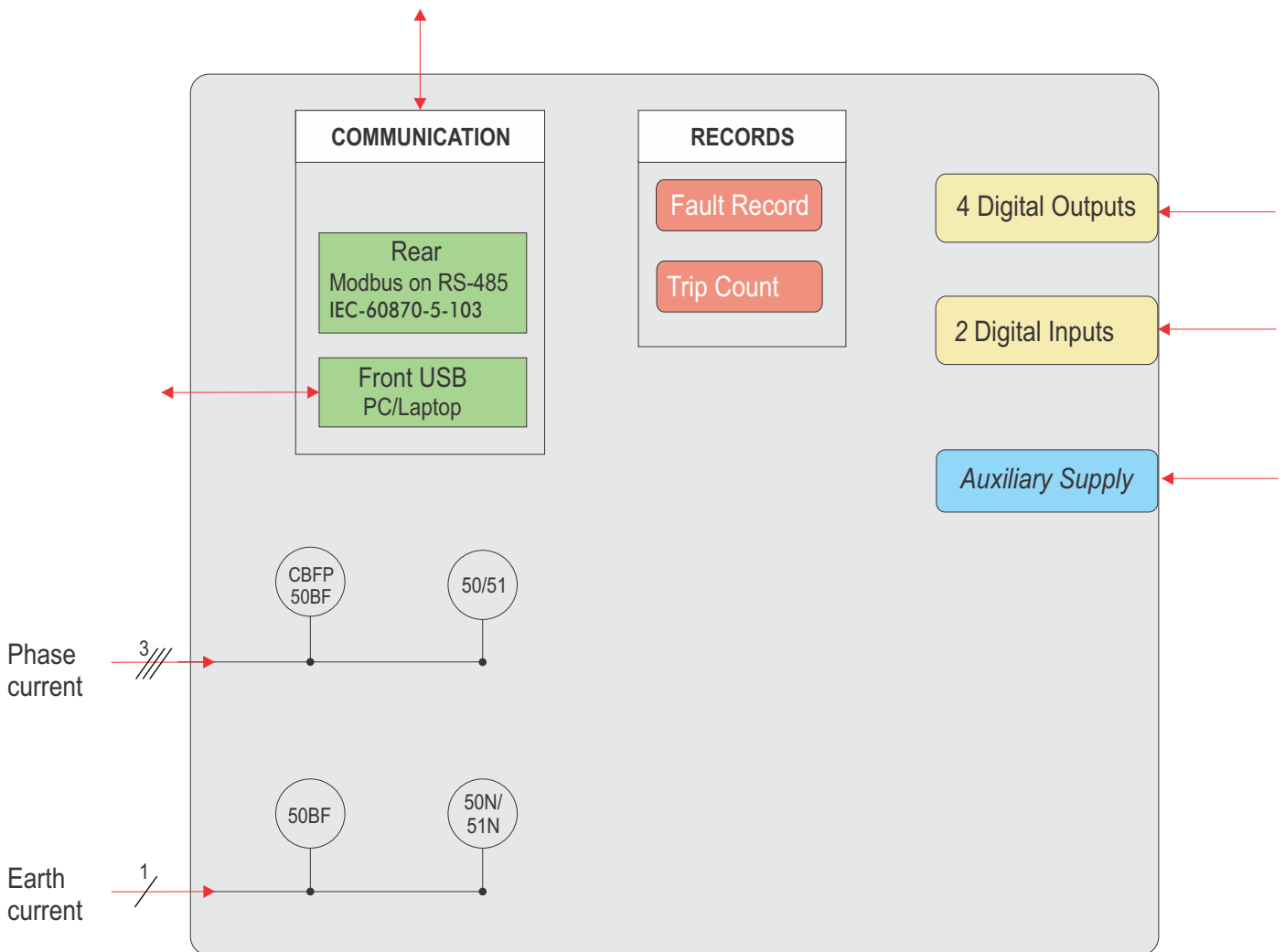
4) Hardware

- ❖ Micro controller based numeric design.
- ❖ Measures true RMS with DFT filter .
- ❖ 4 Current analog inputs.
- ❖ Max. 2 digital inputs.
- ❖ Max. 4 digital outputs.
- ❖ Alpha numeric (12 x 2) LCD.
- ❖ RS-485 & USB communication.
- ❖ 5 Push button on the front for MMI.

