We touch your electricity everyday!

CSEZEN-F 550x

Advance Feeder Protection & Monitoring IED

DRAW-OUT WITH SELF CT SHORTING

FAULT EVENT DISTURBANCE RECORDER

DI/DO PROGRAMMABLE MATRIX

METERING PROTECTION

Catalog

C&S electric

PMD Division

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1.0 Introduction

CSEZEN series offers a multi functional comprehensive smart protection solution for Feeder, Generator, Motor & Transformer segment.

CSEZEN family of protective relays are advance numerical relays that provide multi protection and monitoring with reliable and fast protection solution in a single unit.

In this family of CSEZEN series, the CSEZEN-F is an advanced Feeder protection relay designed for controlling, protecting and monitoring industrial installations, public distribution networks and substations.

CSEZEN-F also provides an automation solution of power control. It complies with IEC 60870-5-103, IEC 61850, Modbus protocol for high integration of protection & control. CSEZEN-F offers following features in a compact & smart flush mounting enclosure.

- Draw-out enclosure have modular design with CT shorting
- Programmable Rated Current 1A & 5A
- Measurement, Protection & Metering
- DI/DO/LED Matrix Programmability
- Four sets of setting groups
- Disturbance Recording
- Last 20 fault record (non-volatile memory) with time stamp
- Last 500 event record (non-volatile memory) with time stamp
- Intelligent key for DI & DO status, details of fault pickup & status
- Communication (Local & Remote)
- CSEZEN-F relays are equipped with self supervision function
- Self-diagnostic feature, separate output contact for any internal relay failure

2.0 Application

CSEZEN-F relay will cover wide range of protection functions required for feeder segment. It can be used as part of protection scheme for transformers and generator transformers. CSEZEN-F relays can also provide back-up protection for HV and EHV transmission systems.

3.0 Hardware

- Digital Signal Processor based numeric design
- Measures true RMS with DFT filter
- CT Terminal with self shorting
- 1A & 5A site selectable
- 4 Current Analog Input
- 4 Voltage Analog Input
- Max.16 Digital Inputs
- Max.16 Digital Outputs
- 20x4 Alpha numeric LCD
- 10 LEDs at Pickup & Trip on fault
- Push button on the front for HMI
- Programmable Scheme Logic (PSL)
- USB with Laptop interface
- LAN-RJ45/RS-485/USB ports for Communication

4.0 Protection Features

- Three Phase Time Over Current Protection
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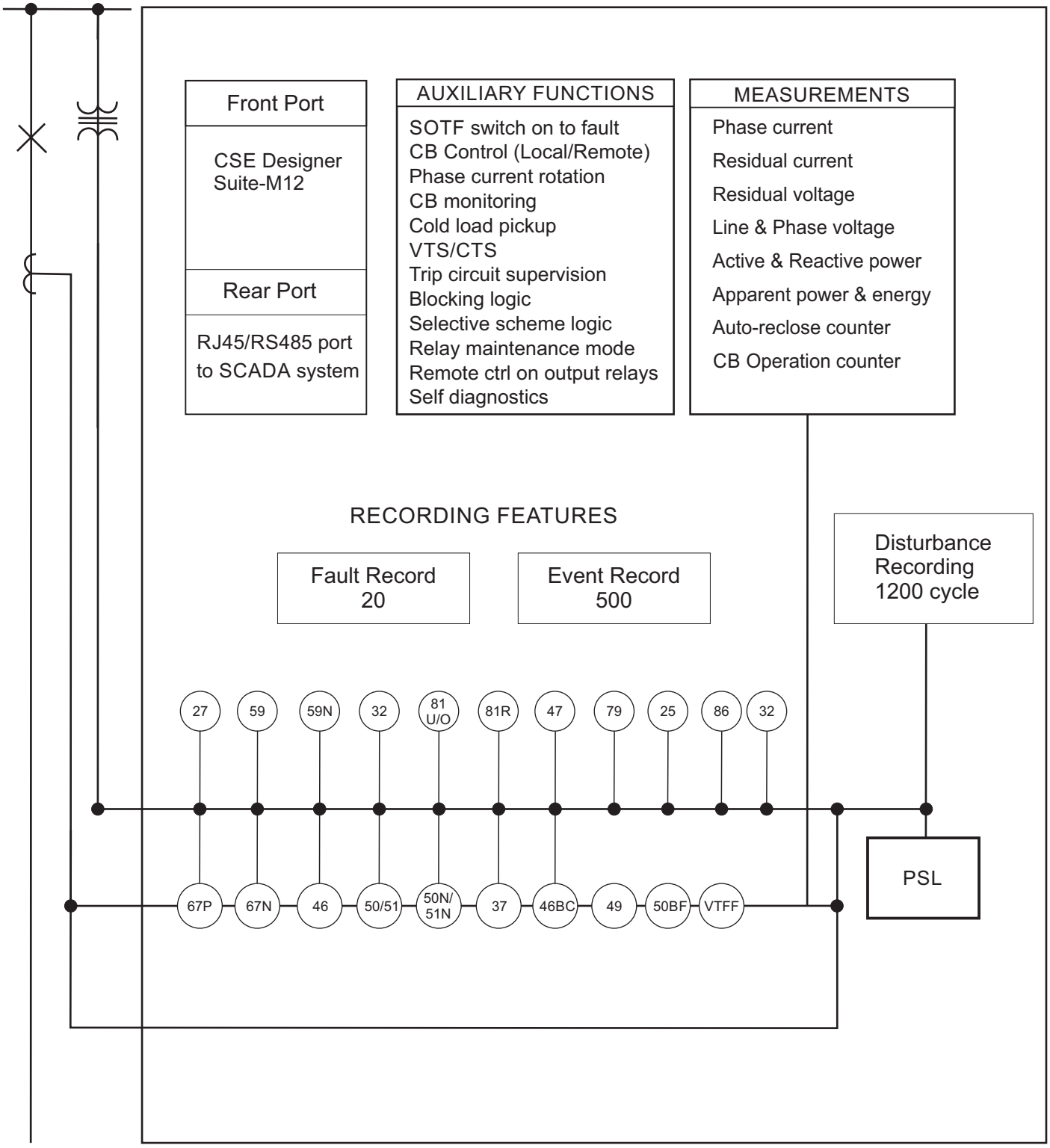
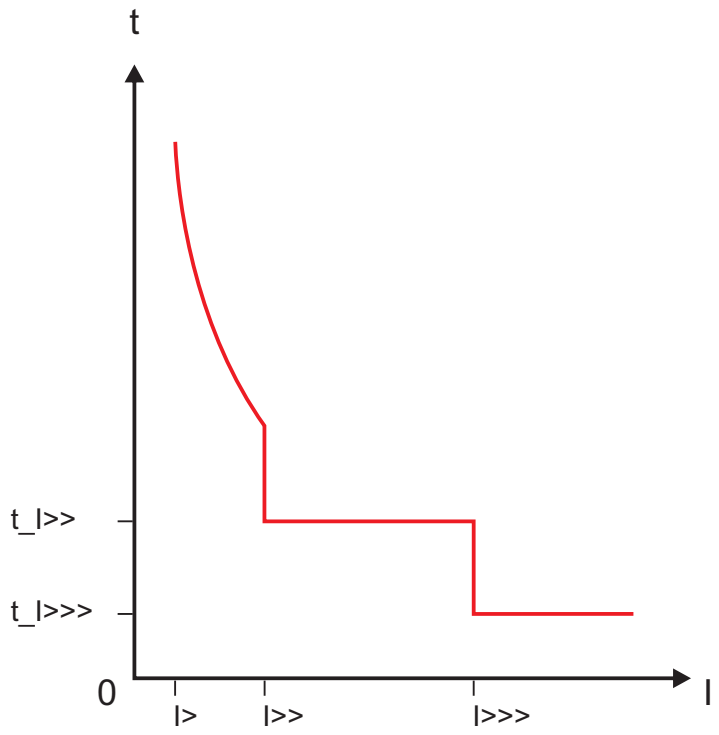


7.0 Protection Functions

Three Phase Over-current

Three Phase over current element (50P/51P) operates in a time period that depends on the applied current and on the set curve. The protection element trip when phase current exceeds the set current threshold for the set time.

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



Over current Element

Inverse Characteristics Formula

Refer following formula for EINV, VINV, LINV, NINV1.3, NINV3.0 characteristics:

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 ti =Time multiplier
I =Fault current IS =Setting value of current

Phase Directional Element

The Phase directional element provides independent elements for each phase and determines the direction of the current.

Its main function is to apply a blocking signal to the over current elements to prevent their operation when the current is flowing in a certain direction. In order to determine the direction of the current, the element uses phase current values as operation magnitude and phase-to-phase voltage values as polarization magnitude. This means that in order to polarize a phase, we use the phase-to-phase voltage of the other two phases known as crossed polarization.

Feature : This setting allows enabling or disabling the corresponding directional element.

MTA : The MTA setting corresponds to the Torque angle, which is the rotation applied To phase-to-phase crossed voltage.

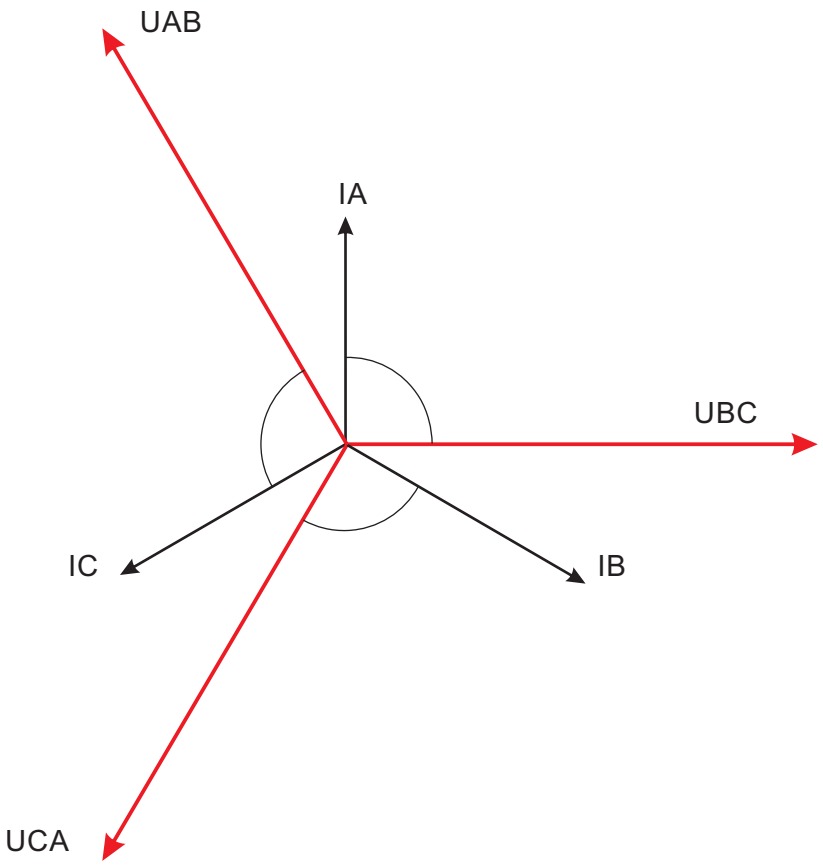
Direction : This setting allows selecting the area for the directional element to operate either forward or reverse.

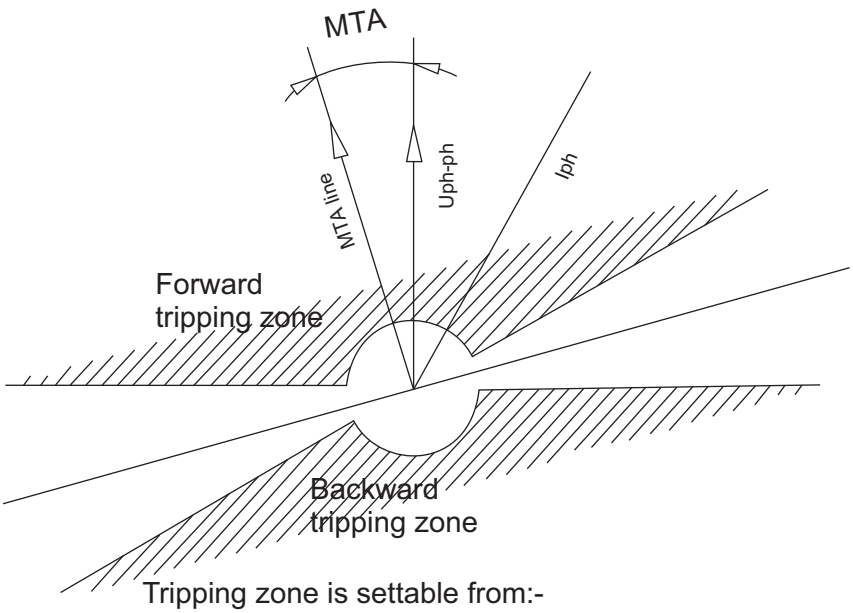
Polarization Voltage Threshold : This is the minimum voltage considered for the direction calculation. Under this setting, the element will be blocked or behave as non-directional depends on the below settings.

Behaviour below minimum polarization : This setting allows selecting either non directional or block depending on the selection, when applied voltage is less than polarization voltage threshold.

In order to give directionality to an over current relay, it is necessary to provide it with a suitable reference or polarizing signal. The reference generally used is the system voltage, as its angle remains relatively constant under fault conditions. The phase fault elements of the directional relay are internally polarized by the quadrature phase-phase voltages, as listed in the table below:-

Protected Phase	Operating Current	Polarizing Voltage
A Phase	IA	VBC
B Phase	IB	VCA
C Phase	IC	VAB





Tripping zone is settable from:-
+50 to +1750 in step of 10 with
reference to MTA (Torque angle)

MTA (Torque angle) is settable
from -900 to +900 in step of 10

The directional element analyze the relation between operating current and reference voltage to determine the fault direction. This is related to the relay characteristics angle (range -900 to +900C) as selected by the user. Typically a relay characteristics angle of 450 is chosen for transformer feeders and 300 for plain feeders.

The operate zone is effectively bounded +900 about the system characteristics angle for current levels

Earth Over current

The earth current is measured from the earth input terminals B13-B15/B14-B16.

The independent two stages (Ie> & Ie>>) 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 (Ie>>) can be configured with definite time only.

Derived Earth Over current

The derived earth over current element protection is used to cover application such as HTB/HTA transformers. The derived earth current (Ie_d>) is the vector summation:

$Ie\_d = (\vec{IL1} + \vec{IL2} + \vec{IL3})$

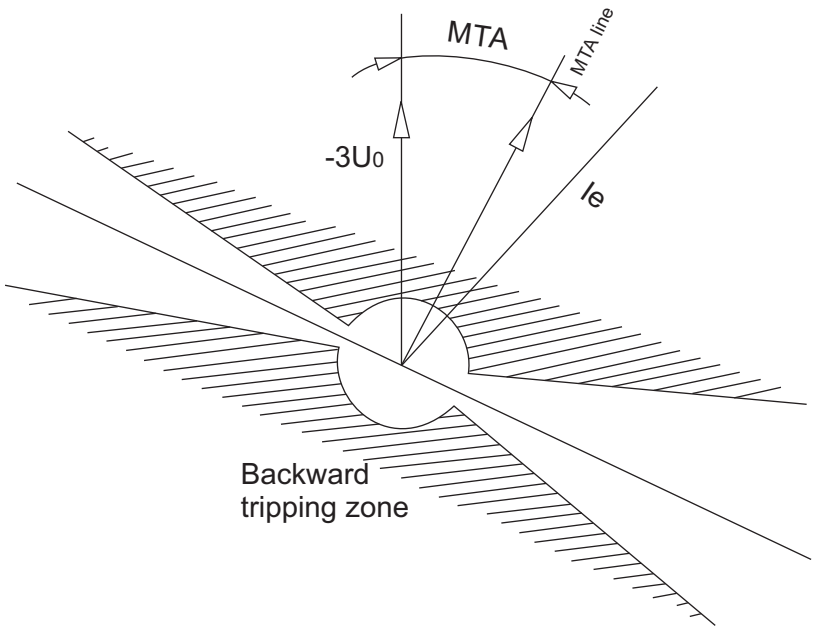
The derived earth over current has two independent thresholds: Ie_d> and Ie_d>>.
Refer Table-4 for Earth over current setting.

Directional Earth Fault

Earth directional is a directional protection element used for monitoring the earth over current element.

The operation magnitude is the earth current measured directly from the corresponding input B13-B15/B14-B16, while the polarization magnitude is the Neutral voltage Un (B23-B24).

The direction is evaluated using the earth current with the Un as polarization voltage for the earth fault directional protection. The angle determines the range in which the fault is considered forward and reverse.



Tripping zone is settable from:-
+50 to +1750 in step of 10 with
reference to MTA (Torque angle)

MTA (Torque angle) is settable
from -900 to +900 in step of 10

Restricted Earth Protection

The restricted earth fault relay is high impedance differential scheme which balances zero sequence current flowing in the transformer neutral against zero sequence current flowing in the transformer phase windings. Any unbalance for in-zone fault will result in an increasing voltage on the CT secondary and thus will activate the REF protection.

