We touch your electricity everyday!

# CSENEX-I 100/101

Intelligent Measuring and Protection Device


Catalog

C&S electric

PMD Division

# CONTENTS



## 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)
- Draw out with self CT shorting (Model Dependent)
- Event recorder
- Fault recorder
- Trip Counter
- DI/DO programmable matrix (DI available only in CSENEX-I 101 model)
- 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.

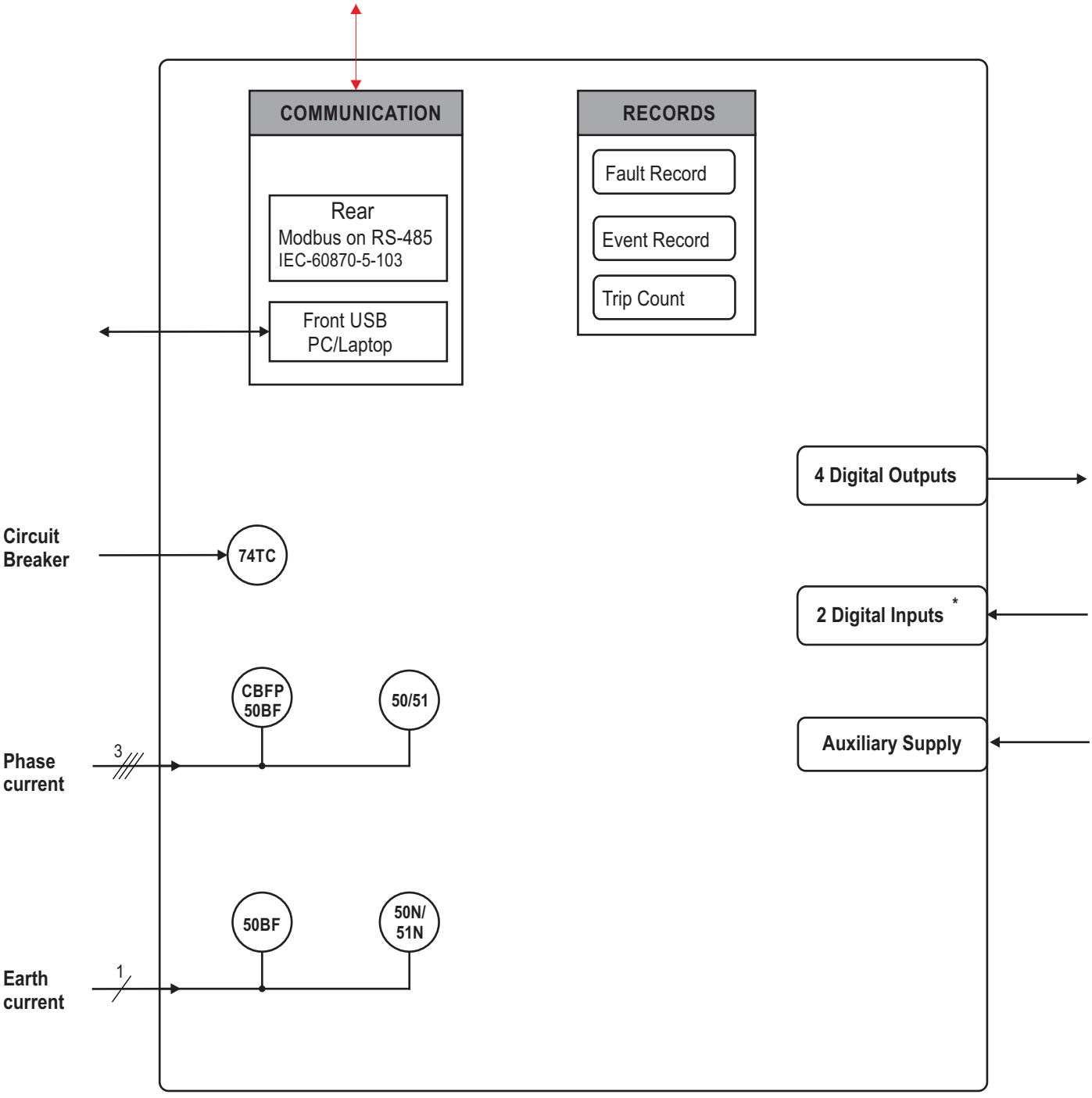
## 4) Hardware

- Micro controller based numeric design
- Measures true RMS with DFT filter
- 4 Current analog inputs
- Max. 2 digital inputs (available in 101 model)
- Max. 4 digital outputs
- Alpha numeric (12 x 2) LCD
- 5 Push button on the front for HMI
- RS-485 & USB communication

## 5) Protection Features

- Three phase time over current protection
- Three phase instantaneous protection
- Earth time over-current
- Earth instantaneous over-current
- Circuit breaker failure protection
- Trip Circuit Supervision
- Cold Load Pickup
- Harmonic Blocking

## 6) Functional Diagram




(Figure 1)

* Model dependent

## Protection Function

### Three Phase Over-current Protection

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

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.

### Trip Circuit Supervision

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

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.

### 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.

### Cold Load Pickup

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 exceed the protection setting without the presence of a fault. This may be due to the fact that the off period of all the loads (furnaces, heaters, coolers etc.) is elapse and they are all connected at the same time, producing a strong inrush current in the line, but which can be supported within certain time. This phenomenon can occur not only at the moment of the breaker manual closing, after having remained open for a certain time, but also with the breaker permanently closed due to the operation of another upstream breaker.

What the function does is detecting when those conditions are given and changing the tripping settings during a programmable time.

The function is activated when the current in the 3 phases is below 0.08A, then the programmed time starts to run to determine that the load is cold (this time can be 0, what means that any circuit breaker opening could lead to the cold load situation). Once that time has expired and the current has not exceed again 0.15A, the protection usual setting values are replaced by the cold load pickup ones. When any of the phase current exceed 0.15A a counter with programmable time starts, during which the setting are the cold load pickup ones. When expiring this time, the settings are again the usual ones.