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)

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.

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.

Harmonic based Protection Blocking

To avoid any nuisance tripping, CSENEX-I provides harmonic detection & protection blocking feature. Relay will hold the tripping for a set time, if harmonic is present with protection pickup. Blocking time & harmonic selection is configurable in the relay.

Note: Harmonics is detected based on presence for at least 2 cycles.

Protection blocking due to harmonics is active, when percentage of harmonics present is more than 25% of fundamental current.

7) Fault Recording

CSENE-X-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] IL2 : 00.00A
 [F] IL3 : 00.00A
 [F] Ie : 00.00A
 HOUR MIN : HH:MM
 SEC mSEC : Sec:mSec
 F-TYPE : FAULT TYPE

Where

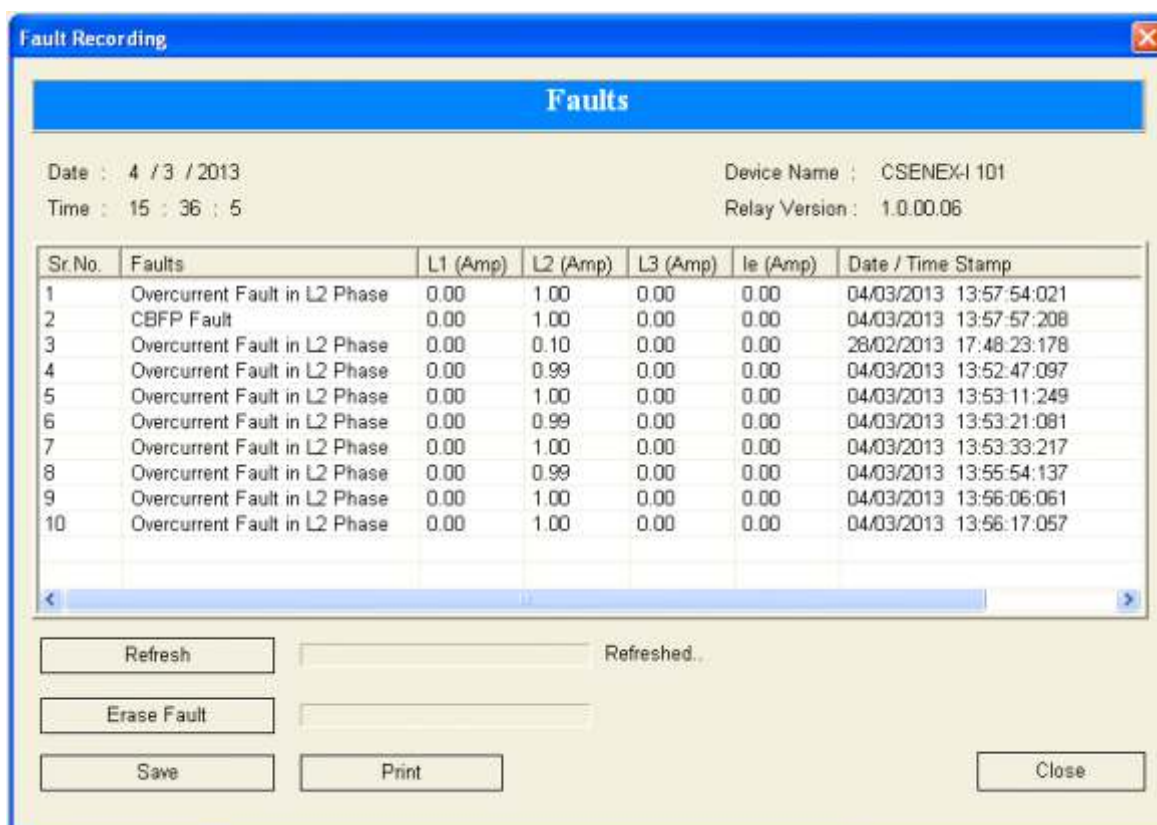
[F][ILx] Magnitude of phase current's.