This scheme is very sensitive and can then protect against low levels of fault current in resistance grounded systems where the earthing impedance and the fault voltage limit the fault current.

In addition, this scheme can be used in a solidly grounded system.

Negative Phase Sequence Over current

This function protects against current unbalances resulting from anomalies in the power System or unbalanced loads. Negative phase sequence over current element give greater sensitivity to resistive phase to phase faults, where phase over current element may not operate.

If I2 is Negative phase sequence current then

$$3|\vec{I2}| = |\vec{Ia} + a2 \cdot \vec{Ib} + a \cdot \vec{Ic}| \quad \text{Where } a = 1\angle 120^0$$

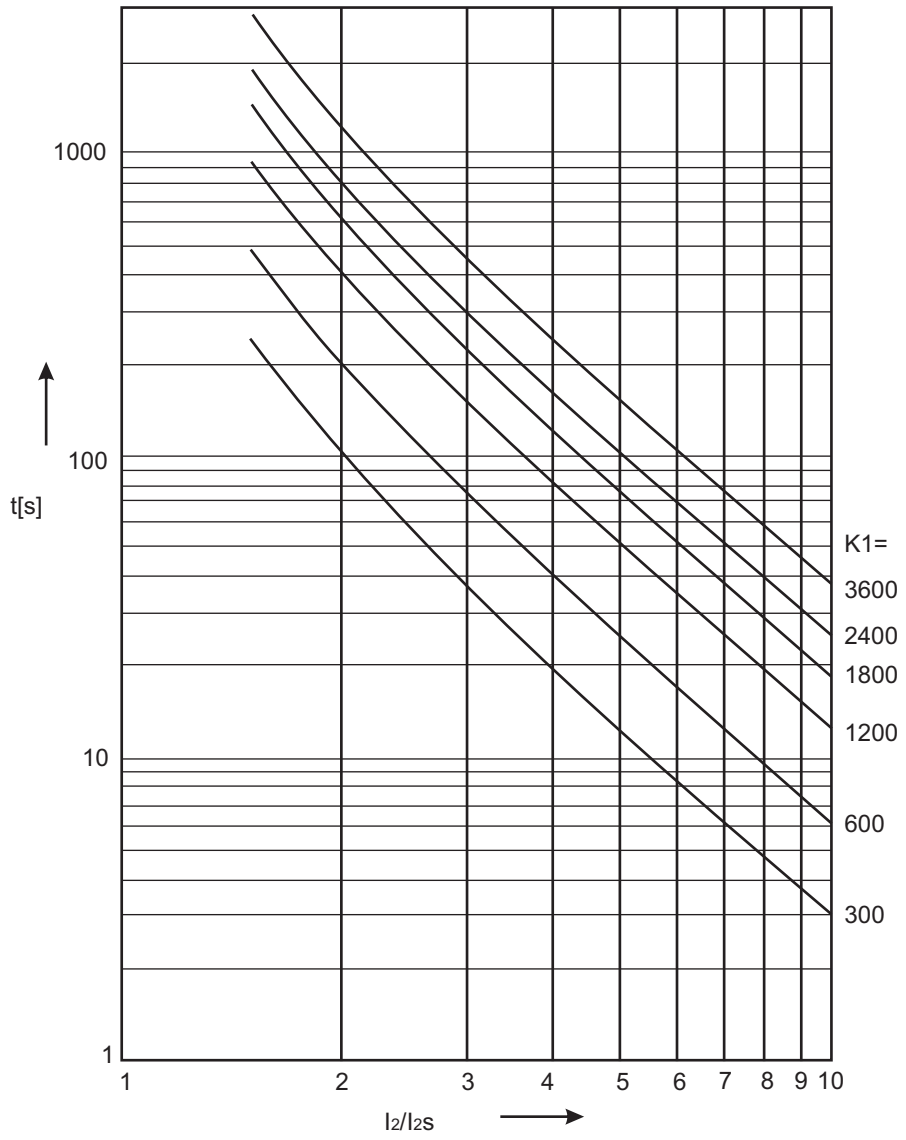
The Trip can be time delayed by a curve selectable by settings.

Refer following formula for the inverse characteristics of Negative Phase Sequence protection: -

Negative Phase Sequence Equation

$$t = \frac{K1}{(I_2/I_{2s})^2 - 1}$$

K_1 : TMS for Inverse characteristics of NPS
t : Expected Trip Time
I_2 : Measured negative sequence value
I_{2s} : Permissible NPS value



Negative Phase Sequence Inverse Time Characteristics

Three Phase Under current

The undercurrent protection makes it possible to detect a loss of load (for example the draining of a pump or breakage of a conveyor belt). If the phase current goes below the programmed undercurrent threshold for a programmed definite time the trip signal is given.

Thermal Over load

Thermal overload protection can be applied to prevent damages to the electrical plant equipment when operating at temperatures in excess of the designed maximum withstand. A prolonged over loading causes excessive heating, which may result in premature deterioration of the insulation or in extreme cases, insulation failure.

CSEZEN relays incorporate a current based thermal replica, using load current to reproduce the heating and cooling of the equipment to be protected. The element thermal overload protection can be set with both alarm and trip stages.

The heating within any plant equipment, such as cables or transformers, is of resistive type (I^2R x t), thus the quantity of heat generated is directly proportional to current squared (I^2). The thermal time characteristics used in the relay is based on current squared, integrated over time.
The CSEZEN relays automatically use the highest phase current as input information for the thermal model. Thermal protection can be inhibited on start-up. The thermal time characteristic is given by following formula:-

The formula for calculating the trip characteristics is as follows:

$$\text{Trip time (taus)} = \tau \ln \left[\frac{\left\langle \frac{I^2}{Ib^2} \right\rangle - p^2}{\left\langle \frac{I^2}{Ib^2} \right\rangle - k^2} \right] \quad \text{for } p^2 < \frac{I^2}{(Ib^2)} \cap p^2 \le k^2$$

with τ = thermal time constant of the object to be protected.

I_b= Basic current

I_P= Initial load current

P= Initial load factor (p= 0 means cold operating component)

k= constant

for thermal characteristics user has two choices

(1) Thermal based on highest measured RMS current

OR

(2) Thermal based on positive & negative sequence measured.

$I = \sqrt{I_1^2 + Neg\_k \times I_2^2}$

where

I_0 = Zero phase sequence current (ZPS)

I_1 = Positive phase sequence current (PPS)

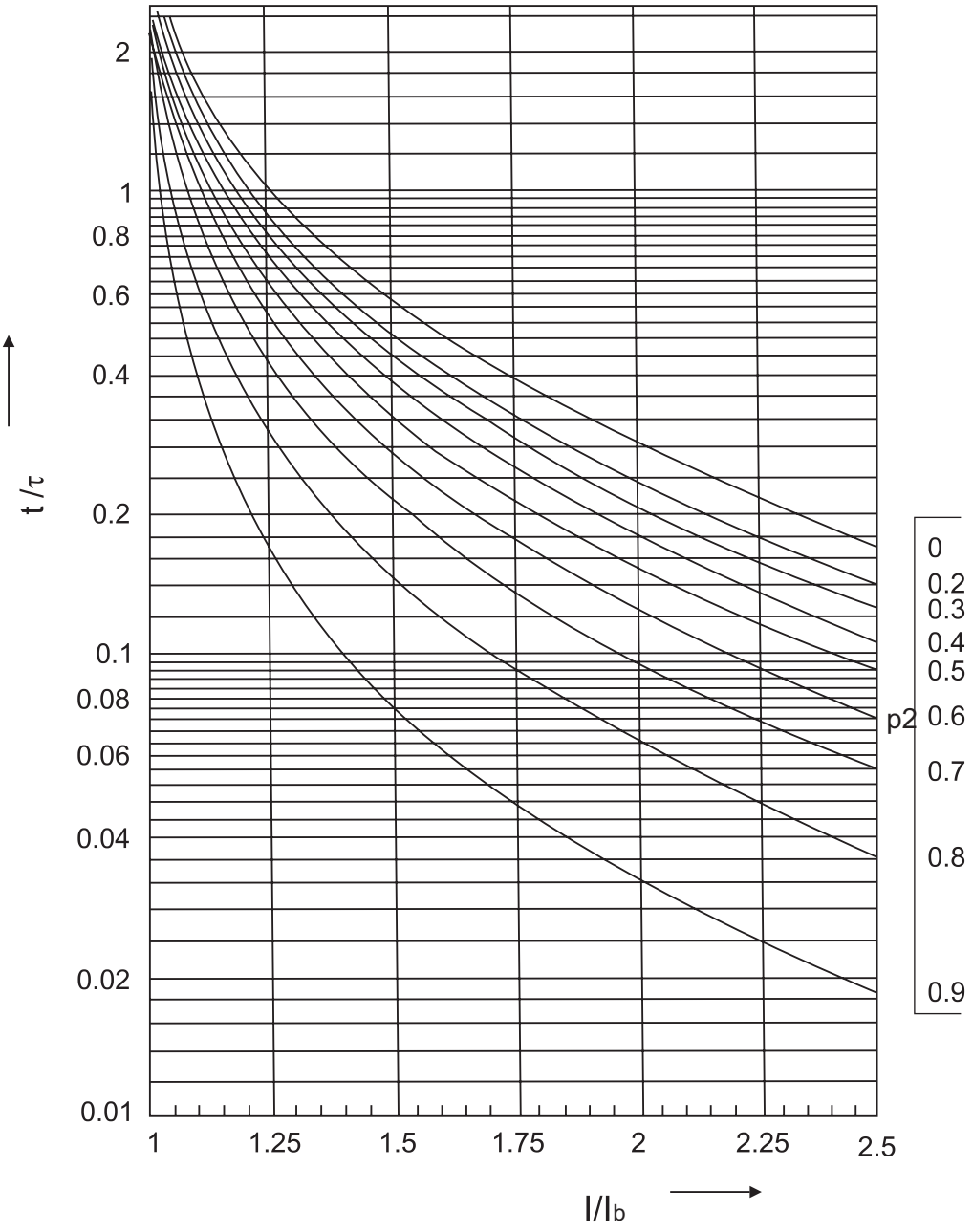
I_2 = Negative phase sequence current (NPS)

Neg_k= is weighting factor of NPS (constant value)

In CSEZEN relay three modes are available for saving of thermal memory during power reset. These modes are programmable.

M1: On Power Reset thermal memory becomes 0.
M2: On Power Reset thermal memory starts from the same value as at the time of Power Off.
M3: On Power Reset thermal memory subtracts for the time it is in Off state & starts from the remaining value.

Presentation of the Trip with variable initial load factor:



Broken Conductor

Majority of faults on a power system are shunt faults and induce appreciable current increase so easily detectable by standard over current protection element.

Another type of unbalanced system condition is the series or open circuit fault. This fault can arise from broken conductors, mal operation of single phase switchgear or the operation of fuses.

Series faults will not induce an increase in phase current on the system and hence are not easily detectable. However on a lightly loaded line, the negative sequence current resulting from a series fault condition may be very close to or less than the full load steady state unbalance arising from CT errors, load unbalance etc. a negative sequence protection element therefore would not operate at low load levels.

CSEZEN relays incorporate a protection element, which measures the ratio of negative to positive phase sequence current (I2/I1). This protection element will be affected to a lesser extent than the measurement of negative sequence current alone, since the ratio is approximately constant with variations in load current. Hence a more sensitive setting may be achieved.

Auto Re-closer Strategy

As 80% of faults in overhead lines are transient, the use of the auto recloser is very advantageous. Automatic auto-recloser allows a substation to operate unattended. The number of visits on site to manually re-close a circuit breaker after a fault, can then be substantially reduced. This feature gives an important advantage for substations supervised remotely.

Typically this auto re-close (AR) sequence of Instantaneous Trip(s) and Reclose Delays (Dead times) followed by Delayed Trip(s) provide the automatic optimum method of clearing all types of faults i.e. both Transient and Permanent, as quickly as possible and helps in improving the up time of the network in service.

DI Inputs

AR Blocking - To block the auto re-closer through remote DI

CB Close DI - To get the circuit breaker status

CB Ready - To get the CB ready or to give the closing command

Configurable Outputs:

79 AR Close

79 Lockout

AR - Blocked

Unit changes immediately to "AR-blocked" status when an external AR Blocking DI is applied or internal EXIT is chosen for AR cycle in HMI. No Auto reclosing is possible in "AR-blocked" status.

Activating of AR

Prior to every AR it is possible to select which kind of tripping (I> or I>>, Ie>, I>>> etc.) will lead to automatic reclosing. This can be separately fixed for each protection.

Dead time (td)

Starts with the off signal of the circuit breaker. No closing command to the circuit breaker is given till expiry of the set dead time.

User programmable dead times are available for each protection trip operation.

The dead time is initiated when the trip output contact resets, the pickup is reset and the CB is open.

The CB close output relay is energized after the dead time has elapsed If CB ready input is present.

The dead time (dead time td1, dead time td2 dead time td3 dead time td4) starts when the feedback on 'CB CLOSE DI' is not available.

Reclaim time (tr)

This is the time during which after switching on or after AR a subsequent reclosing is prevented.

If the number of the set shots is reached, the relay is locked for this time after the last reclosing attempt.

If CB Ready DI is not available relay will not generate closing command.

If the circuit breaker dose not trip again, the auto re-close cycle resets to original STATE-1 at the end of the reclaim time.

After Successful re-closure the relays goes to the lock out state.

- If the protection operates during the reclaim time of the relay:

- either advances to the next AR cycle that is expected in next auto re-close state or if all the programmed re-closer attempts have been accomplished, it locks out.

The reclaim time is started with the automatic closing command.

Once a CB has reclosed and remained closed for a specified time period (the reclaim time), the AR sequence is reinitialized and a successful close output issued. A single common reclaim time is used (Reclaim Timer). when an auto reclose sequence does not result in a Starting Condition for Auto recloser

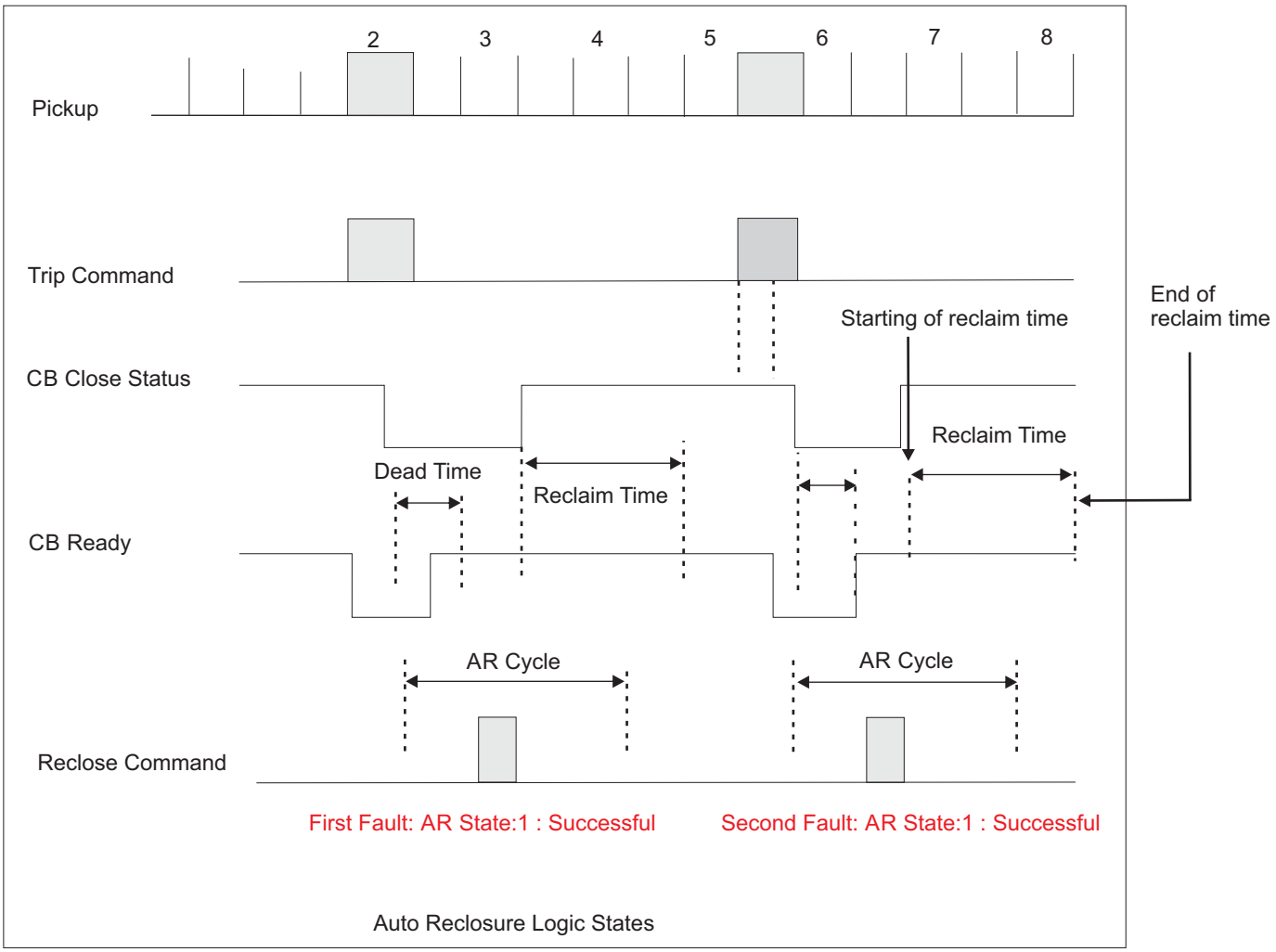
1) AR should be enabled by manual setting.
2) AR blocked DI is not available
3) Respective protection AR cycle should not in exit condition.