## 7) Fault Record

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

Where

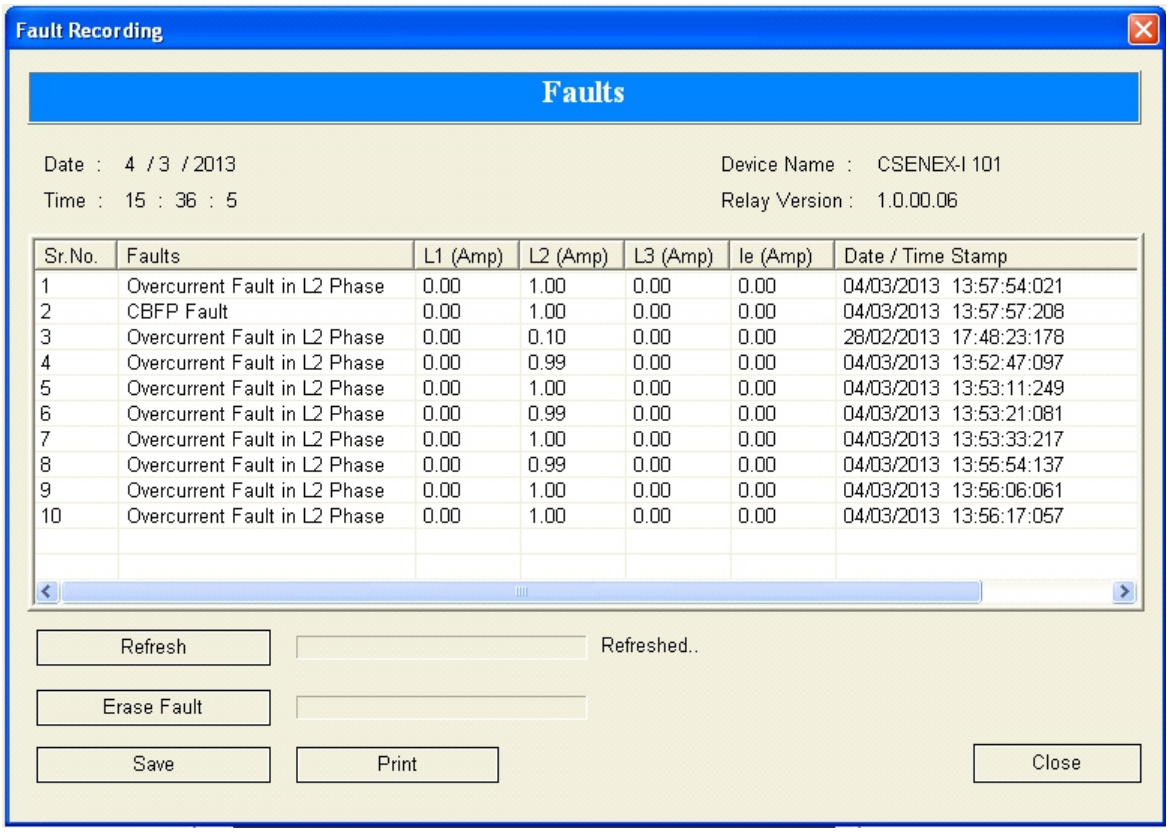
[F][ILx] Magnitude of phase current's.

[F]Ie Magnitude earth fault current's

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

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.




| 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)

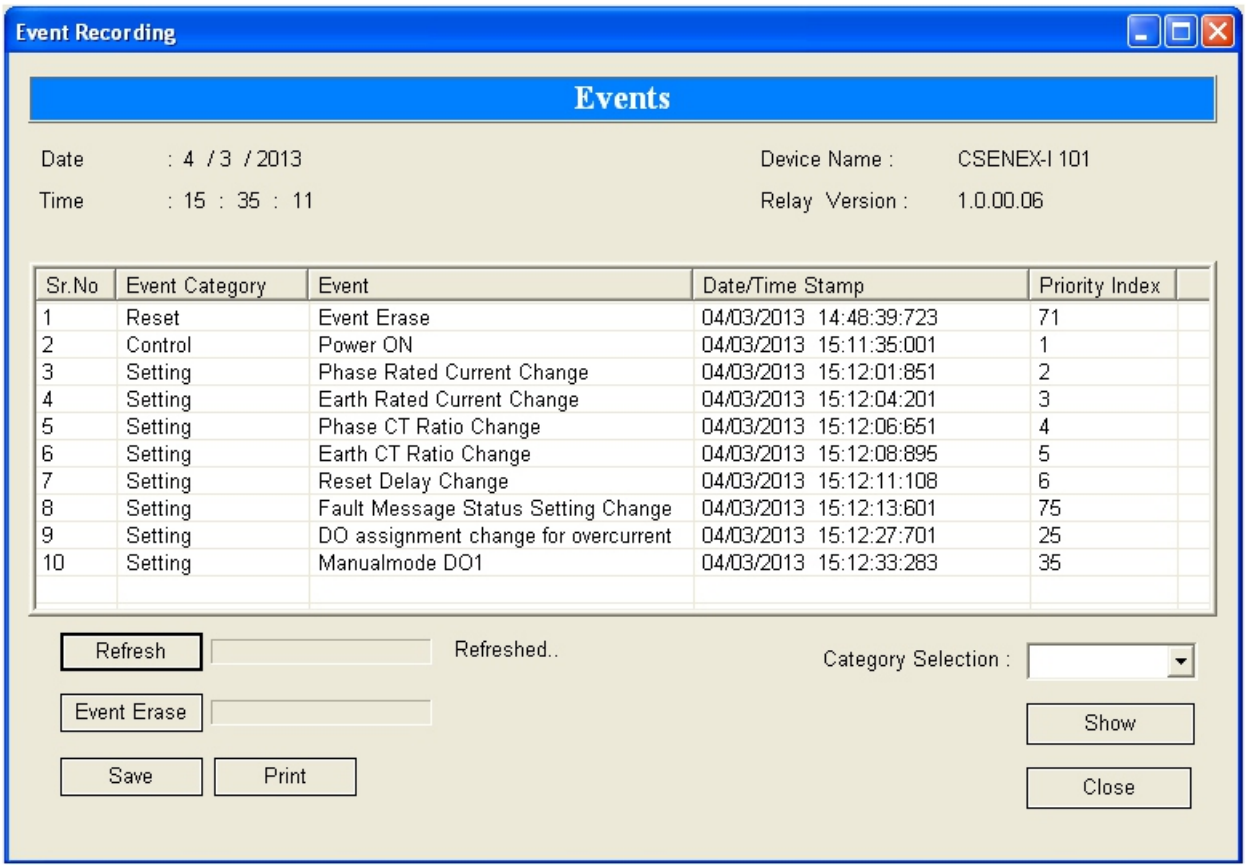
## 8) Event Record

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




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

### Output Contacts

| | | |
|---|---|---|
| No. of Digital Outputs | : | DO1, DO2, DO3, DO4)<br>[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) (only available in CSENEX-I 101 model) |
| Programmable (DI Assignment) | : | Programmable |

## 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.
- Sixteen 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 downward direction. |
|  | is used to scroll in upward direction. |