[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)



Sr.No.	Faults	L1 (Amp)	L2 (Amp)	L3 (Amp)	Ie (Amp)	Date / Time Stamp
1	Overcurrent Fault in L2 Phase	0.00	1.00	0.00	0.00	04/03/2013 13:57:54:021
2	CBFP Fault	0.00	1.00	0.00	0.00	04/03/2013 13:57:57:208
3	Overcurrent Fault in L2 Phase	0.00	0.10	0.00	0.00	28/02/2013 17:48:23:178
4	Overcurrent Fault in L2 Phase	0.00	0.99	0.00	0.00	04/03/2013 13:52:47:097
5	Overcurrent Fault in L2 Phase	0.00	1.00	0.00	0.00	04/03/2013 13:53:11:249
6	Overcurrent Fault in L2 Phase	0.00	0.99	0.00	0.00	04/03/2013 13:53:21:081
7	Overcurrent Fault in L2 Phase	0.00	1.00	0.00	0.00	04/03/2013 13:53:33:217
8	Overcurrent Fault in L2 Phase	0.00	0.99	0.00	0.00	04/03/2013 13:55:54:137
9	Overcurrent Fault in L2 Phase	0.00	1.00	0.00	0.00	04/03/2013 13:56:06:061
10	Overcurrent Fault in L2 Phase	0.00	1.00	0.00	0.00	04/03/2013 13:56:17:057

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

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)






Input Contacts

No of digital inputs : 2 (DI1, DI2)
 Programmable (DI Assignment) : Programmable

8) 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 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 downward direction.
	is used to scroll in upward direction.



(Figure 4) (HMI)

9) Communication (Local & Remote)

The unit has:

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

9.1) Rear Communication

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

9.2) Front Communication

The entire setting, Faults 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.

10) Setting Ranges

CSENE-X-I 101-C1 Setting

Active Group Setting

Parameters	Display	Setting Range		Step Size
		Min	Max	
Active Group	ACTIVE	G1	G2	1

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	I>	0.05xIp	4.0xIp	0.01xIp	EXIT
	Phase over-current definite timing	t>	0.1 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	I>>	0.5xIp	30xIp	0.1xIp	EXIT
	Phase over-current hi-set definite timing	t>>	0.03 Sec	20 Sec	0.01Sec	0.10 Sec
5	Earth over-current low set pickup setting	Ie>	0.05xIn	2.5xIn	0.01xIn	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	Ie>>	0.05xIn	15xIn	0.05xIn	EXIT
	Earth over-current hi-set definite timing	te>>	0.03 Sec	20 Sec	0.01 Sec	0.10 Sec

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

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

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

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

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

For Current Range 0.2 to 20xIn:

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

For Current Range 0.05 to 0.2xIn:

Trip timing Accuracy : VINV / NINV 3.0 / 1.3 : +20% OR +40mSec (whichever is higher)
 EINV / NINV 0.6 / LINV : +20% OR +40mSec (whichever is higher)

Circuit Breaker Failure Protection

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

DI Assignment

Parameter	Display	Setting Range	Step	Default
Remote Reset	RMT_RST	DI1, DI2, Exit	-----	-----
Remote Trip	RMT_TRP	DI1, DI2, Exit	-----	-----
Group Toggling	GRP_TOG	DI1, DI2, Exit	-----	-----

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	Sfssup	1	1234	----
6	Circuit breaker failure protection	CBFP	1	1234	----
7	Remote Trip	RMT_TRP	1	1234	----

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	Default
1	Fault Erase	Faults	NO	YES	-----	NO
2	Trip Counter Erase	TRP_CNT	NO	YES	-----	NO

Harmonic Blocking

S.No.	Parameter	Display	Min	Max	Step	Default
1	Phase harmonic	Ph_Har	NO	YES	-----	NO
2	Earth Harmonic	ET_Har	NO	YES	-----	NO
3	Phase blocking time	t_Ph	0.10	20.00	-----	0.10
4	Earth blocking time	t_Et	0.10	20.00	-----	0.10

Common 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 A	5 A	-----	1 A
2.	Rated earth current	I _n	1 A	5 A	-----	1 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	0.1sec	0
6.	Fault Message Status	F-Stats	NO	YES	-----	NO