Lock out State

Lockout state of the breaker means no further attempts to AR in these conditions

1) Lockout occurs when all auto re-closure attempts are over and protection operates during the final Reclaim Time.
2) If CBFP failure appeared in relay (if CBFP enable).
3) At the end of the each reclaim timer if the CB is in the open position (Close DI is not present).
4) If a Close pulse of AR relay is given and the CB fails to close through close DI input or expiry of Trip Contact Sense time.
5) If a open pulse given to CB and CB fails to open in between Trip Contact Sense time.

In any of these cases, Manual reset will be required to reinitiate the AR.



Auto Reclosure Logic States

Cold Load Pickup

This function aims is 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. CSEZEN relay is detecting when those conditions are given and replacing the active group setting during a programmable time by group4 settings.

In group4 cold load setting will be same as those in active group so in group4 except cold load setting all other protection setting values are programmable.

Voltage Protection

CSEZEN relay are equipped with under voltage, over voltage, Positive phase sequence voltage, negative phase sequence over voltage and zero phase sequence over voltage protections.

Under / Over voltage

Under-voltage conditions may occur on a power system for a variety of reasons such as Increased system loading and complete loss of bus-bar voltage whereas over voltage conditions are generally related to loss of load conditions. Under load shedding conditions the supply voltage will increase in magnitude.

Two thresholds are available for under and over voltage function. Each one can be independently activated or deactivated.

Neutral Displacement Voltage

CSEZEN-F550x Relay has an sensing element which is connected to monitor phase to neutral voltage the protection elements operates in a time period that depends on the applied voltage and on the set curve, The protection element trip when the neutral voltage exceeds the set voltage threshold for the set time.

Positive Sequence Under voltage protection

This function is based on the positive phase sequence component of the voltage, which is calculated internally.

$$\vec{U1}=1/3|(\vec{UL1}+a\vec{UL2}+a2\vec{UL3})|$$

When positive phase sequence voltage goes below the programmed positive phase sequence threshold for a programmed definite time the trip signal is given.

Negative Sequence Over voltage protection

Where an incoming feeder is supplying a switchboard which is feeding rotating plant (e.g. induction motor) correct phasing and balance of the AC supply is essential. Incorrect phase rotation will result in any connected motors rotating in the wrong direction. For directionally sensitive applications, such as elevators and conveyor belts, it may be unacceptable to allow this to happen CSEZEN relay will operate from negative phase sequence voltage due to any unbalanced condition occurring on the incoming supply and is calculated internally.

$$\vec{U2}=1/3|(\vec{UL1}+a2\vec{UL2}+a\vec{UL3})|$$

Refer following formula for IDMT characteristics for over/under voltage

$$t = \frac{TMS}{(V/Vs) - 1}$$

Where

t = Operating time in seconds
TMS = Time multiplier setting
V = Applied Input Voltage
VS = Relay Setting Voltage

Note: This equation is only valid for V/Vs ratio < 0.95 (for under voltage) and > 1.1 (for over voltage)

Voltage Control Over current Protection

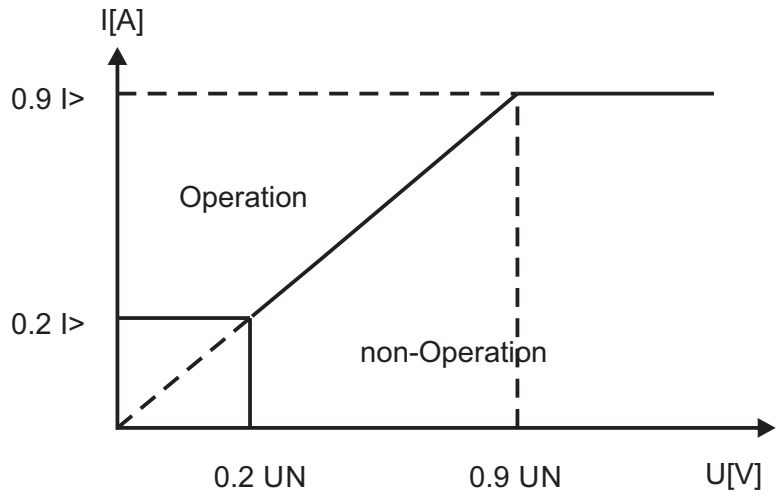
This function reduces the tripping time in case of severe faults due to voltage fall because it lowers the pickup level of the over current unit depending on the voltage level. 51V function means the control of the over current elements by the monitoring of the phase voltage.

This function improves sensitivity of over current unit because changes the pickup level proportional to applied input voltage so it provides better coordination and fault detection. In industry, standard backup over current protection schemes for MV generators fed from switchgear circuit breaker, voltage controlled over current protection is used.

This protection has two modes of operations :–

MODE1: When the control voltage is lower than a programmed value, the function 51effective settings are no more those programmed in Over current menu but replaced by 51V menu settings.

MODE2: In this mode, controlled pick up current of function 51 varies linearly in the control voltage range of 20-90% of the nominal voltage. For control voltage value higher than 90% of the nominal pick up current is the programmed one for the function 51.



The over current operating characteristics is proportional to the input voltage within the specified voltage range.

Frequency Protection

CSEZEN relay are equipped with under frequency, over frequency and rate of frequency change protection.

Under/Over Frequency Protection

This element is used to detect the tendency of the variation of frequency due to severe disturbances performed by load shedding. Two thresholds are available for under and over frequency function. Each one can be independently activated or deactivated.

Rate of Change of Frequency Protection

The rate of change of frequency elements are very important to detect any power loss under severe disturbances and eventually perform load shedding of secondary load.

It can also compliment the generator control system to reduce or shed generation when the frequency rises above the nominal frequency at a high rate.

The frequency of change units has two steps; this allows the disconnection of loads before reaching undesired frequency levels.

Harmonic Blocking

In the CSEZEN relays, starting of the phase current and earth current stage can be blocked under inrush conditions to avoid unsuitable trip during transformer magnetization.
As soon as the ratio of second harmonic component is above the programmed value (in percentage) then selected over current and earth protection will be blocked for a settable duration.

Circuit Breaker Failure Protection

The CB failure protection is based on supervision of phase currents and earth current after tripping events. The test criterion is whether all phase currents have dropped to less than 5% of Nominal value of rated current within the set time (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.

Trip Circuit Supervision

This feature detects any anomalies in the circuit with the switch open or close. It detects trip circuit supply failure of circuit breaker, tripping mechanism failure like circuit breaker contact degeneration in wires, contacts and coils.

Output Relay Latching

Any digital output can be latched. Reset of the latched output is possible by logic input front panel operator interface or by remote communication or through RESET key.

Blocking Logic

CSEZEN relay includes logic inputs, which can be configured to block the selected protection functions. Each protection functions can be locked via a digital input as selected and assigned.

Test of Output Relays

Select the TRIP TEST menu from HMI, then by using backward/forward key it will start operating the output relays & LEDs one by one unless the enter key is pressed again.

Local / Remote CB Control

In CSEZEN-F circuit breaker control can be done locally using front keys whereas same can be controlled remotely using configurable DIs as well as communication mode.

Selective Relay Scheme Logic

CSEZEN-F relays include selective logic scheme for various protection functions.

VT Fuse Failure (VTFF) / Voltage Transformer Supervision (VTS)

This feature is used to detect failure of the analog ac voltage inputs to the relay. This may be caused by internal voltage transformer faults, overloading or faults on the interconnecting wiring to relays. This usually results in one or more VT fuses blowing.

Relay is able to detect a VT loss by using VTS/VTFF automatism. As soon as VT loss is detected, voltage dependent function Voltage control over current (51V) will be blocked, an alarm can be raised and directional over current functions might be replaced by non-directional over current functions.
VTS automation uses a fixed logic. A VT fault occurs if at least one of the two following conditions is verified.
Negative sequence voltage is greater than 0.3 x Un and
Negative sequence current is smaller than 0.5 x In
OR
-Voltage is smaller than 0.1xUn and current greater than 0.1xIn
-The VT fault disappears as soon as one criteria is not valid anymore.
-A VTS alarm occurs when a VT fault occurs during more than set delay time tVTS
only manual reset is applicable for DO assigned to VTS alarm.

Current Transformer Supervision (CTS)

The current transformer supervision feature is used to detect failure of one or more of the ac phase current inputs to the relay. Failure of a phase CT or an open circuit of the interconnecting wiring can result in incorrect operation of any current operated element. Additionally interruption in the ac current circuits risk dangerous CT secondary voltages being generated.

The CT supervision feature operates on detection of derived zero sequence current, in the absence of corresponding derived zero sequence voltage that would normally accompany it.

A CTS alarm will occur when a CT fault (zero sequence current is above set value of I0> and below set value of zero sequence voltage U0<) occur during more than set value of t_CTS time delay.

Only manual reset is applicable for DO assigned to CTS alarm.

Switch on to Fault Protection

Under particular conditions, it can happen that when the feeder is supplied by the closing of the CB a fast trip command may be required if a fault is present (closing on to burden).

Some faults may be caused by conditions not removed from the feeder after a reclosing cycle or a manual trip or due to earthed clamps left on after maintenance works. In these cases, it may be desirable to clear the fault condition in fast time, rather than waiting for the Trip time delay associated with the I>> & I>>> protection. t_SOTF time delay is used for I>> & I>>> protections in such conditions.

With the switch on to fault (SOTF) submenu, it is possible to shorten the time to trip For I>> & I>>> protection if selected, when for example the relay has detected a fault that is still present on a feeder after energizing.

Setting Group

CSEZEN-F relays have four protection related setting groups. Changes between the groups are executed via the front interface, a dedicated logic input or through the communication port.

To avoid any undesirable tripping, the setting group change is only executed when none of the protection functions are running (deactivated or inhibited).

Phase Current Rotation

In some applications, there is a need to match the plant phase sequence with the connected relay. Without changing the cabling CSEZEN-F relays include the phase rotation feature that allows the setting of the phases in clockwise or in anti clockwise rotation (1-2-3 or 1-3-2 sequence)

Power Protection

CSEZEN relay are equipped with under power, over power and reverse power protections.

a) Under Power Protection

It protects against excessive decrease in 3 phase power and it compares the active power with the programmed value of under power threshold. If the measured value of active power is lower than the set value, the protection will trip the corresponding relay.

Any reverse power will be considered below the under power threshold, so it will operate this protection. Two thresholds are available for under power function. Each one can be independently activated or deactivated.

b) Over Power Protection

It protects against excessive increase in 3 phase power and it compares the active power with the programmed value of over power threshold. If the measured value of active power is greater than the set value, the protection will trip the corresponding relay.

Two thresholds are available for over power function. Each one can be independently activated or deactivated.

c) Reverse Power Protection

The protection actuates when the power flow gets reversed and the measured value of active power is greater than the set value, the protection will trip the corresponding relay. Two thresholds are available for reverse power function. Each one can be independently activated or deactivated.

Time Synchronization

Inside CSEZen there is an internal time clock. Relay supports SNTP Protocol (ordering based). SNTP (Simple network Time Protocol) have mechanisms within the protocol to synchronize the clock and keep it accurate to certain accuracy. The protocol itself has the ability to send commands and re-synchronize the clock so that each attached IED using its synchronization capability on the network is accurate within resolution. The relay makes the synchronization automatically using SNTP protocol. The internal clock of the relay is synchronized to the UTC time of the NTP server.

8.0 Data Acquisition Function

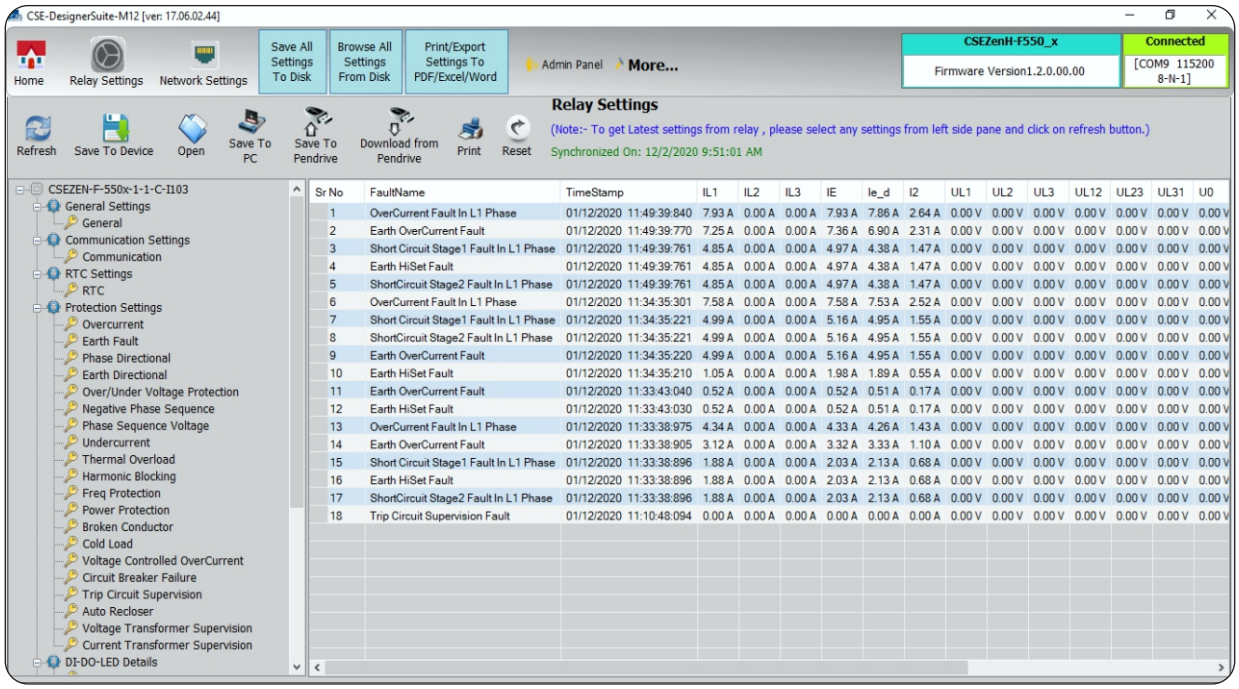
Measurement

- 3 Phase Current, 3 Phase Star Voltage, 3 Phase Delta Voltage, Bus Voltage, Bus Frequency, 3 Phase Active Power, 3 Phase Reactive Power, 3 Phase Apparent Energy, Individual Power Factor, 3 Phase Power Factor, Forward Active Energy, Reverse Active Energy, Forward reactive Energy, Reverse Reactive Energy, Energy Counters (1 Energy Counter is equivalent to 6553.5 Gwh/GVarh) Total Energy Calculation (6553.5 x energy counter + displayed energy) & Line Frequency.
- Earth current measurement
- Derived earth current measurement
- Negative / Positive / Zero phase sequence
- Trip counter
- Thermal memory
- AR cycles
- I_1/I_2 (Positive Phase Sequence current / Negative Phase Sequence current)

9.0 Fault Record

CSEZEN-F records last 20 faults in its non volatile memory with its time stamp.
Each record has the following information:

Fault Format					
IL1	:	XX.XXA	U0	:	XX.XXV
IL2	:	XX.XXA	U1	:	XX.XXV
Il3	:	XX.XXA	U2	:	XX.XXV
Ie	:	XX.XXA	Power	:	XX.XXW
Ie_d	:	XX.XXA	Them_mem	:	XXXX%
I2	:	XX.XXA	FREQ	:	XX.XXHz
UL1	:	XX.XXV	Dir_Status	:	XXXX
UL2	:	XX.XXV	HR MIN	:	HH:MIN
UL3	:	XX.XXV	SEC Ms	:	Sec: mSec
UL12	:	XX.XXV	DATE	:	DD:MM:YY
UL23	:	XX.XXV	F-TYPE	:	Type of fault
UL31	:	XX.XXV			

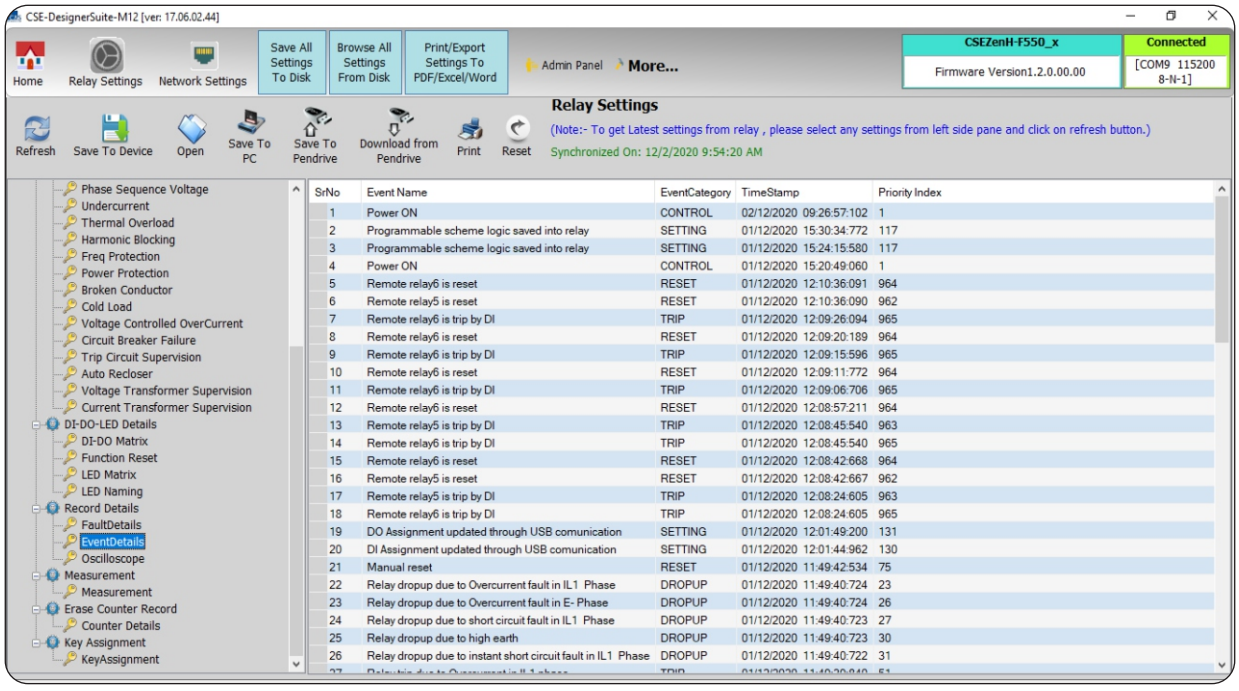


Fault Data recording on PC software

10.0 Event Record

The unit stores in non volatile memory the last 500 events with its time stamp. When the available memory space is exhausted, the new event automatically overwrites the oldest event, which can be retrieved from a PC.