(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

**a) Rear Communication** * (Model dependent)
The protocol for the rear port is MODBUS-RTU, IEC-60870-5-103.

**b) 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 & 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<br>Phase over-current definite timing<br>Phase over-current inverse timing | I><br>t><br>ti> | 0.05xIp<br>0.1 Sec<br>0.01 | 4.0xIp<br>150 Sec<br>1.50 | 0.01xIp<br>0.01Sec<br>0.005 | EXIT<br>0.10 Sec<br>0.05 |
| 4 | Phase over-current hi-set pickup setting<br>Phase over-current hi-set definite timing | I>><br>t>> | 0.5xIp<br>0.03 Sec | 30xIp<br>20 Sec | 0.1xIp<br>0.01Sec | EXIT<br>0.10 Sec |
| 5 | Earth over-current low set pickup setting<br>Earth over-current low set definite timing<br>Earth over-current low set inverse timing | Ie><br>te><br>tie> | 0.05xIn<br>0.03 Sec<br>0.01 | 2.5xIn<br>150 Sec<br>1.50 | 0.01xIn<br>0.01Sec<br>0.005 | EXIT<br>0.10 Sec<br>0.05 |
| 6 | Earth over-current hi-set pickup setting<br>Earth over-current hi-set definite timing | Ie>><br>te>> | 0.5xIn<br>0.03 Sec | 8xIn<br>20 Sec | 0.05xIn<br>0.01 Sec | EXIT<br>0.10 Sec |

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 $t = \frac{0.14/0.061/0.028}{(I/Is)^{0.02}-1}$ ti [s]

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

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

For Current Range 0.05 to 0.2xIn:
Trip timing Accuracy : VINV / NINV 3.0 / 1.3 / DEFT : +20% OR +40mSec (whichever is higher)
EINV / NINV 0.6 / LINV : +20% OR +40mSec (whichever is higher)

### Trip Circuit Supervision Protection

| S.No. | Parameter | Display | Setting Ranges | | Step Size | Default |
|---|---|---|---|---|---|---|
| | | | Min | Max | | |
| 1 | TCS | t_TCS | 0.03 | 2 | 0.01 | EXIT |

### Circuit Breaker Failure Protection

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

### DO Reset

| S.No. | Display | Setting Ranges | 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 |

### DI Assignment (Only available in CSENEX-I 101 model)

| S.No. | Parameter | Display | Min | Max | Step Size | Default |
|---|---|---|---|---|---|---|
| 1 | Circuit Breaker Close | CB close | DI1 | Exit | ----- | ----- |
| 2 | Circuit Breaker Open | CB open | DI1 | Exit | ----- | ----- |

### 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 |

## 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 |

## 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 | Trip Circuit protection | TCS | 1 | 1234 | ---- |
| 7 | Circuit breaker failure protection | CBFP | 1 | 1234 | ---- |

## Cold Load Pickup Setting

| S.No | Parameter | Display | Min | Max |
|---|---|---|---|---|
| 1 | Cold Load Pickup enable | CLP PKP | NO | YES |
| 2 | Cold Load Short Circuit Setting | I>> | 0.50 xIp | 30.0 xIp |
| 3 | Cold Load Short Circuit Time | t>> | 0.03 s | 20.00 s |
| 4 | Cold Load Earth Hi-set Setting | Ie>> | 0.50 xIn | 8.0 xIn |
| 5 | Cold Load Earth Hi-set Time | te>> | 0.03 s | 20.00 s |
| 6 | Cold Load Time | tcl | 0.00 s | 100.00 s |
| 7 | Cold Load Pickup Time | tac | 0.00 s | 100.00 s |

## 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 * | Ip | 1 A | 5 A | ----- | 1 A |
| 2 | Rated earth current * | In | 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 Communication

(*Availability as per model selection)

| | |
|---|---|
| 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 |

### Front 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

| Quantity | Range | Frequency Range | Accuracy |
|---|---|---|---|
| Current | 1.0 - 30 x$I_p$ | 50 Hz | +2% |

## 12) Technical Data

### Measuring Input

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

| Type Test | | | |
|---|---|---|---|
| F1 | Functional Tests | Internal Design<br><br>Specifications & IEC60255-151:2009 | Performance in line with Specification & Standards<br>Pickup / Drop down / Power consumption in Current / Voltage / Aux. Supply / Trip timing accuracy: OC / NPS / Thermal / Zero Sequence |

| Climatic Test | | | |
|---|---|---|---|
| C1 | Temperature Dry Cold (Relay operational) | IEC 60068-2-1 | -20 deg C, 96 hours |
| C2 | Temperature Dry Cold Transportation & Storage | IEC 60068-2-1 | -25 deg C, 96 hours |
| C3 | Temperature Dry Heat (Relay operational) | IEC 60068-2-2 | 55 deg C, 96 hours |
| C4 | Temperature Dry Heat Transportation & Storage | IEC 60068-2-2 | 70 deg C, 96 hours |
| C5 | Damp Heat Test (Relay operational) | IEC 60068-2-30 | 95% @ +55 / +25 deg C, 6 cycle (12hr + 12hr each) |

| Enclosure | | | |
|---|---|---|---|
| C6 | Enclosure | IEC 529 | Front IP54 (Dust 5x + Water x4) |

**Mechanical Test**

| Relay Operational | | | |
|---|---|---|---|
| M1 | Vibration response / Endurance test | IEC 60068-2-6 | Class I<br>Vibration response (Relay operational)<br>10Hz~150 Hz - peak displacement 0.035 mm below 58/60 Hz, 0.5 g above, 1 sweep cycle in each axis<br>Vibration endurance (Relay de-energised)<br>10 Hz~150 Hz 1g, 20 sweep cycles in each axis |
| M2 | Shock Response / Withstand Test | IEC 60255-2-27 | Class I<br>Shock response (Relay operational) 5g 11mS<br>3 pulse in each axis<br>Shock withstand (Relay de-energised) 15g 11mS<br>3 pulses in each axis |
| M3 | Bump Test | IEC 60255-21-1 | Bump (Relay de-energised) 10g 16mS<br>1000 pulses in each axis |
| M4 | Seismic Test | IEC 60255-21-3 | Class I<br>Method A single axis sine sweep<br>1 Hz~35 Hz–below 8/9 Hz 3.5 mm peak displacement horizontal axis, 1.5 mm vertical axis above 8/9 Hz 1g horizontal, 0.5 g vertical<br>1 sweep cycle in each axis |

| Electrical Test | | | |
|---|---|---|---|
| E1 | Insulation Resistance >100MΩ | IEC 60255-27:2013 | 500V DC, 5 sec between all terminals & case earth, between terminals of independent circuits including contact circuits and across open contacts |
| E2 | DC & AC Supply Voltage (Relay operational) | IEC 60255-26 | Voltage range, upper & lower limit continuous withstand, ramp up & down over 1 minute |
| E3 | Voltage Dips, Short Interruptions & Voltage variations immunity (Relay operational) | IEC 60255-26 | 3 Dips & 3 Interruptions at 10 sec intervals of duration between 10mS and 500mS at zero crossings & at other points on wave<br>Variation: 100% to 40% over 2s, hold for 1s, return to 100% over 2s |
| E4 | Ripple in DC supply (Relay operational) | IEC 60255-26 | 12% AC ripple |
| E5 | **Dielectric Test**<br>(Relay de-energised)<br>No breakdown or flash over<br>Test voltage 45~65 Hz sinusoidal or with DC voltage at 1.4x the stated AC values | IEC 60255-27:2013 | 2.0 KV @ 1min All circuit to Earth / Between IP & OP |
| E6 | High Voltage Impulse (Relay de-energised) | IEC 60255-27:2013 | 5 kV peak 1.2/50uS, 0.5 J-3 positive, 3 negative between all terminals to case earth between independent circuits |
| E7 | VT Input Thermal Withstand | | 1.5xVn, continuous |
| E8 | CT Input Thermal Withstand | | 250xIn half wave<br>100xIn for 1 second<br>30xIn for 10 second<br>4xIn continuously |
| E9 | Contact performance & endurance tests | IEC 60255-1:2009 | |