Rear port communication setting

RS-485 Communication		
Protocol	:	MODBUS RTU, IEC-60870-5-103
Baud rate selection (programmable)	:	9600/19200/38400 bps
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 'W1' Model	18V-150V DC
		For 'H' Model	85V-280V AC / 110V-300V DC
Supply Range for Digital Input	:	For 'L & H' Model	24V above 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 Hz	+2%

11) 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

12) Type Test

DESIGN STANDARD		
Specified ambient service temp. range	:	VDE 04355 part 303, IEC 255-4, BS 142
For storage	:	400C to + 850C
For operation	:	-200C to 700C
Environmental protection class 'F' as per DIN 40040 and per DIN IEC 68, part 2.3	:	relative humidity 95% at 400C 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

13) 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. 1.5 Kg

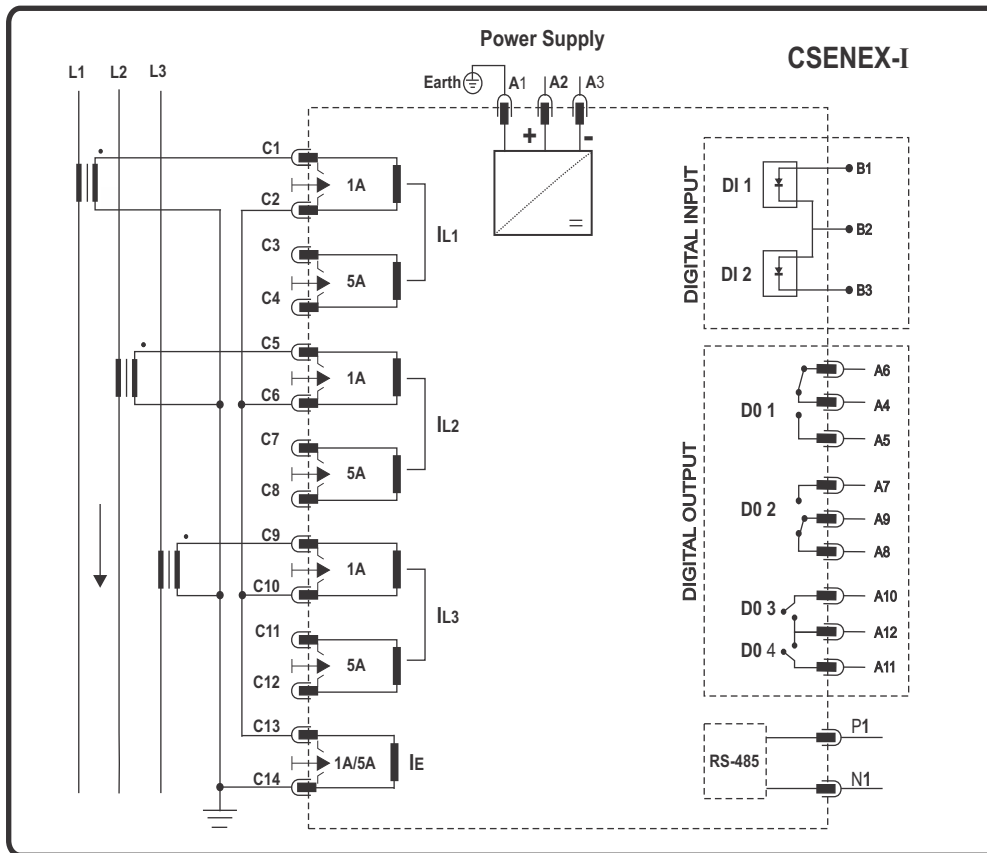
Relay Contact Rating

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

14) Connection Diagram

Terminal Connection Details



(1A & 5A common model)