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

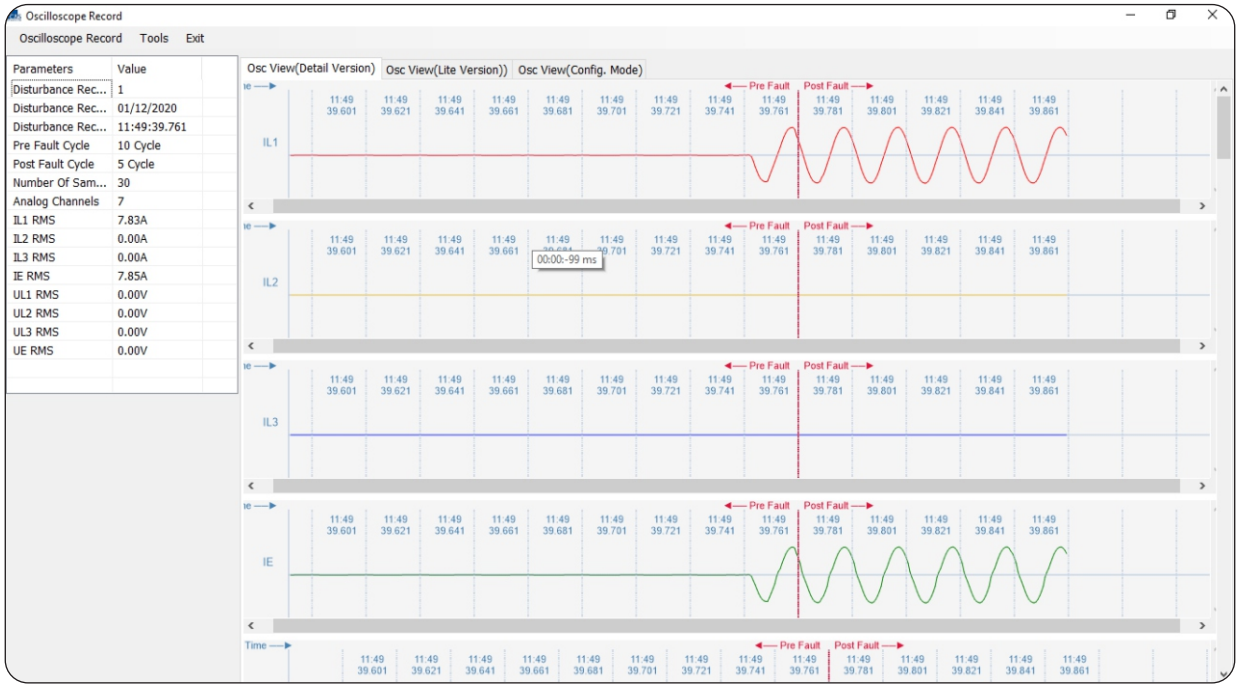


Event Data recording on PC Software

11.0 Disturbance Record

The CSEZEN-F relay has an oscillograph data recorder with the following characteristics:

- Oscilloscopic recording can trigger on Pickup or on trip or via DI i.e. change from pre-fault to post-fault stage. It is programmable.
- Each record comprises the samples from max. 8 analog signals (depends upon the different models) and the status of maximum 16 digital inputs and maximum 16 digital outputs. There will be 30 samples per cycle.
- Relay saves maximum 1200 cycles, and the number of cycles per record is programmable which limits the maximum no. of records possible to store in the relay (for example: if 40 cycles are selected, then there will be maximum 30 records of 40 cycles each).
- The pre-fault and post-fault cycles are programmable.
- Records are in the non volatile memory.
- The records are transferred to PC using USB interface. The data is graphically displayed and can be taken on printer.
- Record 1 is always latest record. 2nd record is older than 1st..... and so on.
- Disturbance record is available in comtrade format as per IEC60255-24.



Oscilloscope recording on PC software

12.0 Communication (Local & Remote)

The unit has:

- 1 Front USB port for direct connection to a PC
- 1 Rear RS-485 communication port
- Rear Ethernet port (RJ-45) for IEC-61850
- The ethernet port can be optionally replaced with Dual Fiber optics port

Dual Rear Communication (RS-485)

The choice of protocol for the rear RS-485 communication port is based on ordering information. The user can choose either MODBUS or IEC-60870-5-103 protocol.

Front Communication (USB)

The entire setting including protection parameter setting for both group, Fault, Event & Disturbance record 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.

IEC-61850 Communication

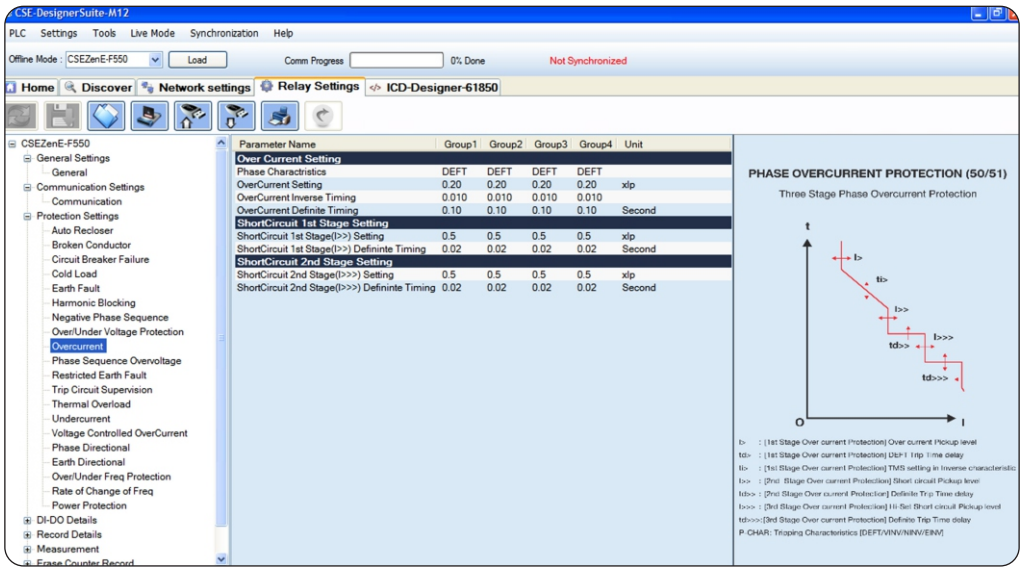
Our IEDs now support several enhanced features of the Edition-2 of IEC-61850 standard, such as peer-to-peer communication between the relays, known as GOOSE messaging, buffered and unbuffered reporting, settings change as well as support for all control models as described in IEC 61850-7-2 Ed2.

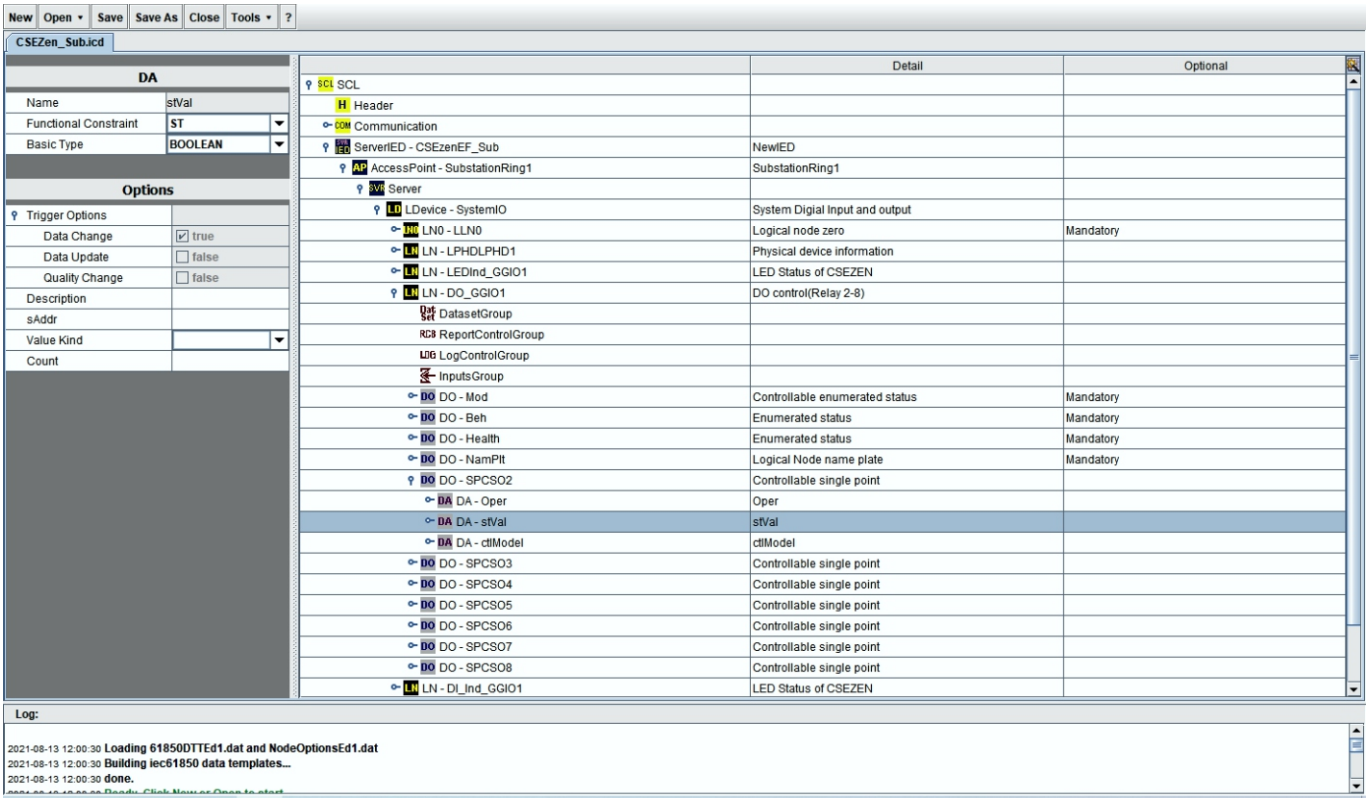
Further, Edition-2 introduces the concept of Goose subscription and monitoring via the LGOS logical node supported by our IEDs.

The IEC 61850 and a companion standard, the IEC 62439 defines two additional requirements by way of the Parallel Redundancy Protocol (PRP) and High Availability Seamless Redundancy (HSR) protocol to attain zero packet loss. While PRP achieves network redundancy by packet replication over two independent networks operating in parallel, HSR is realized using a ring topology to transmit packets in either direction. CSEZEN-F series relays support both PRP as well as HSR over dual redundant RJ 45 ports (*Model dependent, please speak with our sales team for models that support HSR/PRP).

All relay models that support HSR/PRP also offer enhanced cyber security features and comply with cyber security requirements.

The IEC 61850 interface is configured with familiar, user-friendly CSE Designer M12 software.



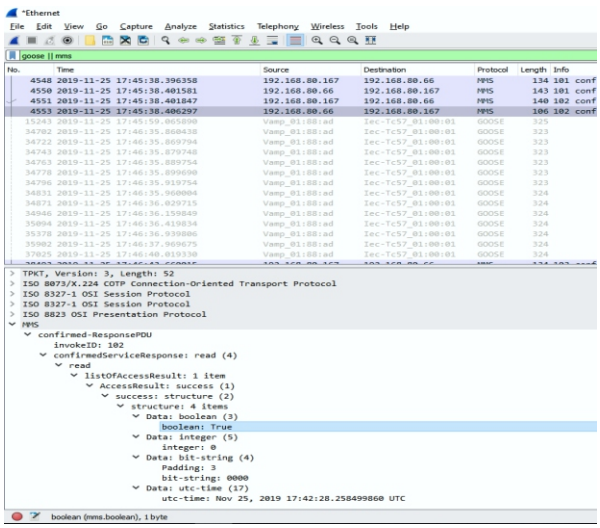


IEC 61850 Features

CSCSEZEN IEDs come with a powerful Software suite called `IED Assistant` for easy configuration ofIEC61850 related settings during installation or for troubleshooting.

CSEZEN IEDs support the following IEC-61850 features:

- Full Buffered and Unbuffered Reports on all optional fields triggered on General Interrogation or Data Change.
- GOOSE Publish and Subscribe on all IED parameters.
- Time Synchronization with Time Zone Support
- Supports all control schemes as defined by the standard.
- PLC based programming & logic equations for GOOSE parameters
- GOOSE parameter mapping to LED & Dos
- Support for metering parameters (Analog values)



13.0 Human Machine Interface

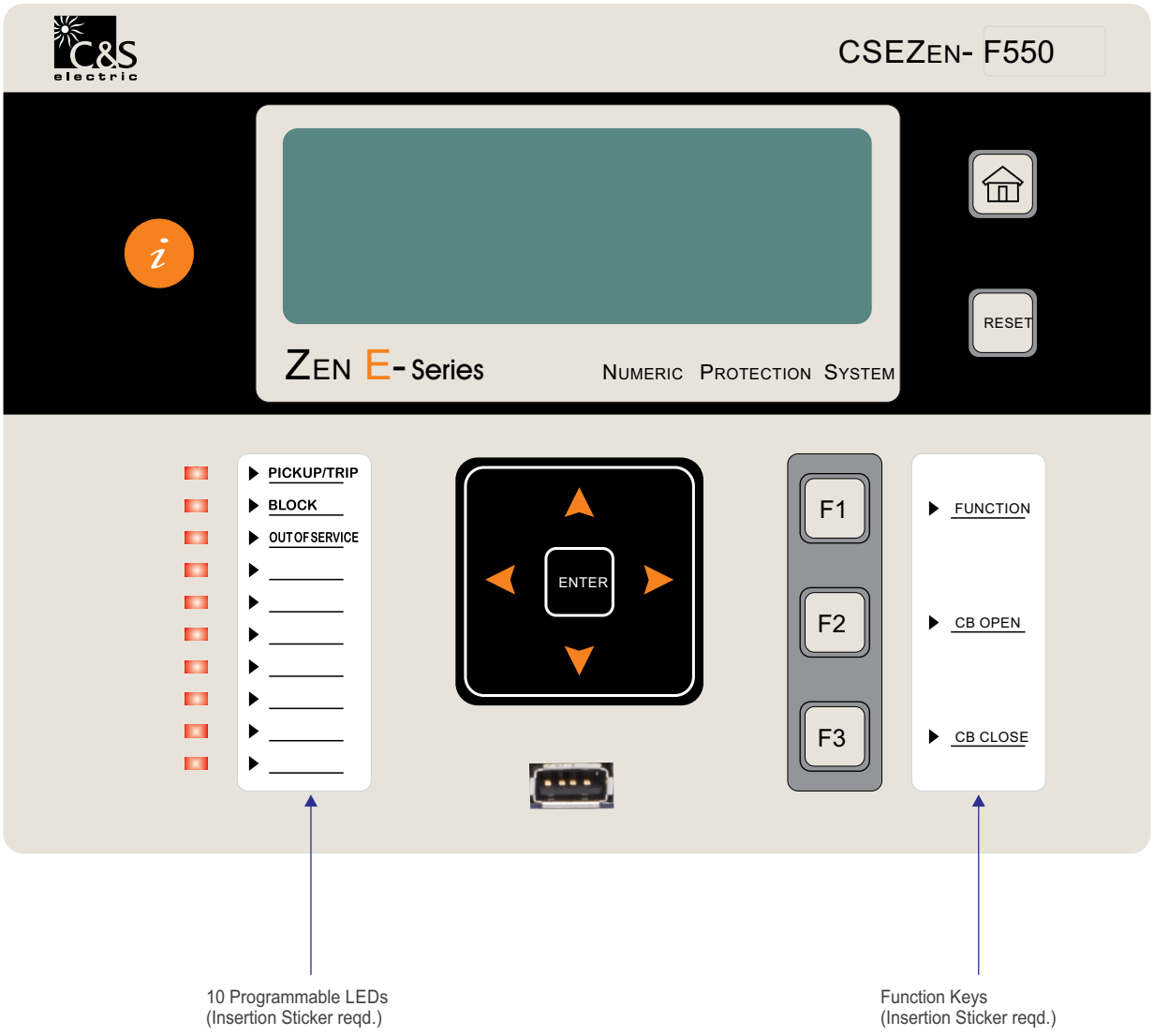
CSEZEN-F offers a variety of front user interfaces, including:

Human-Machine Interface (HMI)

It comprises of 20x4 Alpha numeric display and 11 push buttons for setting and other operations for local access:

- Two push switches for set values of normal tripping characteristics.
- One RESET push switch & One ENTER push switch.
- One intelligent (I) Key.
- One push switch for the tripping of relay assigned to F1 Key.
- Two push switches for the tripping of relay assigned to Circuit breaker open & Circuit breaker close.
- Ten LEDs for pickup or tripping on faults & events in any phase.