| Electro-magnetic Compatibility | | | |
|---|---|---|---|
| R1 | Electrical fast Transient/Burst<br>(Relay operational) | IEC 60255-26 : 2013<br>IEC 61000-4-4 | Class IV- ±4.0 kV All Circuits.<br>Pulse 5 / 50nsec / Duration 15msec /<br>Period:300msec/Pulse Freq: 5KHz / 2KV at I/O |
| R2 | HF Disturbance Test<br>(Oscillatory Waves)<br>1 MHZ Burst<br>(Relay operational) | IEC 60255-22-1 : 2007 | Class III<br>Longitudinal 2.5 kV peak, 2sec between<br>independent circuits & case earth |
| R3 | Electrostatic Discharge<br>(Relay operational ) | IEC 60255-26 : 2013<br>IEC 61000-4-2 | Class III<br>8kV air discharge, 6KV contact<br>No of Discharge : 10<br>both polarities at 1 sec intervals |
| R4 | Conducted Disturbance<br>RF fields<br>(Relay operational) | CISPR-11 : 2015<br>IEC 60255-26 : 2013 | 0.15 to 80 MHZ (Level-3)<br>Severity Level 10V RMS<br>+ sweeps 0.05-0.15 MHZ & 80-100 MHZ |
| R5 | Radiated RF E-M field<br>immunity test<br>(Relay operational) | CISPR-22 : 2008<br>IEC 60255-26 : 2013 | Class III Test method A<br>+ sweep 80-1000 MHZ<br>or IEC 1000-4-3 80-1000 MHZ<br>severity 10 V/m 80% modulated 1 kHz |
| R6 | Surge Immunity capacitively<br>coupled<br>(Relay operational) | Latest: IEC 60255-26:2013 | Short circuit combination wave generator<br>1.2 uS/50 uS open circuit<br>repetition rate 1 per minute<br>Power supply, CT & VT circuits –<br>4kV common mode 2 Ohm source<br>2kV differential mode 12 Ohm source |
| R7 | Power Frequency<br>Magnetic Field<br>(Relay operational) | IEC 61000-4-8 : 2009 | 100 A/m for 1 minute<br>in each of 3 axes |
| R8 | Conducted & Radiated RF<br>Interference Emission<br>(Relay operational) | IEC 60255-26 | CISPR-11 / Class A |
| R9 | Power Frequency,<br>conducted common mode | IEC 1000-4-16<br>IEC 60255-22-7 | DC to 150 kHz Test Level 4<br>300V at 16 2/3 Hz and 50 Hz |

## Trip 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 |
| DC Current Carrying Capacity | 8A@30VDC / 0.3A@110VDC/ 0.2A@220VDC |
| 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 | 10,000 operation minimum |
| Unloaded contact | 30,000 operation minimum |

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

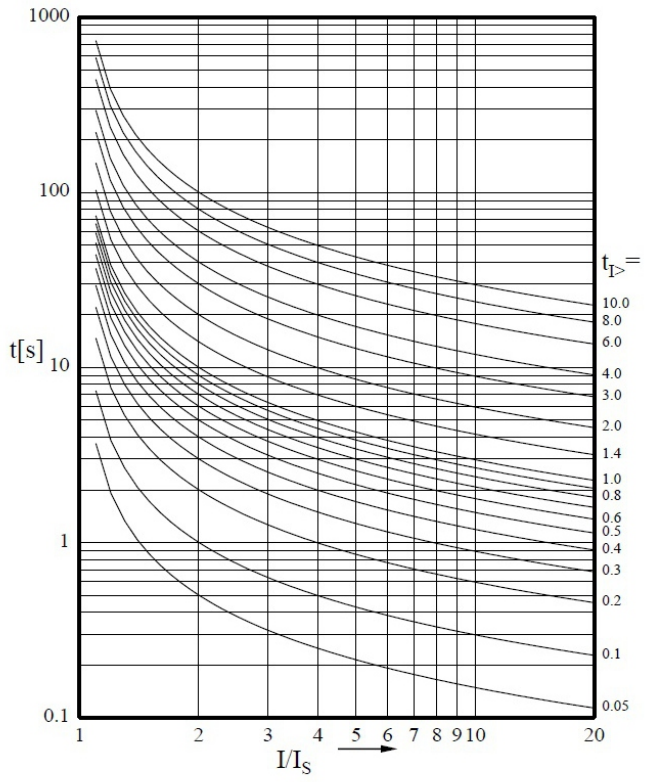
## 15) Model Selection Table

| 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 | ✓ |
| Cold Load Pickup | 62 CLD | ✓ | ✓ |
| Harmonic blocking | 50H | x | ✓ |
| Digital input | - | x | 2 |
| Digital output | - | 4 | 4 |
| Fault record | - | 10 | 10 |
| Event record | - | 16 | 16 |
| Selection of 1/5A | - | O | O |
| Front communication | - | ✓ | ✓ |
| Rear comm. (RS-485) | - | O | O |

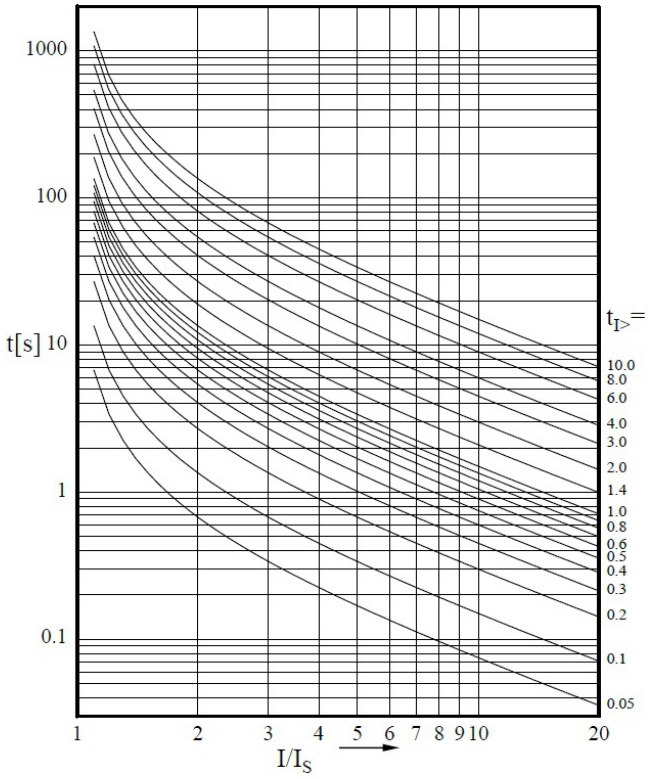
O : Optional based on Ordering Information