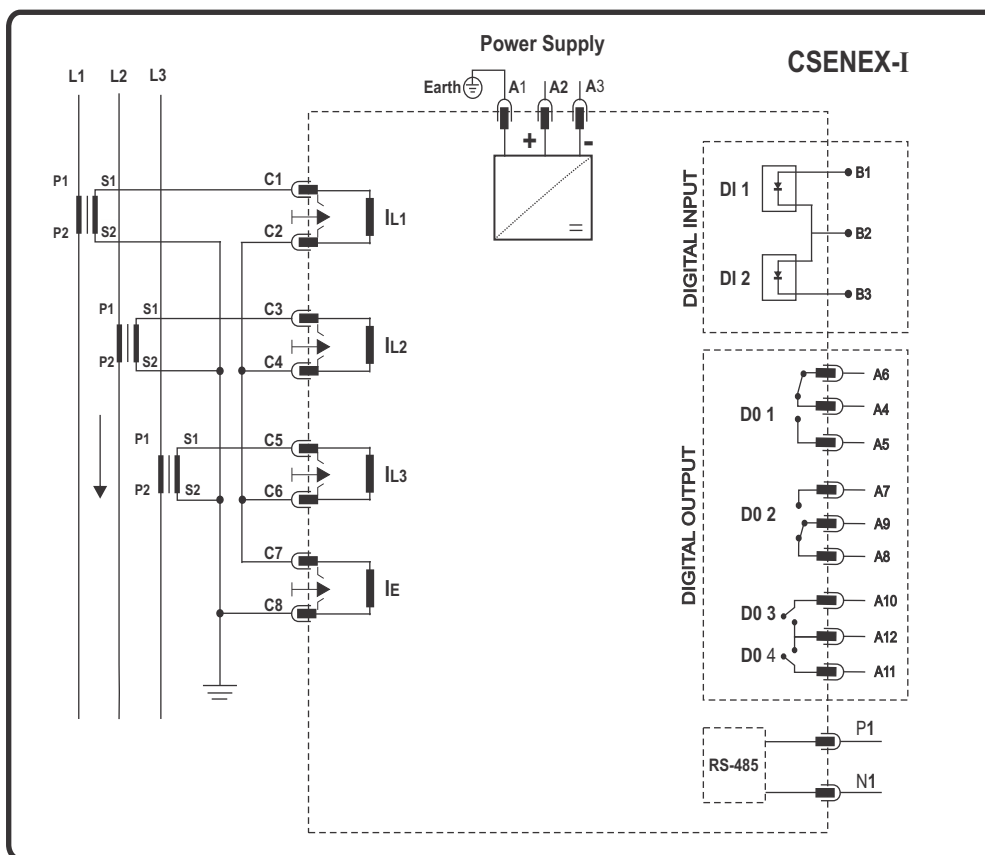
(Figure 5)

Terminal Description

Terminal Name	Terminal Description
A1	: Auxiliary Supply Earth
A2-A3	: Auxiliary Supply (A2: + & A3: -)
P1-N1	: RS-485: N1, P1 communication port
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)
B1-B2	: Potential Digital Input 1
B3-B2	: Potential Digital Input 2
C1-C2	: CT Terminal for Phase current input (1A) L1
C3-C4	: CT Terminal for Phase current input (5A) L1
C5-C6	: CT Terminal for Phase current input (1A) L2
C7-C8	: CT Terminal for Phase current input (5A) L2
C9-C10	: CT Terminal for Phase current input (1A) L3
C11-C12	: CT Terminal for Phase current input (5A) L3
C13-C14	: CT Terminal for Earth current input (1A / 5A)