In order to change any setting first press enter then only (t / u) key will act as decrement/increment else these key will function as scroll in backward/forward direction.



Key Description

Keys	Manual Key
i	is used as intelligent key to see the details of the fault pickup / digital input / output status & last fault details / LED Status.
HOME	is used as a HOME key.
RESET	is used as a RESET key.
ENTER	is used as a ENTER key.
▲	is used to scroll in upward direction for parameters.
▼	is used to scroll in downward direction for parameters.
◀	is used to scroll in backward direction and for decrement of parameters.
▶	is used to scroll in forward direction and for increment of parameters.
F1	is used as a FUNCTION key.
F2	is used as a CB Open key.
F3	is used as a CB Close key.

Digital Output Contacts

Max. No. of digital outputs : 16 (DO1, DO2 .....DO16)

Type of outputs : Relay (potential free)

Programmable (DO Assignment) : Yes (Max. 15 DO are programmable & 1 is fixed for self supervision function

Relay reset type : Programmable (Auto/Manual)

Digital Inputs

Max. No of digital inputs : 16 (DI1, DI2..... DI 16)

Type of inputs : AC/DC Voltage (opto isolated)

Programmable (DI Assignment) : Yes

LED Description

In CSEZEN Relay Ten LEDs are given for pickup or tripping on faults & events in any phase. 3 LEDs are fix

1)	PICKUP/TRIP	Relay is in Pickup / Trip mode
2)	BLOCK	Some protection function is blocked
3)	OUT OF SERVICE	Relay is in out of service mode (Protection on hold)

5 LEDs are programmable via front end software CSE Designer Suite - M12, 10 of which are in front fascia. For these 10 LEDs protection function naming sticker is needed to be inserted.

USB Description

CSE Designer Suite - M12

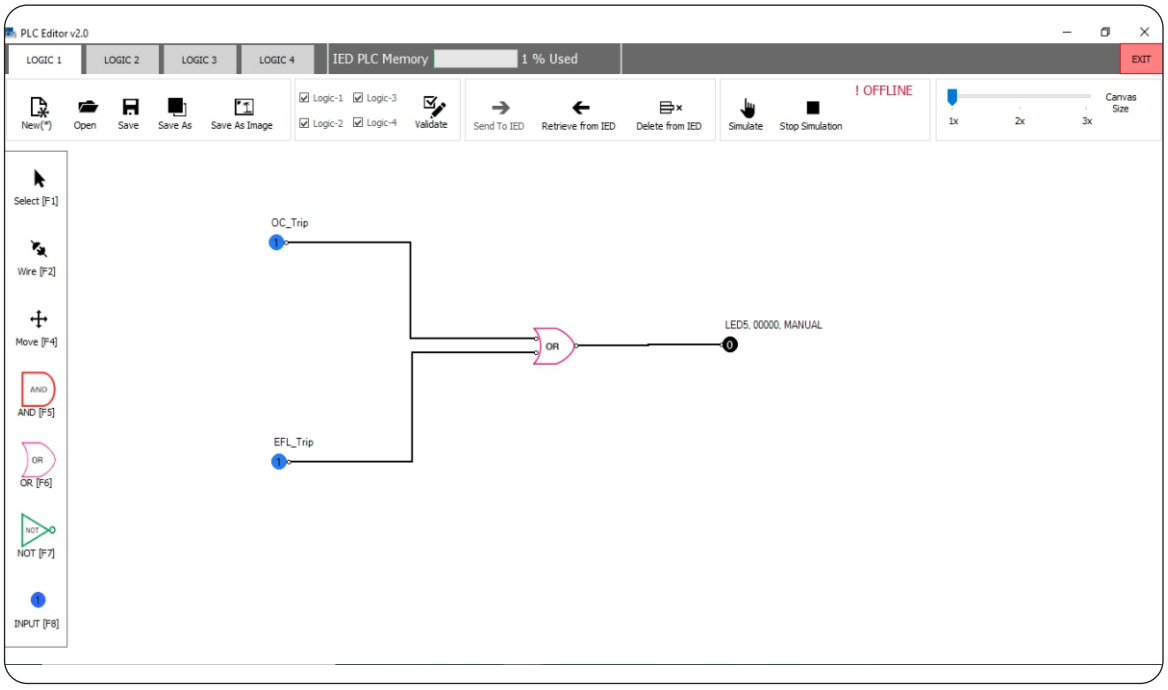
USB port is available as HOST. PC/Laptop can be interfaced via USB port for connecting with CSE Designer Suite - M12 Front End Software.

Programmable Scheme Logic

In CSEZEN Relays maximum 4 nos. of programmable scheme logic can be configured using the front end interface CSE Designer suite-M12. This interface uses Boolean equations. Flexible logic allows user to create logic diagram to be assigned digital output.

The designed logic is event driven to ensure that protection is not delayed.

The following figure describes the use of protection schemes using the over current pickup & under voltage pickup from downstream relays to block operation of upstream relays using a digital output.



14.0 Setting Ranges

Active Group Setting

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Active Group	ACTIVE GROUP	GROUP1	GROUP4	-	GROUP1
Group Toggle Step	TOGGLE STEP	+1	+3	1	+1

(Table-1)

Over current Protection

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
I> pickup setting Stage-1	I>	0.05xIp	5.00xIp	0.01xIp	Disable
Phase trip characteristic Stage-1	PCURVE	DEFT	EINV,VINV,LIINV,NINV1.3, NINV3.0,NINV0.6	-	DEFT
ti> inverse timing Stage-1	ti>	0.01	1.5	0.005	0.010
t> definite timing Stage-1	t>	000.10sec	150.00sec	0.01sec	000.10sec
I>> pickup setting Stage-2	I>>	0.50xIp	40.00xIp	0.5xIp	Disable
t>> definite timing Stage-2	t>>	000.02sec	20.00sec	0.01sec	000.02sec
I>>> pickup setting	I>>> Pickup	00.50xIp	40.00xIp	0.50xIp	Disable
I>>> definite timing	I>>> Deft Time	00.02sec	20.00sec	0.01sec	00.02sec
SOTF Function	SOTF Function	Disable	Enable	-	Disable
SOTF Definite time	t_SOTF	0.02sec	0.50sec	0.01sec	0.02sec

(Table-2)

Over Voltage / Under Voltage

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Under Voltage Characteristics	UV< Characteristic	DEFT	IDMT	-	DEFT
Blocking on Loss of Voltage	Block On VoltLoss	Enable	Disable	-	Disable
Under Voltage Threshold Setting	UV< Threshold	5 %Un	100 %Un	1 %Un	10 %Un
Under Voltage Pickup Setting	U< Pickup	5 %Un	120 %Un	1 %Un	Enable
Under Voltage TMS Setting	U< TimeMultiplier	0.05	2.00	0.01	0.05
Under Voltage Definite Time	U< Deft Time	00.03sec	20.00sec	0.01sec	00.03sec
Under Voltage Hi-set Pickup Setting	U<< Pickup	5 %Un	120 %Un	1 %Un	Disable
Under Voltage Definite Time	U<<Td	00.03sec	20.00sec	00.01sec	00.05sec
Over Voltage Characteristics	OV> Characteristic	DEFT	IDMT	-	DEFT
Over Voltage Pickup Setting	OV> Pickup	20 %Un	170 %Un	1 %Un	Enable
Over Voltage TMS Setting	OV> TimeMultiplier	0.05	2.00	0.01	0.05
Over Voltage Definite Time	OV> Deft Time	00.03sec	20.00sec	00.01sec	00.05sec
Over Voltage Hi-set Pickup Setting	OV>> Pickup	20 %Un	170 %Un	1 %Un	Enable
Over Voltage Definite Time	OV>> Deft Time	00.03sec	20.00sec	00.01sec	00.05sec

(Table-3)

Earth Fault Protection * (These setting will not be applicable if sensitive earth fault protection is available)

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Earth characteristic	Curve Type	DEFT	EINV,VINV,LIINV,NINV 1.3,NINV3.0, NINV0.6	-	DEFT
Earth pickup setting	Ie> Pickup	0.05xIn	2.5xIn	0.01xIn	Disable
Earth inverse timing	Ie> TD Multiplier	0.010	1.500	0.005	0.010
Earth definite timing	Ie> Deft Time	000.03sec	150.00sec	000.01sec	000.03sec
Earth hi-set pickup setting	Ie>> Pickup	0.50xIn	10.00xIn	0.05xIn	Disable
Earth hi-set definite timing	Ie>> Deft Time	00.02sec	20.00sec	00.01sec	00.02sec
Derived Earth current function	Ie_d> Function	Disable	Enable	-	Disable
Derived Earth current Pickup	Ie_d> Pickup	00.10xIn	15.00xIn	00.01xIn	01.00xIn
Derived Earth current Definite time	Ie_d> Deft Time	00.02sec	100.00sec	00.01sec	00.10sec
Derived Earth current Hi-set function	Ie_d>> Function	Disable	Enable	-	Disable
Derived Earth current Hi-set Pickup	Ie_d>> Pickup	00.10xIn	15.00xIn	00.01xIn	01.00xIn
Derived Earth Hi-set definite time	Ie_d>> Deft Time	00.02sec	100.00sec	00.01sec	00.10sec

Note : Earth Fault protection settings are applicable to REF protection.

(Table-4)

Phase Directional

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
I> Directional feature	I> Direction	Disable	Enable	-	Disable
I>> Directional feature	I>> Direction	Disable	Enable	-	Disable
I>>>Directional feature	I>>> Direction	Disable	Enable	-	Disable
MTA Setting	Max. Torque Angle	-90Deg	90Deg	1Deg	0Deg
Direction	Direction	Forward	Reverse	-	Forward
Polarization voltage threshold	Pol Volt Threshold	005Volt	150Volt	1Volt	010Volt
Behavior at less than min. polarization voltage	Beh.Volt Loss	Block	Non-Dir	-	Block

(Table-5)

Earth Directional (These setting will not be applicable if sensitive earth fault protection is available)

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Ie> Directional feature	Ie> Direction	Disable	Enable	-	Disable
Ie>> Directional feature	Ie>> Direction	Disable	Enable	-	Disable
MTA Setting	Max. Torque Angle	-90Deg	90Deg	1Deg	0Deg
Direction	Direction	Forward	Backward	-	Forward
Polarization voltage threshold	Pol Volt Threshold	005Volt	150Volt	1Volt	010Volt
Behavior at less than min. polarization voltage	Beh.Volt Loss	Block	Non-Dir	-	Block

(Table-6)

Sensitive Earth Fault *

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Phase Characteristics	Curve Type	DEFT	EINV, VINV, NINV1.3,LINV NINV3.0, NINV0.6	-----	DEFT
Ie> Current Setting	Ie> Pickup	0.002 Amp	1 Amp	0.001 Amp	0.1Amp
Ie> inverse timing	Ie> TD Multiplier	0.01 sec	1.5 sec	0.005 sec	0.1 sec
Ie> Definite timing	Ie> Deft Time	0.03 sec	150 sec	0.01 sec	0.03 sec
Ie>> Current Setting	Ie>> Pickup	0.002 Amp	1 Amp	0.001 Amp	0.1 Amp
Ie>> Definite timing	Ie>> Deft Time	0.03 sec	150 sec	0.01 sec	0.03 sec

(Table-7)

Under Current Protection

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Under Current Pickup Setting	I<Pickup	0.20xIp	1.00xIp	0.01xIp	Disable
Under Current Timing	t<	001.00sec	260.00sec	000.01sec	002.00sec
Under Current Threshold	ThrsSet	0.50xIp	1.00xIp	0.05xIp	0.50xIp

(Table-8)

Circuit Breaker Failure Protection

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
CBFP time delay	CBFP Deft time	0.03sec	2.00sec	0.01sec	Disable

(Table-9)

Trip Circuit Supervision

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Trip circuit supervision	TCS Deft time	0.03sec	2.00sec	0.01sec	Disable

(Table-10)

* Model Dependent

Negative Phase Sequence Protection

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
NPS Trip Characteristic	I2> Characteristics	DEFT	INVERSE	-	DEFT
NPS Pickup Setting	I2> Pickup	0.10xIp	1.00xIp	0.01xIp	Disable
Time Multiple	K1 TD Multiplier	05sec	600sec	01sec	05sec
Definite Time Delay	I2> Deft time	00.1sec	600.0sec	00.1sec	00.2sec

(Table-11)

Power Protection

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Min. active power stage1	Active Power<	NO	YES	-	NO
Min. active power stage1 set value	Active Power< pkup	2 %Pn	200 %Pn	1 %Pn	100 %Pn
Min. active power stage1 time setting	Active Power< Time	0.03sec	60sec	0.01sec	0.3sec
Min. active power stage2	Active Power<<	NO	YES	-	NO
Min. active power stage2 set value	Active Power<< pku	2 %Pn	200 %Pn	1 %Pn	100 %Pn
Min. active power stage2 time setting	Active Power<< Tim	0.03sec	60.00sec	0.01sec	0.03sec
Max. active power stage1	Active Power>	NO	YES	-	NO
Max. active power stage1 set value	Active Power>pkup	5 %Pn	200 %Pn	1 %Pn	100 %Pn
Max. active power stage1 time setting	Active Power>Time	0.03sec	100.00sec	0.01	0.03sec
Max. active power stage2	Active Power>>	NO	YES	-	NO
Max. active power stage2 set value	Active Power>>pkup	5 %Pn	200 %Pn	1 %Pn	100 %Pn
Max. active power stage2 time setting	Active Power>>Time	0.03sec	60.00sec	00.01sec	0.03sec
Reverse power stage1	Reverse Power>	NO	YES	-	NO
Reverse power stage1 set value	ReversePower>pkup	2 %Pn	200 %Pn	1 %Pn	100 %Pn
Reverse power stage1 time setting	ReversePower>Time	0.03sec	60.00sec	00.01sec	0.03sec
Reverse power stage2	Reverse Power>>	NO	YES	-	NO
Reverse power stage2 set value	ReversePower>>pkup	2 %Pn	200 %Pn	1 %Pn	100 %Pn
Reverse power stage2 time setting	ReversePower>>Time	0.03sec	60.00sec	00.01sec	0.03sec

(Table-12)

Cold Load Protection

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Mode of Trigger	MODE	Cold Load	DI/Inrush	-	Disable
Cold load time	tcold	00000sec	10000sec	00001sec	00020sec
Cold load pickup time	tclp	0001sec	3600sec	0001sec	0020sec
Inrush percentage setting	If2/If1	20%	100%	5%	30%

(Table-13)