## Inverse Graph Representation

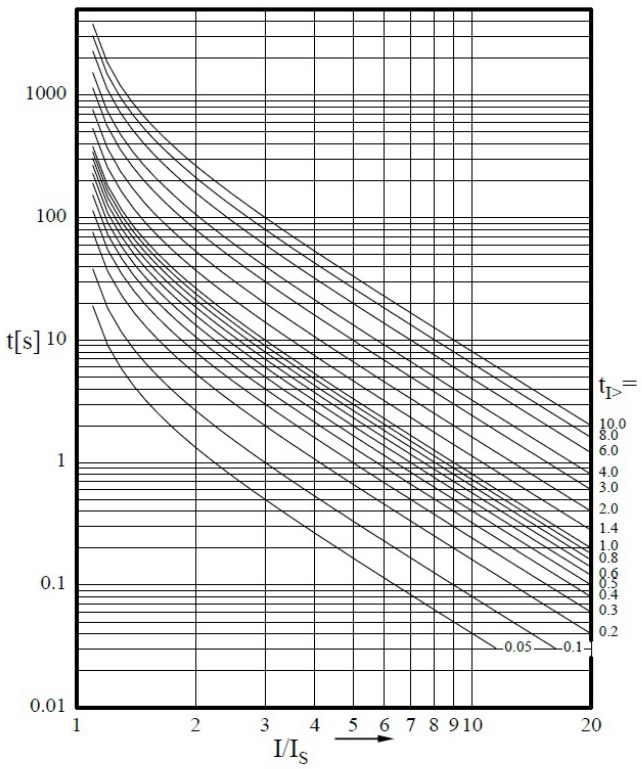
### Inverse Time Characteristics



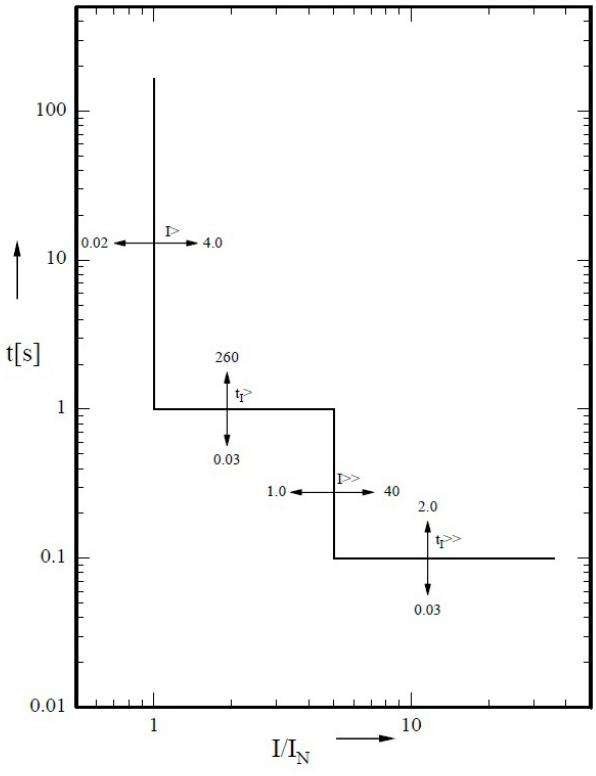

*Normal Inverse*



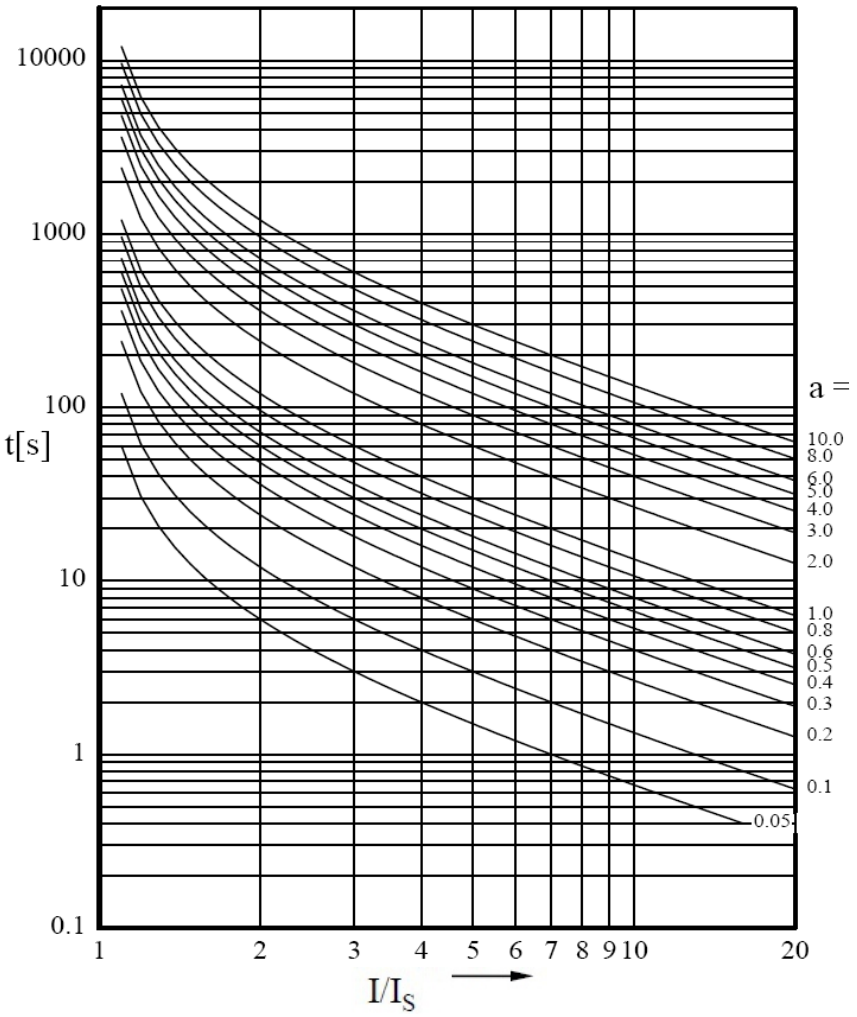

*Very Inverse*




*Extremely Inverse*

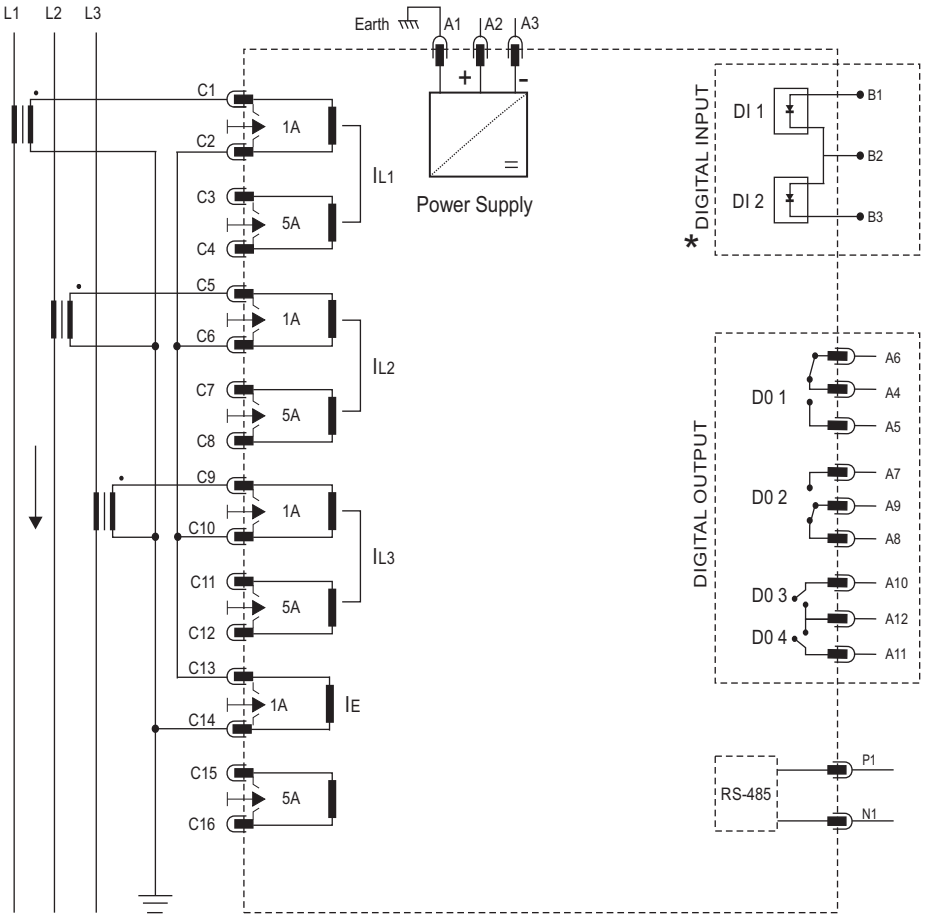



*Definite time overcurrent relay*




*Long time inverse*