Connection Diagram

Terminal Connection Details



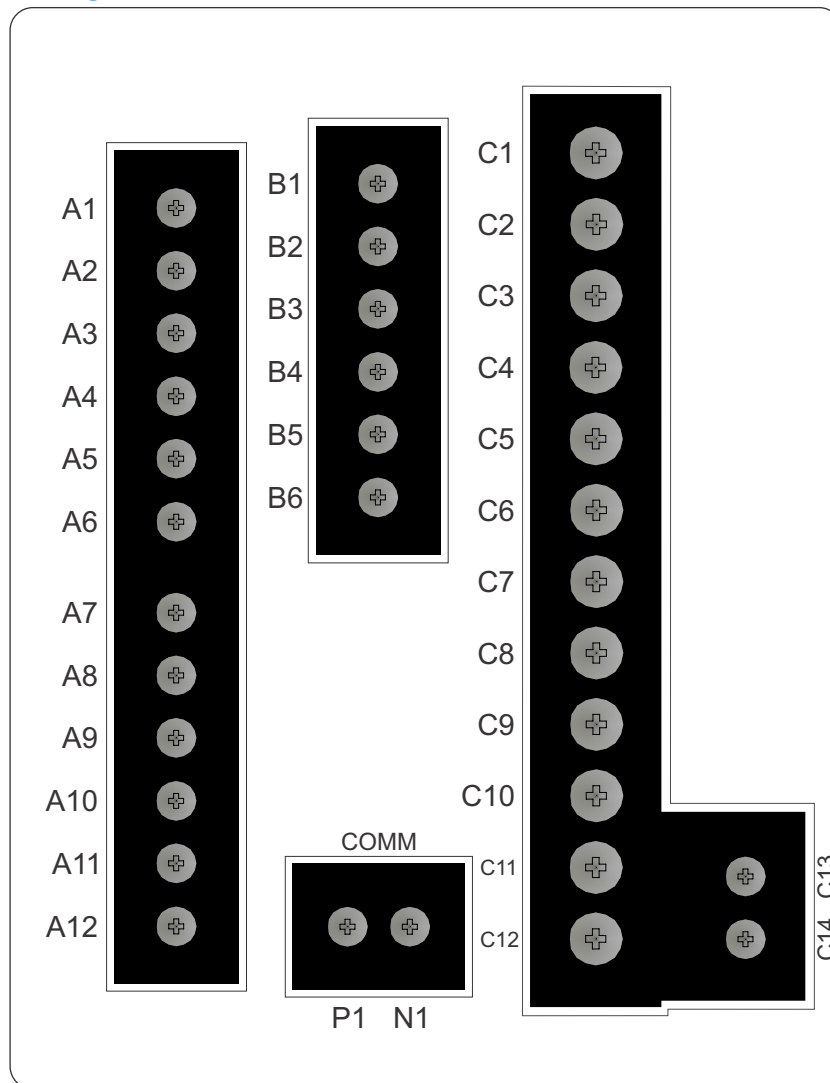
(1A or 5A ordering based model)

(Figure 6)

Terminal Description

Terminal Name	Terminal Description
A1	Auxiliary Supply Earth
A2-A3	Auxiliary Supply (A2: + & A3: -)
P1-N1	RS-485: N1, P1 communication port
A12-A11	Potential free Digital Output 4
A12-A10	Potential free Digital Output 3
A7-A9-A8	Potential free Digital Output 2
A6-A4-A5	Potential free Digital Output 1
B1-B2	Potential Digital Input 1
B3-B2	Potential Digital Input 2
C1-C6	CT Terminal for Phase current inputs L1(C1-C2), L2(C3-C4), L3(C5-C6)
C7-C8	CT Terminal for Earth current input

15) Back Terminal Diagram



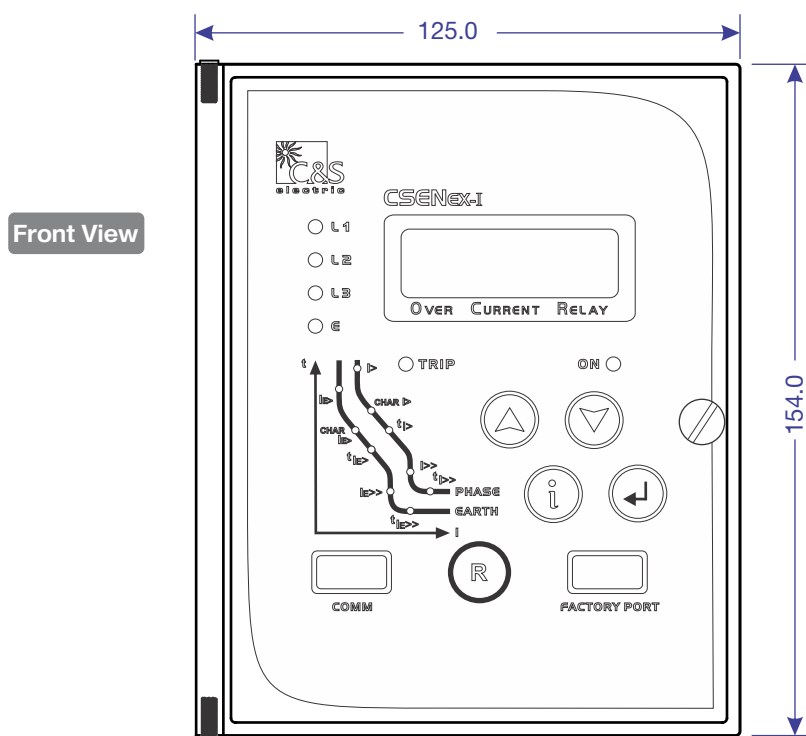
(Figure 7)