Over / Under Rate of change of Frequency

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Number of cycles under frequency	Pickup Cycle	3	15	1	3
Minimum Voltage	Reqd. Mini. Volt	20Volt	100Volt	1Volt	20Volt
Pickup setting of low under frequency	f< Pickup	40.00Hz	70.00Hz	0.01Hz	Disable
Definite time for low under frequency	f< Deft time	00.00sec	60.00sec	0.01sec	00.02sec
Pickup setting of high under frequency	f<< Pickup	40Hz	70Hz	0.01Hz	Disable
Definite time for high under frequency	f<< Deft time	0.00sec	60sec	0.01sec	0.02sec
Pickup setting of low over frequency	f> Pickup	40Hz	70Hz	0.01Hz	Disable
Definite time of low over frequency	f> Deft Time	00.00sec	60.00sec	00.01 sec	00.02sec
Pickup setting of high over frequency	f>> Pickup	40Hz	70Hz	0.01Hz	Disable
Definite time of high over frequency	f>> Deft Time	0.00sec	60.00sec	0.01sec	0.02sec
DFDT Pickup Cycle	DFDT Pickyp Cycle	2	15	1	4
Direction Setting	Direction	DECREASE	BI-DIRECTION	-	INCREASE
Max. Supervision Frequency Setting	Max. Sup Freq	40.00Hz	70.00Hz	0.01Hz	55.00Hz
Pickup setting of df/dt1 frequency	df/dt1 Pickup	00.20Hz/s	10.00Hz/s	00.01Hz/s	0.2Hz/s
Definite time for df/dt1 frequency	df/dt1 Time	0.00sec	20.00sec	0.01sec	0.02sec
Pickup setting of df/dt2 frequency	df/dt2 Pickup	00.20Hz/s	10.00Hz/s	0.01Hz/s	Disable
Definite time for df/dt2 frequency	df/dt2 Time	0.00sec	20.00sec	0.01sec	0.03sec

(Table-14)

ND / U1 / U2 Setting

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Neutral displacement voltage pickup setting	ND> Pickup	2 %Un	100 %Un	1%Un	Disable
Neutral displacement voltage characteristic	ND> Characteristics	DEFT	IDMT	-	DEFT
Neutral displacement voltage TMS setting	ND> TD Multiplier	0.05	2.00	0.01	0.05
Neutral displacement voltage definite time	ND> Deft Time	00.03sec	20.00sec	00.01sec	00.05sec
Positive sequence voltage pickup setting	U1< Pickup	10 %Un	100 %Un	1 %Un	Disable
Positive sequence voltage definite time	U1< Deft Time	00.03sec	10.00sec	00.01sec	00.10sec
Negative sequence voltage pickup setting	U2> Pickup	10 %Un	100 %Un	1 %Un	Disable
Negative sequence voltage definite time	U2> Deft Time	00.03sec	10.00sec	00.01sec	00.10sec

(Table-15)

Harmonic Blocking

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Phase 2nd harmonic block	P2ndH	10%If	50%If	1%If	Disable
Earth 2nd harmonic block	E2ndH	10%If	50%If	1%If	Disable
Phase blocking time	tPHASE	00.00sec	20.00sec	00.10sec	00.00sec
Earth block time	tEARTH	00.00sec	20.00sec	00.10sec	00.00sec

(Table-16)

DO Assignment Setting

S.No.	Parameters
1	Over Current Pickup
2	Over Current Trip
3	Short Circuit Stage1 Pickup
4	Short Circuit Stage1 Trip
5	Short Circuit Stage2 Pickup
6	Short Circuit Stage2 Trip
7	Earth Pickup
8	Earth Trip
9	Earth Hi Set Pickup
10	Earth Hi Set Trip
11	Under Current Pickup
12	Under Current Trip
13	Derived Earth Stage1 Pickup
14	Derived Earth Stage1 Trip
15	Derived Earth Stage2 Pickup
16	Derived Earth Stage2 Trip
17	Negative Phase Sequence current Pickup
18	Negative Phase Sequence current Trip
19	Under Voltage Pickup
20	Under Voltage Trip
21	Under Voltage Hi Set Pickup
22	Under Voltage Hi Set Trip
23	Over Voltage Pickup
24	Over Voltage Trip
25	Over Voltage Hi Set Pickup
26	Over Voltage Hi Set Trip
27	Neutral Displacement Voltage Pickup
28	Neutral Displacement Voltage Trip
29	Positive Phase Sequence Voltage Pickup
30	Positive Phase Sequence Voltage Trip
31	Negative Phase Sequence Voltage Pickup
32	Negative Phase Sequence Voltage Trip
33	Neutral Displacement Voltage Pickup*
34	Neutral Displacement Voltage Trip*
35	Thermal Relay
36	Thermal Alarm
37	Trip Circuit Supervision
38	Circuit Breaker Fault Protection

S.No.	Parameters
39	Broken Conductor Pickup
40	Broken Conductor Trip
41	Auto Re closer Close
42	Auto Re closer Lockout
43	Circuit Breaker Open
44	Circuit Breaker Close
45	Over Frequency Pickup
46	Over Frequency Trip
47	Over Frequency Hi set Pickup
48	Over Frequency Hi set Trip
49	Under Frequency Pickup
50	Under Frequency Trip
51	Under Frequency Hi set Pickup
52	Under Frequency Hi set Trip
53	Rate of Change in Freq Stage1 Pickup
54	Rate of Change in Freq Stage1 Trip
55	Rate of Change in Freq Stage2 Pickup
56	Rate of Change in Freq Stage2 Trip
57	Under Power Pickup
58	Under Power Trip
59	Under Power Hiset Pickup
60	Under Power Hiset Trip
61	Over Power Pickup
62	Over Power Trip
63	Over Power Hiset Pickup
64	Over Power Hiset Trip
65	Reverse Power Pickup
66	Reverse Power Trip
67	Reverse Power Hiset Pickup
68	Reverse Power Hiset Trip
69	VTS Alarm
70	CTS Alarm
71	Remote Trip1
72	Remote Trip2
73	Remote Trip3
74	Remote Trip4
75	Remote Trip5
76	Remote Trip6
77	Blocking Relay

(Table-17)

DI Assignment Setting

S.No.	Parameters
1	Circuit Breaker Close
2	Circuit Breaker Open
3	Circuit Breaker Ready
4	Remote Trip1
5	Remote Trip2
6	Remote Trip3
7	Remote Trip4
8	Remote Trip5
9	Remote Trip6
10	Group Toggling
11	Remote Reset
12	Oscilloscope Record Triggering
13	Cold Load
14	Over Current Blocking
15	Short Circuit Stage1 Blocking
16	Short Circuit Stage2 Blocking
17	Earth Blocking
18	Earth Hi-Set Blocking
19	Under Current Blocking
20	Derived Earth Stage1 Blocking
21	Derived Earth Stage2 Blocking
22	Negative Phase Sequence Current Blocking
23	Under Voltage Blocking

S.No.	Parameters
24	Under voltage HiSet Blocking
25	Over Voltage Blocking
26	Over Voltage HiSet Blocking
27	Neutral Displacement Voltage Blocking
28	Positve Phase Sequence Voltage Blocking
29	Negative Phase Sequence Voltage Blocking
30	Neutral Displacement Voltage Blocking*
31	Thermal Blocking
32	Broken Conductor Blocking
33	Cold Load Pickup Blocking
34	Auto Recloser Blocking
35	Over frequency protection Blocking
36	Over frequency Hiset protection Blocking
37	Under frequency protection Blocking
38	Under frequency Hiset protection Blocking
39	Rate of change in freq Stage1 Blocking
40	Rate of change in freq Stage2 Blocking
41	Under Power Protection Blocking
42	Under Power Hi-set Protection Blocking
43	Over Power Protection Blocking
44	Over Power Hi-set Protection Blocking
45	Reverse Power Protection Blocking
46	Reverse Power Hiset Protection Blocking

(Table-18)

Function Reset Setting

S.No.	Parameters
1	Over Current Pickup
2	Over Current Trip
3	Short Circuit Stage1 Pickup
4	Short Circuit Stage1 Trip
5	Short Circuit Stage2 Pickup
6	Short Circuit Stage2 Trip
7	Earth Pickup
8	Earth Trip
9	Earth Hi Set Pickup
10	Earth Hi Set Trip
11	Under Current Pickup
12	Under Current Trip
13	Derived Earth Stage1 Pickup
14	Derived Earth Stage1 Trip
15	Derived Earth Stage2 Pickup
16	Derived Earth Stage2 Trip
17	Negative Phase Sequence current Pickup
18	Negative Phase Sequence current Trip
19	Under Voltage Pickup
20	Under Voltage Trip
21	Under Voltage Hi Set Pickup
22	Under Voltage Hi Set Trip
23	Over Voltage Pickup
24	Over Voltage Trip
25	Over Voltage Hi Set Pickup
26	Over Voltage Hi Set Trip
27	Neutral Displacement Voltage Pickup
28	Neutral Displacement Voltage Trip
29	Positive Phase Sequence Voltage Pickup
30	Positive Phase Sequence Voltage Trip
31	Negative Phase Sequence Voltage Pickup
32	Negative Phase Sequence Voltage Trip
33	Neutral Displacement Voltage Pickup*
34	Neutral Displacement Voltage Trip*
35	Thermal Relay

S.No.	Parameters
36	Thermal Alarm
37	Trip Circuit Supervision
38	Broken Conductor Pickup
39	Broken Conductor Trip
40	Auto Re closer Close
41	Over Frequency Pickup
42	Over Frequency Trip
43	Over Frequency Hi set Pickup
44	Over Frequency Hi set Trip
45	Under Frequency Pickup
46	Under Frequency Trip
47	Under Frequency Hi set Pickup
48	Under Frequency Hi set Trip
49	Rate of Change in Freq Stage1 Pickup
50	Rate of Change in Freq Stage1 Trip
51	Rate of Change in Freq Stage2 Pickup
52	Rate of Change in Freq Stage2 Trip
53	Under Power Pickup
54	Under Power Trip
55	Under Power Hi-set Pickup
56	Under Power Hi-set Trip
57	Over Power Pickup
58	Over Power Trip
59	Over Power Hi-set Pickup
60	Over Power Hi-set Trip
61	Reverse Power Pickup
62	Reverse Power Trip
63	Reverse Power Hi-set Pickup
64	Reverse Power Hi-set Trip
65	Remote Trip1
66	Remote Trip2
67	Remote Trip3
68	Remote Trip4
69	Remote Trip5
70	Remote Trip6
71	Blocking relay

(Table-19)

LED Assignment Setting

S.No.	Parameters
1	Over Current Pickup
2	Over Current Trip
3	Short Circuit Stage1 Pickup
4	Short Circuit Stage1 Trip
5	Short Circuit Stage2 Pickup
6	Short Circuit Stage2 Trip
7	Earth Pickup
8	Earth Trip
9	Earth Hi Set Pickup
10	Earth Hi Set Trip
11	Under Current Pickup
12	Under Current Trip
13	Derived Earth Stage1 Pickup
14	Derived Earth Stage1 Trip
15	Derived Earth Stage2 Pickup
16	Derived Earth Stage2 Trip
17	Negative Phase Sequence current Pickup
18	Negative Phase Sequence current Trip
19	Under Voltage Pickup
20	Under Voltage Trip
21	Under Voltage Hi Set Pickup
22	Under Voltage Hi Set Trip
23	Over Voltage Pickup
24	Over Voltage Trip
25	Over Voltage Hi Set Pickup
26	Over Voltage Hi Set Trip
27	Neutral Displacement Voltage Pickup
28	Neutral Displacement Voltage Trip
29	Positive Phase Sequence Voltage Pickup
30	Positive Phase Sequence Voltage Trip
31	Negative Phase Sequence Voltage Pickup
32	Negative Phase Sequence Voltage Trip
33	Neutral Displacement Voltage Pickup*
34	Neutral Displacement Voltage Trip*
35	Thermal Relay
36	Thermal Alarm
37	Trip Circuit Supervision
38	Circuit Breaker Fault Protection

S.No.	Parameters
39	Broken Conductor Pickup
40	Broken Conductor Trip
41	Auto Re closer Close
42	Auto Re closer Lockout
43	Circuit Breaker Open
44	Circuit Breaker Close
45	Over Frequency Pickup
46	Over Frequency Trip
47	Over Frequency Hi set Pickup
48	Over Frequency Hi set Trip
49	Under Frequency Pickup
50	Under Frequency Trip
51	Under Frequency Hi set Pickup
52	Under Frequency Hi set Trip
53	Rate of Change in Freq Stage1 Pickup
54	Rate of Change in Freq Stage1 Trip
55	Rate of Change in Freq Stage2 Pickup
56	Rate of Change in Freq Stage2 Trip
57	Under Power Pickup
58	Under Power Trip
59	Under Power Hiset Pickup
60	Under Power Hiset Trip
61	Over Power Pickup
62	Over Power Trip
63	Over Power Hiset Pickup
64	Over Power Hiset Trip
65	Reverse Power Pickup
66	Reverse Power Trip
67	Reverse Power Hiset Pickup
68	Reverse Power Hiset Trip
69	VTS Alarm
70	CTS Alarm
71	Remote Trip1
72	Remote Trip2
73	Remote Trip3
74	Remote Trip4
75	Remote Trip5
76	Remote Trip6
77	Blocking Relay

(Table-20)

Broken Conductor Protection

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
NPS to PPS Ratio	I2/I1 Ratio	0.10	0.50	0.01	Disable
Definite Time for broken conductor fault	(BC)Deft Time	0.05sec	20.00sec	0.01sec	0.10sec

(Table-21)

Auto Re-closer

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Blocking of Auto-recloser	ENABLE	NO	YES	-	NO
Set Dead Time-1	D1	000.20sec	300.00sec	000.01sec	000.20sec
Set Dead Time-2	D2	000.2sec	300.00sec	000.01sec	000.20sec
Set Dead Time-3	D3	000.2sec	300.00sec	000.01sec	000.20sec
Set Dead Time-4	D4	000.2sec	300.00sec	000.01sec	000.20sec
Set Reclaim Time	tR	000.2sec	300.00sec	000.01sec	000.20sec
Cycle I>	I> Cycle	2	4/Disable	1	2
Cycle I>>	I>> Cycle	2	4/Disable	1	2
Cycle I>>>	I>>> Cycle	2	4/Disable	1	2
Cycle Ie>	Ie> Cycle	2	4/Disable	1	2
Cycle Ie>>	Ie>> Cycle	2	4/Disable	1	2
Trip sense time	t_TripSns	0.05sec	2.00sec	0.01sec	0.05sec

(Table-22)

Thermal Over-load

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Thermal memory mode	TH_Mode	M1	M2/M3	-	M1
Permissible basic current	Ib	0.20xIp	4.00xIp	0.02xIp	Disable
Constant	TH_Const	0.50	2.00	0.01	1.00
Heating time constant	TH_Heat	000.5min	180.0min	000.1min	000.5min
Cooling constant	TH_Cold	1.00xTh	8.00xTh	0.01xTh	1.00xTh
Thermal alarm	Alarm_R	20%	99%	1%	20%
NPS weighting factor	I2_Wght	0.05	2.50	0.05	2.50
Thermal reset	TH_Reset	00%	99%	1%	70%
Thermal trip characteristics	TH_Char	Th1	Th2	-	Th1

(Table-23)

Voltage Control Over-current

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Voltage control over current type	VCTO Type	MODE1	MODE2	-	MODE1
Control volt	Control Volt	20 %Un	100 %Un	1 %Un	20 %Un
Block over-current Stage-1	Block I>	NO	YES	-	YES
Over current pickup Stage-1	I> Pickup	0.20xIp	4.00xIp	0.01xIp	0.20xIp
Block over-current Stage-2	Block I>>	NO	YES	-	YES
Over current pickup Stage-2	I>> Pickup	0.20xIp	4.00xIp	0.01xIp	0.20xIp
Block short circuit stage1current	Block I>>>	NO	YES	-	YES
Short circuit stage1current	I>>> Pickup	0.50xIp	30.00xIp	0.50xIp	0.50xIp

(Table-24)

Erase Counter Record

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Trip Count	Trip Counter	NO	YES	-	NO
Thermal Memory Reset	Thermal m/m Reset	NO	YES	-	NO
Erase Events	Events Erase	NO	YES	-	NO
Erase Faults	Faults Erase	NO	YES	-	NO
Oscillator Record Erase	Osc. Record Erase	NO	YES	-	NO
Energy Counter Erase	EnergyCounterRst	NO	YES	-	NO

(Table-25)

Common Setting

These are the settings common for all the protections:

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Phase Rated Current	Ip	1.00Amp	5.00Amp	-	1.00Amp
Earth Rated Current	In	1.00Amp	5.00Amp	-	1.00Amp
Phase CT Ratio	Ph CTRatio	001	9999	1	001
Earth CT Ratio	E CTRatio	001	9999	1	001
PT Ratio	PT Ratio	001	6500.0	0.1	001
Phase Selection	PHASE	SINGLE	THREE	-	SINGLE
Wire Configuration	WireConfg	STAR	DELTA	-	STAR
Nominal Frequency	FREQ (Fn)	50Hz	60Hz	10Hz	50Hz
Phase Rotation	Ph Rotation	1-2-3	1-3-2	-	1-2-3
Fault Message Status	[F]Status	Disable	Enable	-	Disable
Service Mode	Servc Mode	Disable	Enable	-	Disable

(Table-26)

Voltage Transformer Supervision (VTS)

Parameters	Display	Setting Range		Step size	Default Setting
		Min	Max		
VT Supervision Function	VTS Function	Disable	Enable	-	Disable
VT Supervision time delay	t_VTS	000.02sec	100.00sec	000.01sec	001.00sec

(Table-27)

Current Transformer Supervision (CTS)