## 17) Connection Diagram (1A & 5A common model)



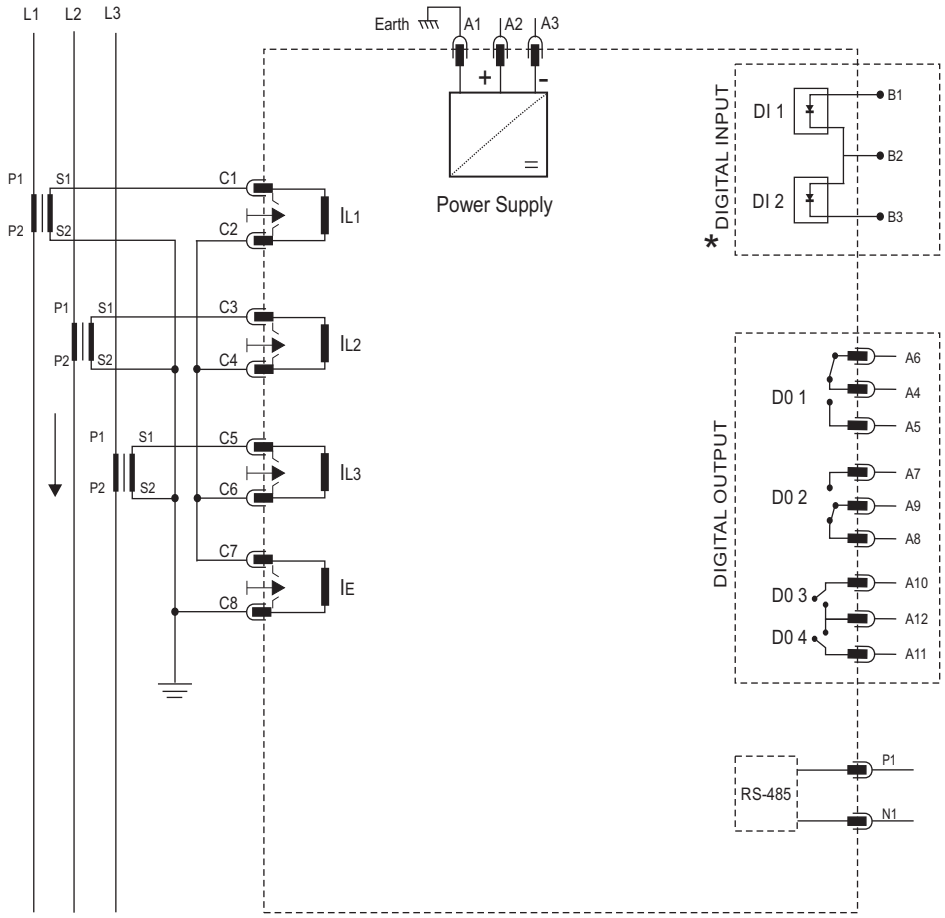

(Figure 6)

### Terminal Description

| Terminal Name | | Terminal Description |
|---|---|---|
| A1 | : | Auxiliary Supply Earth |
| A2-A3 | : | Auxiliary Supply (A2: + & A3: -) |
| P1-N1 | : | For RS-485: P1(Data+ / A), N1(Data- / B) |
| 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) |
| C15-C16 | : | CT Terminal for Earth current input (5A) |