Terminal Description

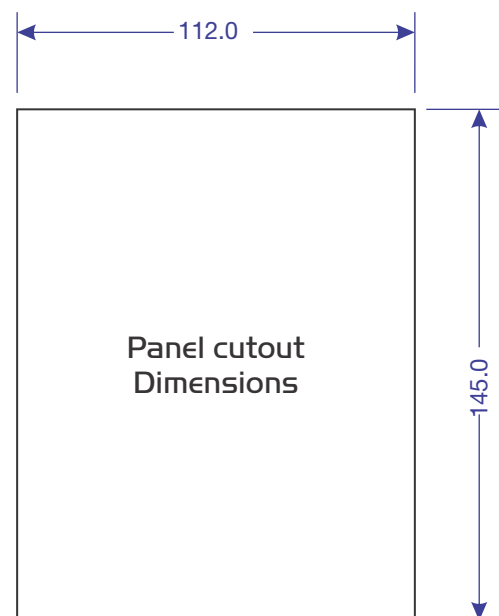
Terminal Name	Terminal Description
A1	: Auxiliary Supply Earth
A2-A3	: Auxiliary Supply (A2: + & A3: -)
P1-N1	: RS-485: N1, P1 communication port
A12-A11	: Potential free Digital Output 4
A12-A10	: Potential free Digital Output 3
A7-A9-A8	: Potential free Digital Output 2 (change over)
A6-A4-A5	: Potential free Digital Output 1 (change over)
B1-B2	: Potential Digital Input 1
B3-B2	: Potential Digital Input 2
C1-C2	: CT Terminal for Phase current input (1A) L1
C3-C4	: CT Terminal for Phase current input (5A) L1
C5-C6	: CT Terminal for Phase current input (1A) L2
C7-C8	: CT Terminal for Phase current input (5A) L2
C9-C10	: CT Terminal for Phase current input (1A) L3
C11-C12	: CT Terminal for Phase current input (5A) L3
C13-C14	: CT Terminal for Earth current input (1A / 5A)

16) Dimensional Details

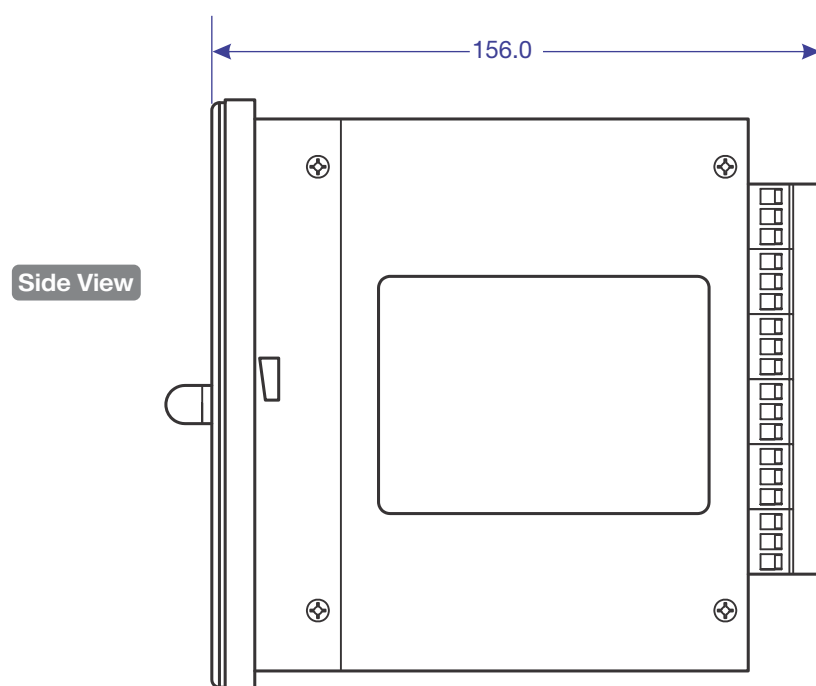
Panel cutout dimensions: WxH = 112.0x145.0mm