Parameters	Display	Setting Range		Step size	Default Setting
		Min	Max		
CT Supervision Function	CTS Function	Disable	Enable	-	Disable
Zero sequence current threshold	I0> Pickup	0.08xIn	1.00xIn	0.01xIn	1.00xIn
Zero sequence voltage threshold	U0< Pickup	2 %Un	100 %Un	1 %Un	10 %Un
CT Supervision time delay	t_CTS	000.02sec	100sec	0.01sec	000.10sec

(Table-28)

Disturbance Record

These are the settings for Oscilloscope recording:

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Oscilloscope recording selection	OSC. RECORD	NO	YES	-	NO
Pre-fault cycle	PRE CYCLE	002C	298C	1C	002C
Post-fault cycle	POST CYCLE	002C	298C	1C	002C
Triggering mode	TRIGGER MODE	PK-UP	PK-UP/TRIP/DI/	-	PK-UP

(Table-29)

Communication (* Model dependent)

RS-485 Communication		Default Setting
Baud rate selection (programmable)	9600 / 19200 / 38400 / 57600 bps	9600 bps
Parity selection (programmable)	EVEN / ODD / NONE	NONE
Stop bit	1 Bit	1 Bit
Data bit	8 Bit data	8 Bit data
Remote address (programmable)	247/254	1
Cable required for Interface	Two wire twisted shielded cable	------

« For MODBUS : Remote Address Setting Range is 1 - 247
& For IEC 103 : Remote Address Setting Range is 1 - 254

(Table-30)

IEC 61850 Communication (* Model dependent)

Specification	Default Setting
Max. no. of GOOSE inputs & outputs	64
Max. no. of clients	6

(Table-31)

Front Communication	
Protocol	CSE Proprietary Protocol : available with front software
Baud rate	115200 bps
Cable required for Interface	A Type USB (female interface)

(Table-32)

15.0 Technical Data

Measuring Input

Rated Data	Rated current I_n :1A or 5A
	Rated frequency F_n : 50 Hz/60Hz
Drop out to Pickup Ratio	>96%
Reset Time	30mSec
AC Current	At I_n=1A <0.1 VA
VA Burden	At I_n=5A <0.2 VA
AC Voltage VA Burden	At V_n=110V <0.06 VA
Thermal withstand capability	Dynamic current withstand
in current circuit	for 1 Sec : 100 x I_n
	for 10 Sec : 30 x I_n
	continuously : 4 x I_n

(Table-33)

Trip Time Accuracy for Current Protections

Parameters	Accuracy
Trip time accuracy for protections except NPS & REF	+30mSec OR +5% (whichever is higher)
Trip time accuracy for NPS	+60mSec OR +7.5% (whichever is higher)
Trip time accuracy for REF	Corresponding to error generated by inaccuracies in each phase +30mSec OR +5% (whichever is higher)

(Table-34)

Trip Time Accuracy for Voltage Protections

Parameters	Accuracy
Trip time accuracy for voltage protections	Inaccuracy in Trip Timing in reference to +2% error in measured voltage OR +30mSec

(Table-35)

Measurement Accuracy

Parameters	Range	Frequency Range	Accuracy
Current in Ampere	1.0-30xIn	50-60Hz	Less than+2%
Voltage	5-150%Un	50-60Hz	Less than+2%
Power	-	-	Less than+5%
Power Factor	-	-	Less than+0.02
Frequency	Fn +10 Hz	40-70 Hz	Less than+0.01 Hz

(Table-36)

Common Data

Dropout ratio	> 96%
Relay reset time	30 ms
Minimum operating time	30 ms
Transient overreach at instantaneous operation	<5 %

(Table-37)

Relay Contact Rating

Contact rating	
Contact relay	Dry contact Ag Ni
Make current	Max. 30A & carry for 3S
Carry capacity	8A continuous
Rated voltage	250V 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, 5A(cosØ=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

(Table-38)

Auxiliary Supply

Rated auxiliary voltage UH	For L Model	18V-150V DC
	For H Model	80V-280V AC / 90V-300V DC
	For U Model	40V-280V AC / 18V-300V DC
Rated supply for digital input	Normal Voltage UN For H Model	40V-280V AC (Active)
		40V-300V DC (Active)
		<25V AC (Inactive)
		<25V DC (Inactive)
	Normal Voltage UN For L Model	18V - 150V DC (Active)
		<10V DC (Inactive)
	Normal Voltage UN For U Model	>22V DC onwards
		>50V AC onwards
Power consumption	Quiescent approx. 3W	Operating approx. <7W

(Table-39)

Date & Time Setting

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Date	DATE	1	31	1	---
Month	MONTH	Jan	Dec	1	---
Year	YEAR(2000 Y)	00	99	1	---
Day	DAY	SUN	SAT	1	---
Hour	HOUR	0	23	1	---
Minute	MIN	0	59	1	---
Second	SEC	0	59	1	---

(Table-40)

16.0 Standards

Type Test			
F1	Functional Tests	Internal Design	Performance in line with Specification & Standards
		Specifications & IEC60255-6 IEC60255-3	Pickup/Drop down/ Power consumption in Current/Voltage/Aux Supply/ Trip timing accuracy: OC/ Directional/ NPS/ Thermal / OV/ Zero Seq/ Over Power/ freq/ Rate of change of Freq

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 60068-2-3	95% @ +55 / +25 deg C, 6 cycle (12hr + 12hr each)

Enclosure			
C6	Enclosure	IEC 529	Front IP54 (Dust5x + Water x4)

Mechanical Test

Relay Operational			
M1	Vibration response / Endurance test	IEC 60255-21-1	Class I Vibration response (Relay operational) 10Hz~150 Hz - peak displacement 0.035 mm below 58/60 Hz, 0.5 g above, 1 sweep cycle in each axis Vibration endurance (Relay de-energised) 10 Hz~150 Hz 1g, 20 sweep cycles in each axis
M2	Shock response / Withstand Test	IEC 60255-21-1	Class I Shock response (Relay operational) 5g 11mS 3 pulse in each axis Shock withstand (Relay de-energised) 15g 11mS 3 pulses in each axis
M3	Bump	IEC 60255-21-1	Bump (Relay de-energised) 10g 16mS 1000 pulses in each axis
M4	Seismic	IEC 60255-21-3	Class I Method A single axis sine sweep 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 1 sweep cycle in each axis

Electrical Test			
E1	Insulation Resistance >100M&	IEC 60255-5	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)		IEC60255-6Voltage range, upper & lower limit continuous withstand, ramp up & down over 1 minute
E3	Voltage Dips, Short Interruptions & Voltage variations immunity (Relay operational)	IEC 1000-4-11	IEC60255-113 Dips & 3 Interruptions at 10 sec intervals of duration between 10mS and 500mS at zero crossings & at other points on wave Variation: 100% to 40% over 2s, hold for 1s, return to 100% over 2s
E4	Ripple in DC supply (Relay operational)	IEC 60255-11	12% AC ripple
E5	Dielectric Test (Relay de-energised) No breakdown or flash over Test voltage 45~65 Hz sinusoidal or with DC voltage at 1.4x the stated AC values	IEC 60255-5	2.0 KV @ 1min All circuit to Earth / Between IP & OP except communication terminals
E6	High Voltage Impulse (Relay de-energised)	IEC 60255-5	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 100xIn for 1 second 30xIn for 10 second 4xIn continuously
E9	Contact performance & endurance tests	IEC 60255-14,15 IEC 60255-23	

Electro-magnetic Compatibility			
R1	Electrical fast Transient/Burst (Relay operational)	IEC 60255-22-4 IEC 60100-4-4	Class IV- +4.0 kV All Circuits. Pulse 5/50msec / Duration 15msec / Period: 300msec/Pulse Freq: 5KHz / 2KV at I/O
R2	HF Disturbance Test (Oscillatory Waves) 1 MHZ Burst (Relay operational)	IEC 60255-22-1	Class III Longitudinal 2.5 kV peak, 2sec between independent circuits & case earth
R3	Electrostatic Discharge (Relay operational)	IEC 60255-22-2 IEC 61000-4-2	Class III 8kV air discharge, 6KV contact No of Discharge : 10 both polarities at 1 sec intervals
R4	Conducted Disturbance RF fields (Relay operational)	IEC 61000-4-6 IEC 60255-22-6	0.15 to 80 MHZ (Level-3) Severity Level 10V RMS + sweeps 0.05-0.15 MHZ & 80-100 MHZ
R5	Radiated RF E-M field immunity test (Relay operational)	IEC 60255-22-3 IEC 61000-4-3	Class III Test method A + sweep 80-1000 MHZ or IEC 1000-4-3 80-1000 MHZ severity 10 V/m 80% modulated 1 kHz
R6	Surge Immunity capacitively coupled (Relay operational)	IEC 61000-4-5 Class 5 Test level 4 IEC 60255-22-5: 2008 Latest: IEC 60255-26:2013	Short circuit combination wave generator 1.2 uS/50 uS open circuit repetition rate 1 per minute Power supply, CT & VT circuits – 4kV common mode 2 Ohm source 2kV differential mode 12 Ohm source
R7	Power Frequency Magnetic Field (Relay operational)	IEC 61000-4-8	100 A/m for 1 minute in each of 3 axes
R8	Conducted & Radiated RF Interference Emission (Relay operational)	EN 55011 IEC 60255-25	CISPR11 / Class A
R9	Power Frequency, conducted common mode	IEC 1000-4-16 IEC 60255-22-7	D.C. to 150 kHz Test Level 4 300V at 16 2/3 Hz and 50 Hz

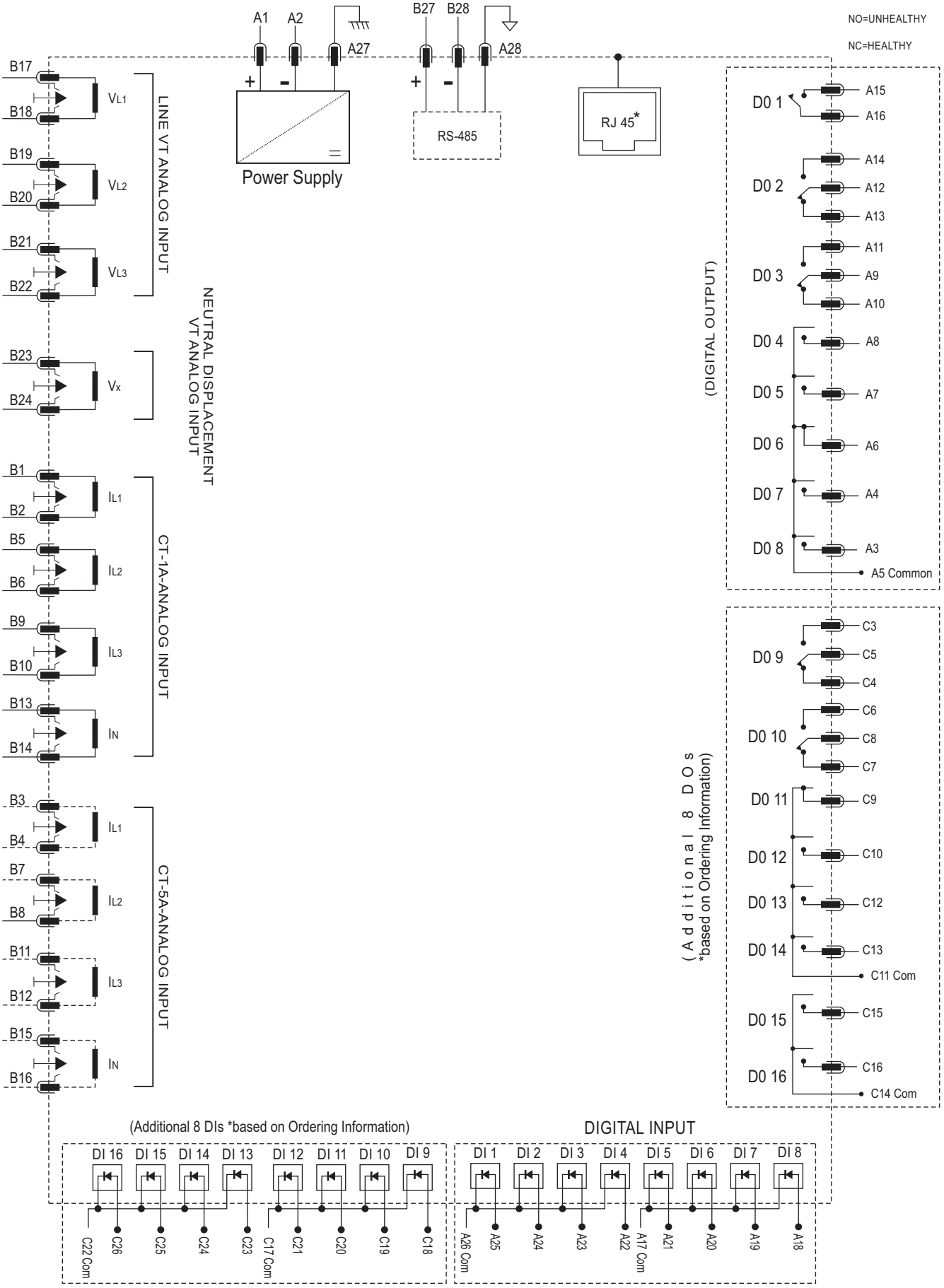
17.0 Recommended Terminal Lugs Specifications

Term Blocks	Type/Cable Specifications
Current Inputs	Ring Type lug / 2.5mm2 or 4 mm2 control cable
Auxiliary Supply	Pin Type lug / 1.5 mm2 / 2.5 mm2 control cable
Rear Comm. Port	Pin Type lug / 1.5 mm2 / 2.5 mm2 control cable
Front Comm. Port	USB, Type - A to A
Binary Input	Pin Type lug / 1.5mm2 / 2.5mm2 control cable
Binary Output	Pin Type lug / 4.0mm2 control cable
Earth Connections	Ring Type / 2.5mm2 or 4 mm2 contact cable

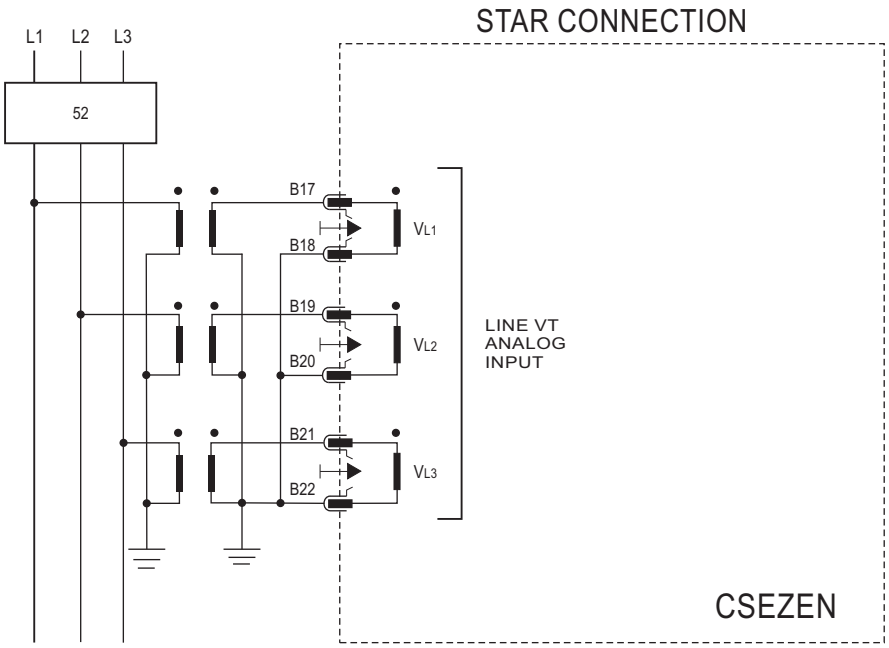
Cable required for Front USB Communication (Type A)

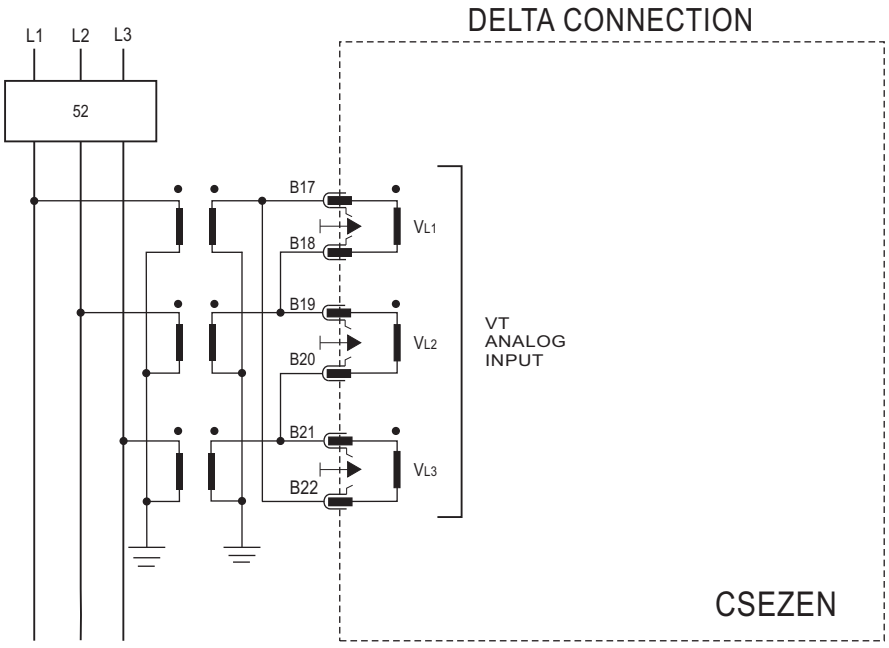
Additional Accessories (Not a part of standard supply)