* Model dependent

## Connection Diagram (1A or 5A ordering based model)



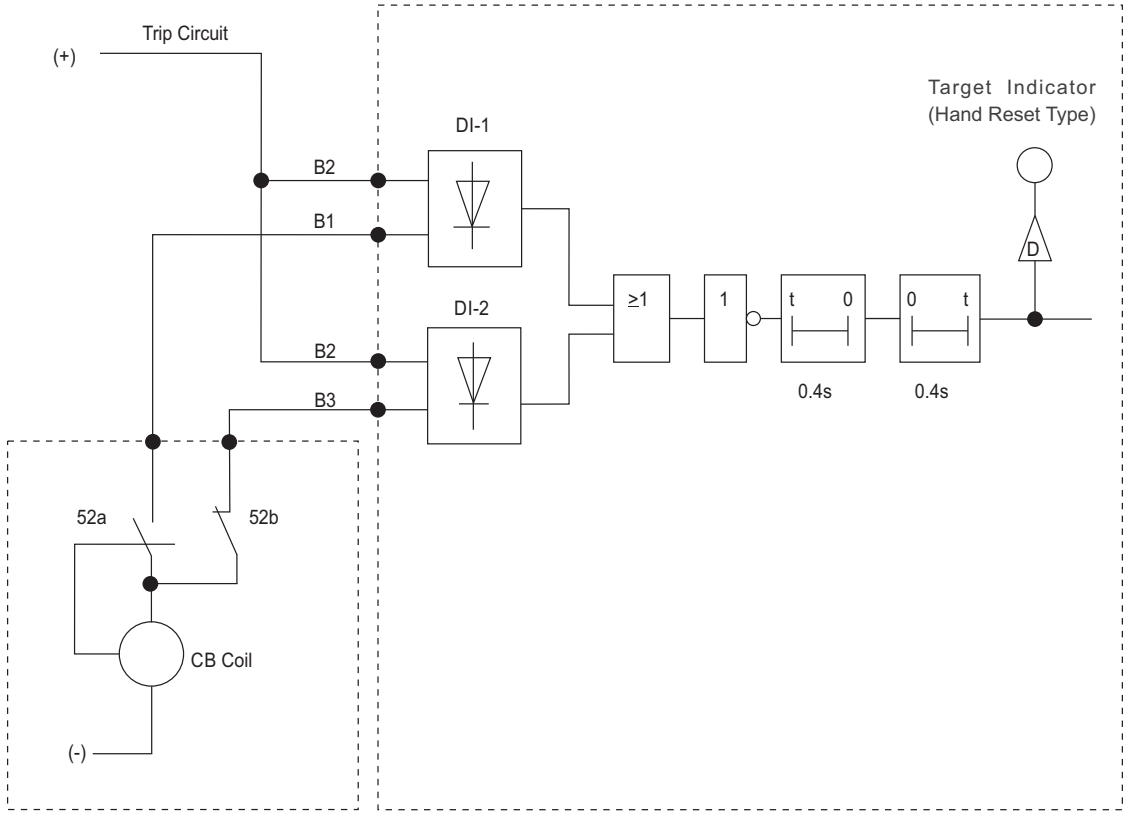

(Figure 7)

### Terminal Description

| Terminal Name | | Terminal Description |
|---|---|---|
| A1 | : | Auxiliary Supply Earth |
| A2-A3 | : | Auxiliary Supply (A2: + & A3: -) |
| P1-N1 | : | For RS-485: P1(Data+ / A), N1(Data- / B) |
| 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 L1(C1-C2), L2(C3-C4), L3(C5-C6) |
| C7-C8 | : | CT Terminal for Earth current input |

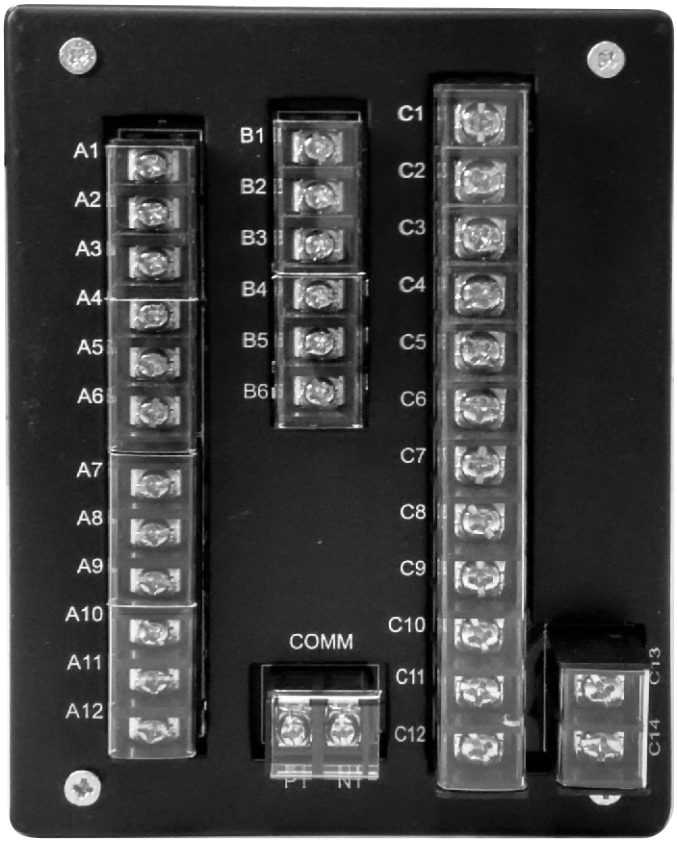
* Model dependent

## 16) Trip Circuit Supervision Diagram




(Figure 5) (Trip Circuit Supervision Function)

## 18) Back Terminal Diagram

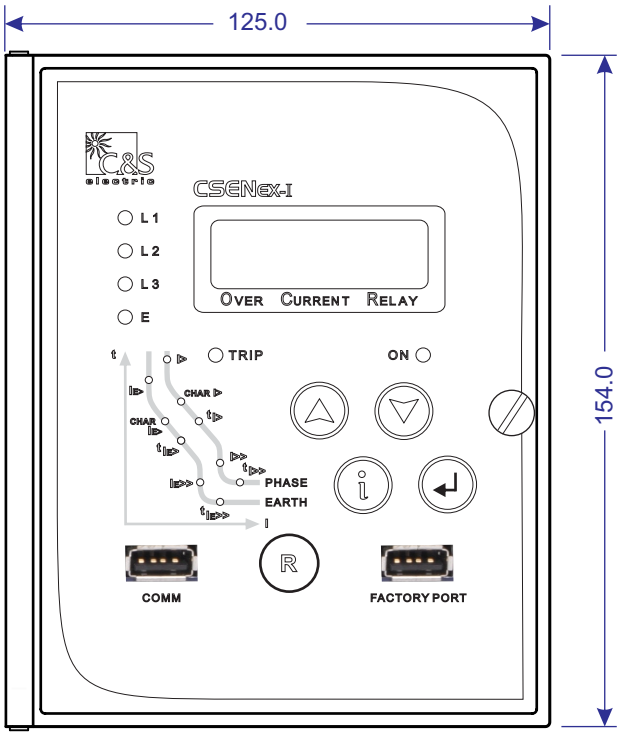



(Figure 8)

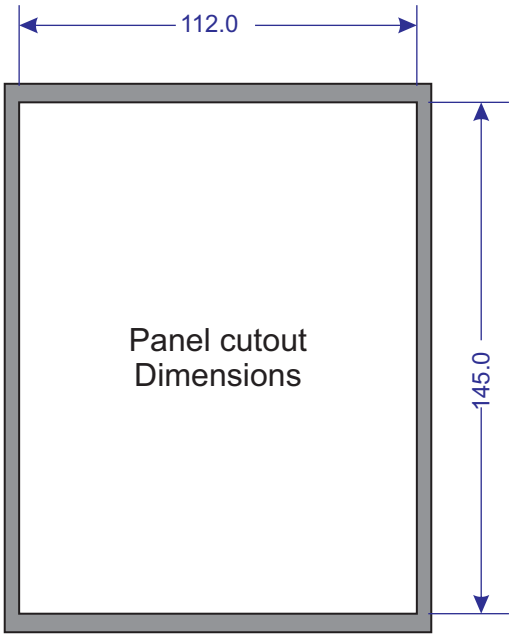
(All the dim. are in mm, Gen. Tol.: ± 1.0mm)