(Figure 8)

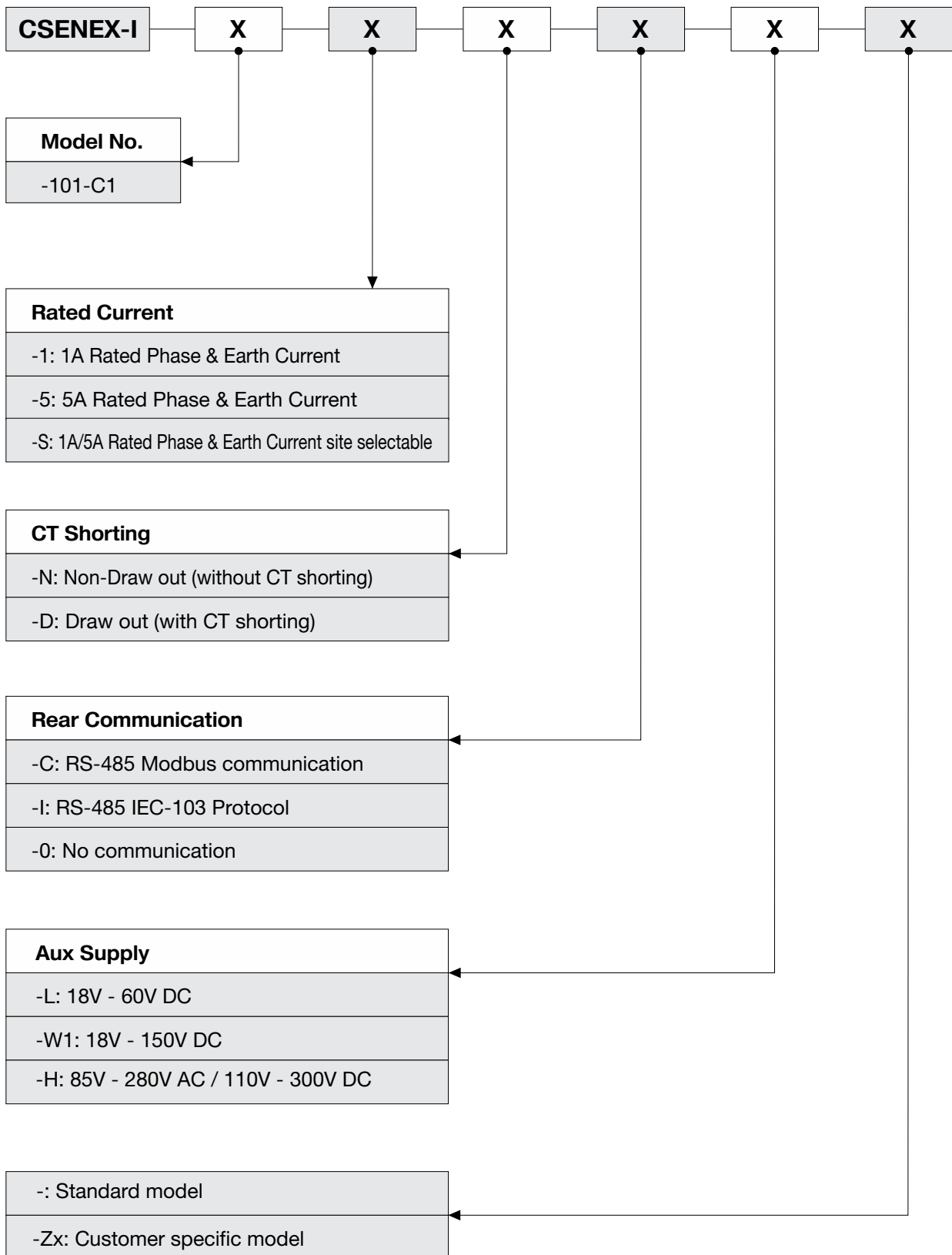


(Figure 9)



(Figure 10)

17) Ordering Information



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