## 19) Dimensional Details

Front View

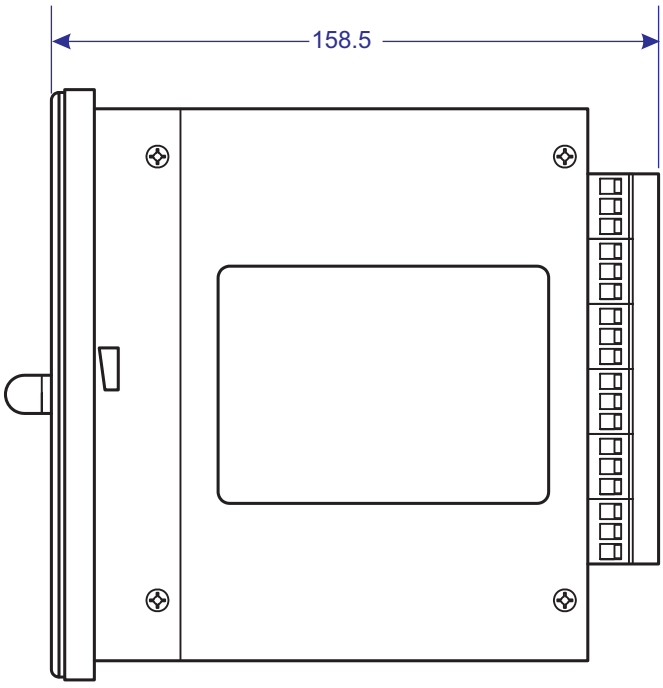



(Figure 9)



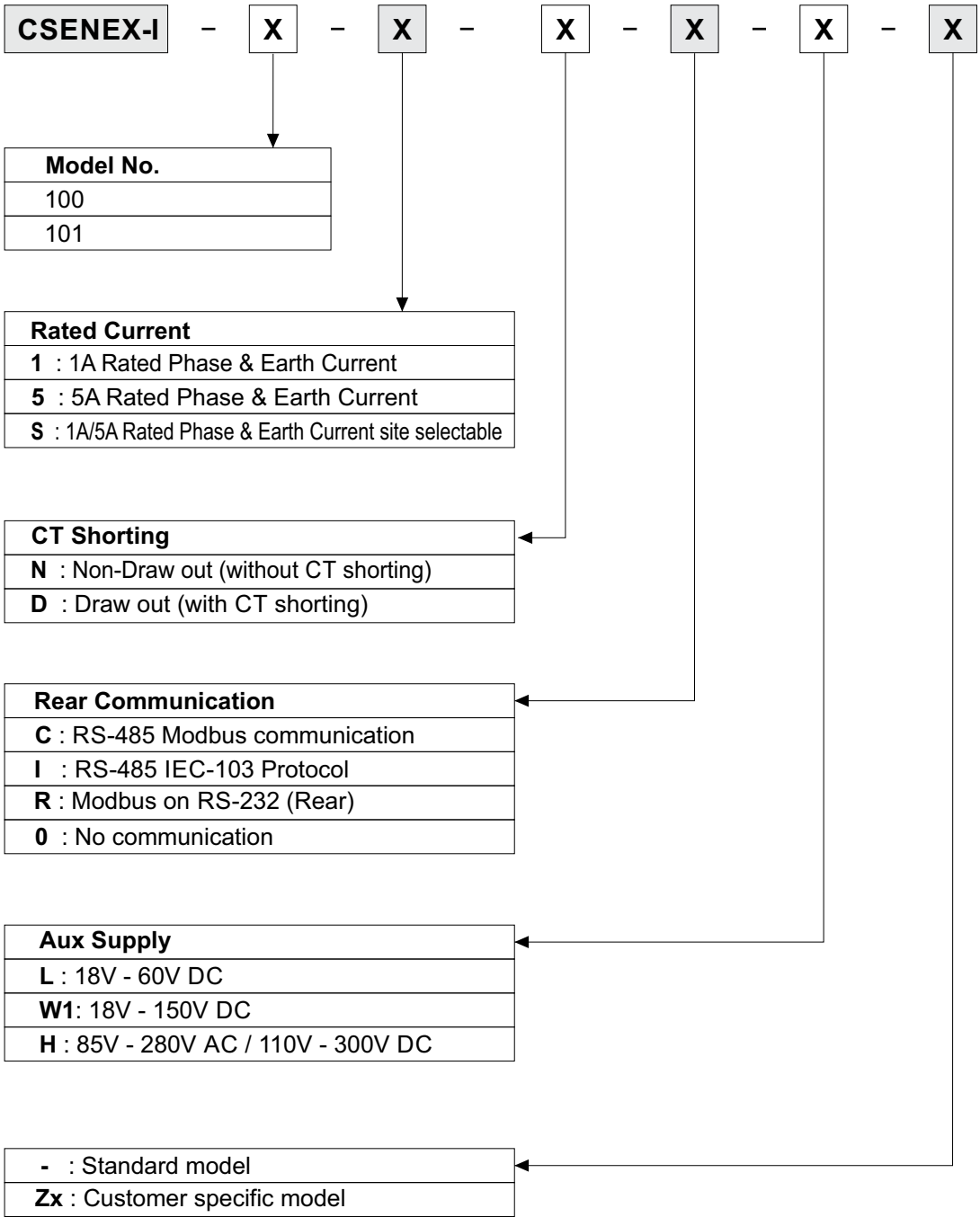

(Figure 10)

Side View




(Figure 11)

## 21) Ordering Information




**EXAMPLE: CSENEX-I-100-1-N-C-L-Zx**

## Revision History

| S.No. | Rev.No. | Details | Date |
|---|---|---|---|
| 01 | 14 | Inclusion of TCS Diagram | 05.08.14 |
| 02 | 15 | Inclusion of Cold Load Pickup Description & Table | 02.09.14 |
| 03 | 16 | Inclusion of RS-232 Communication in Conn. Diagram, Term. Description & Ordering Information | 01.10.14 |
| 04 | 17 | Change in TCS Diagram | 10.09.15 |
| 05 | 18 | Inclusion of Relay mounting arrangement on Page 20 | 11.04.16 |
| 06 | 19 | Change in Inverse formula on page 9 | 25.03.17 |
| 07 | 20 | Added Term no. C15 & C16 for Earth current input (5A) in conn. diagram on page 15 | 06.02.23 |
| 08 | 21 | In Inverse formula on page 9 : Change in trip time accuracy for current range : from 30 to 40 msec | 26.06.23 |
| 09 | 22 | Inclusion of Inverse graph representation on page 15 & 16 | 04.07.23 |
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