18.0 Connection Diagram



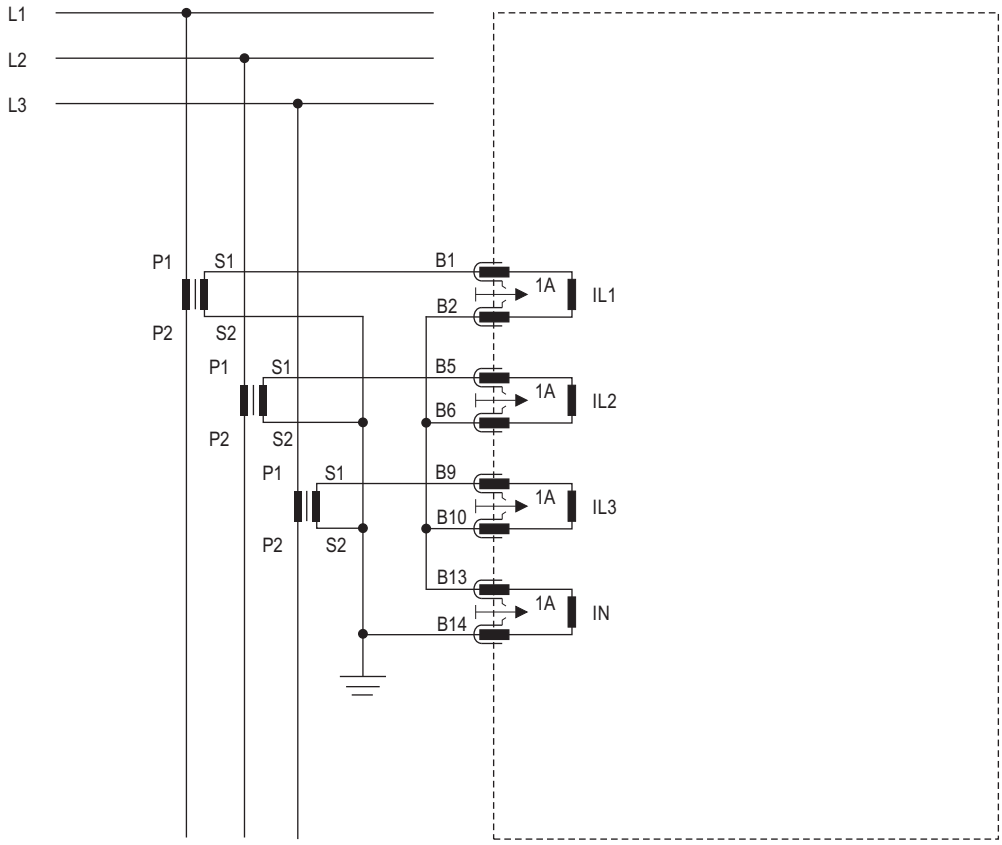
19.0 VT Connection Diagram





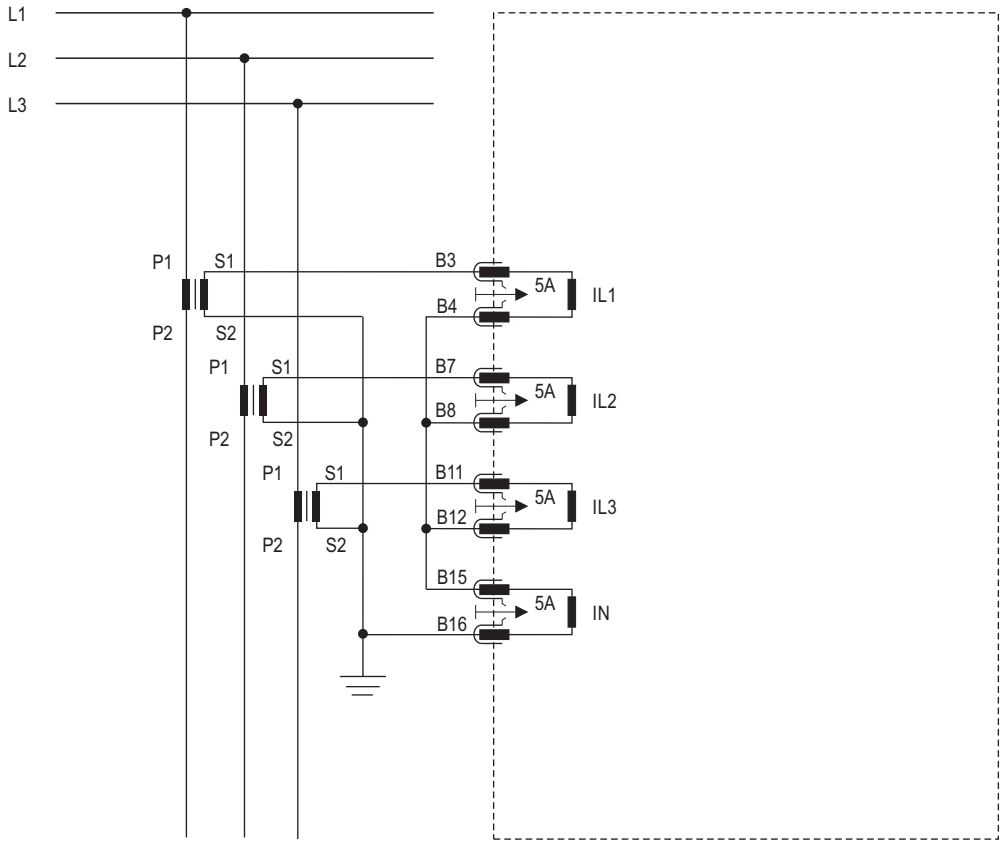
20.0 CT Connection Diagram

CT Schemes
Holmgreen Residual CT Connection for 1A

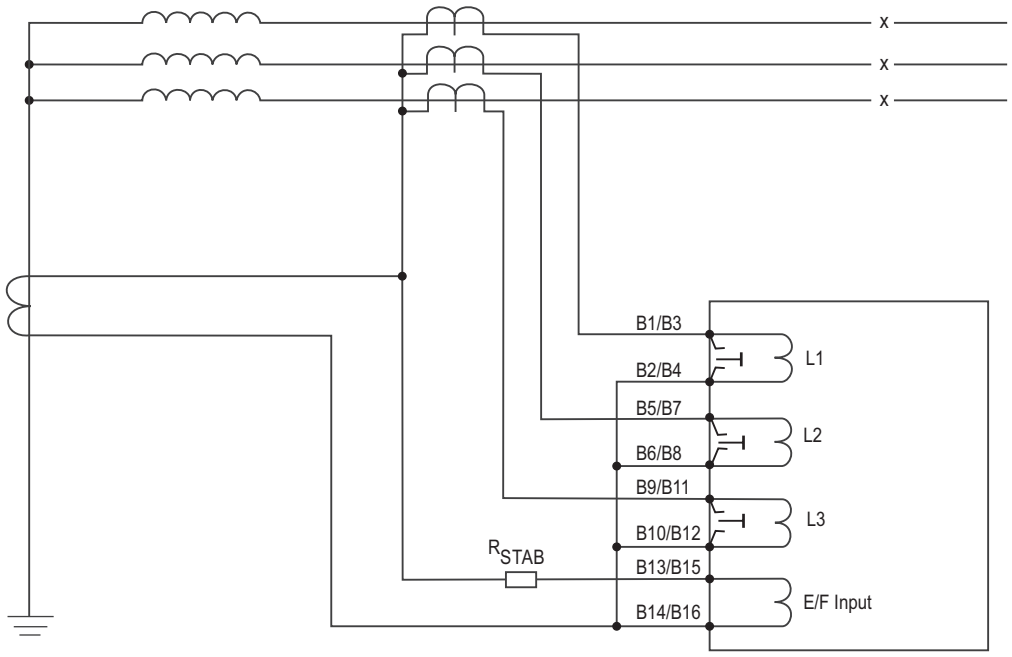


21.0 CT Connection Diagram

CT Schemes
Holmgreen Residual CT Connection for 5A

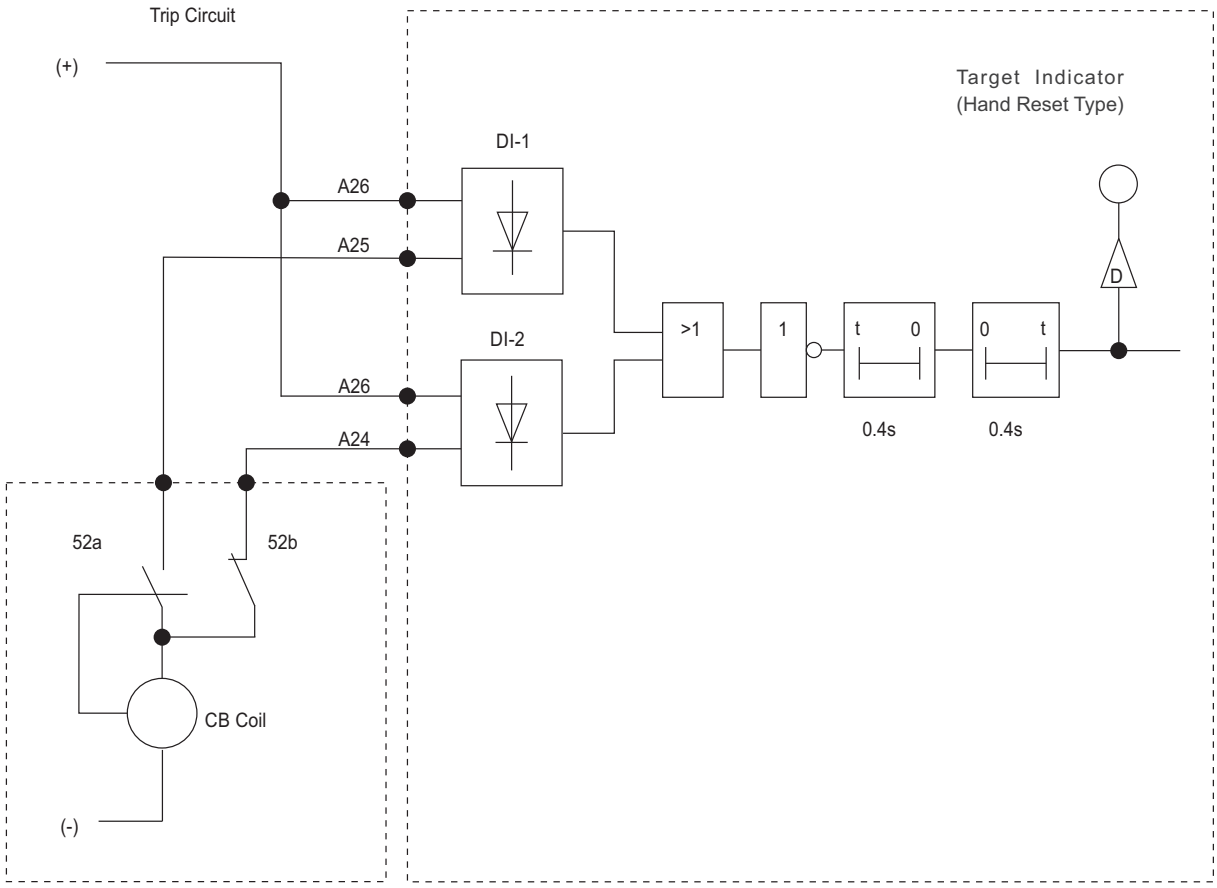


22.0 Connection Scheme for Restricted Earth



CT Connection Diagram for High Impedance REF Aplication

23.0 Trip Circuit Supervision Diagram

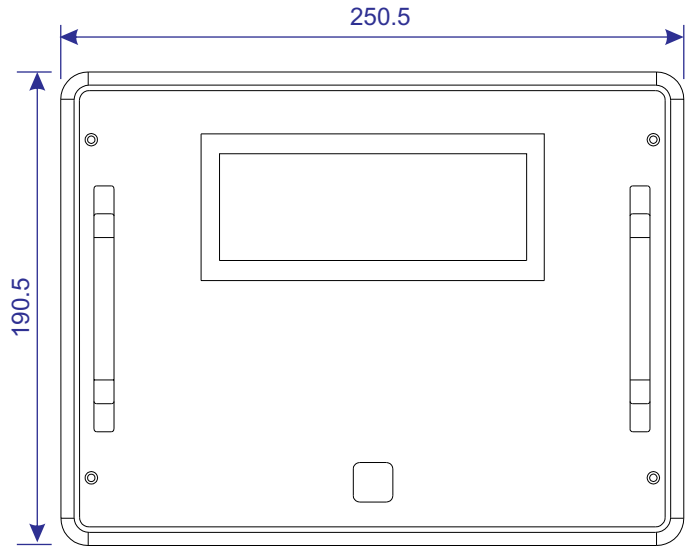


(Trip Circuit Supervision Function)

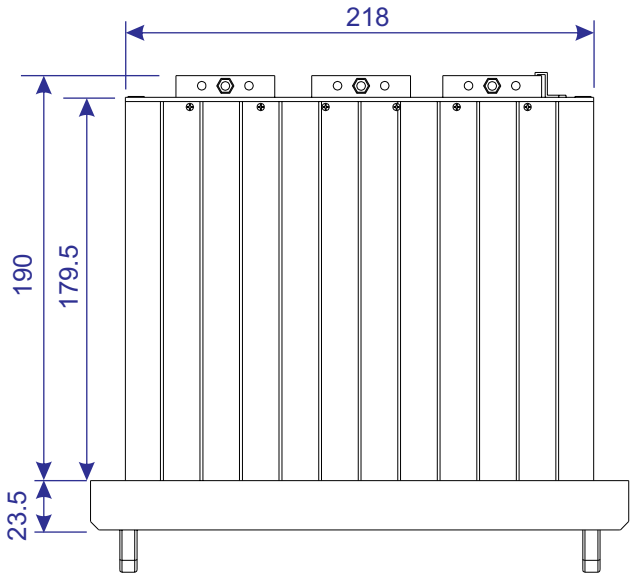
24.0 Dimensional Details

All the dim are in mm (Gen. Tol + 1.0mm)

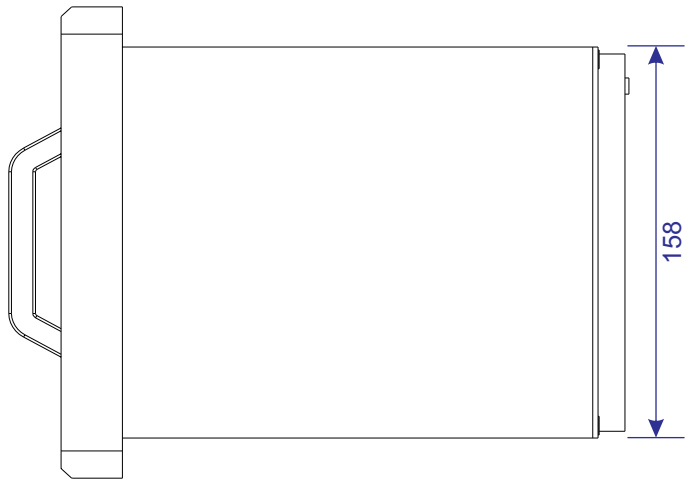
Front View



Top View

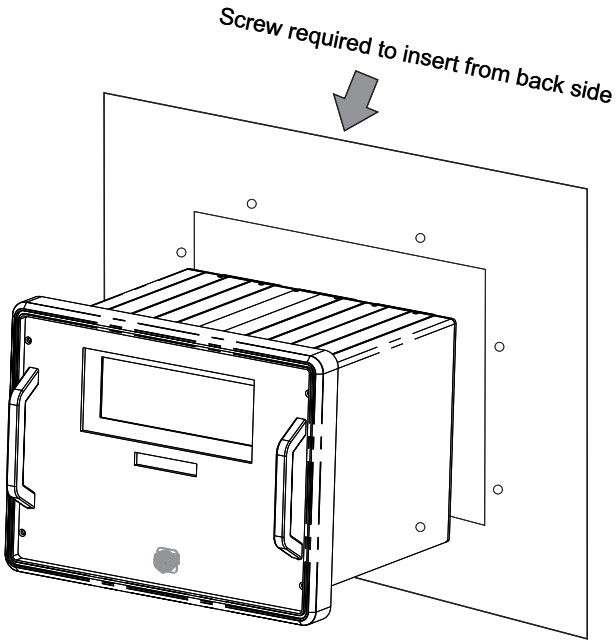


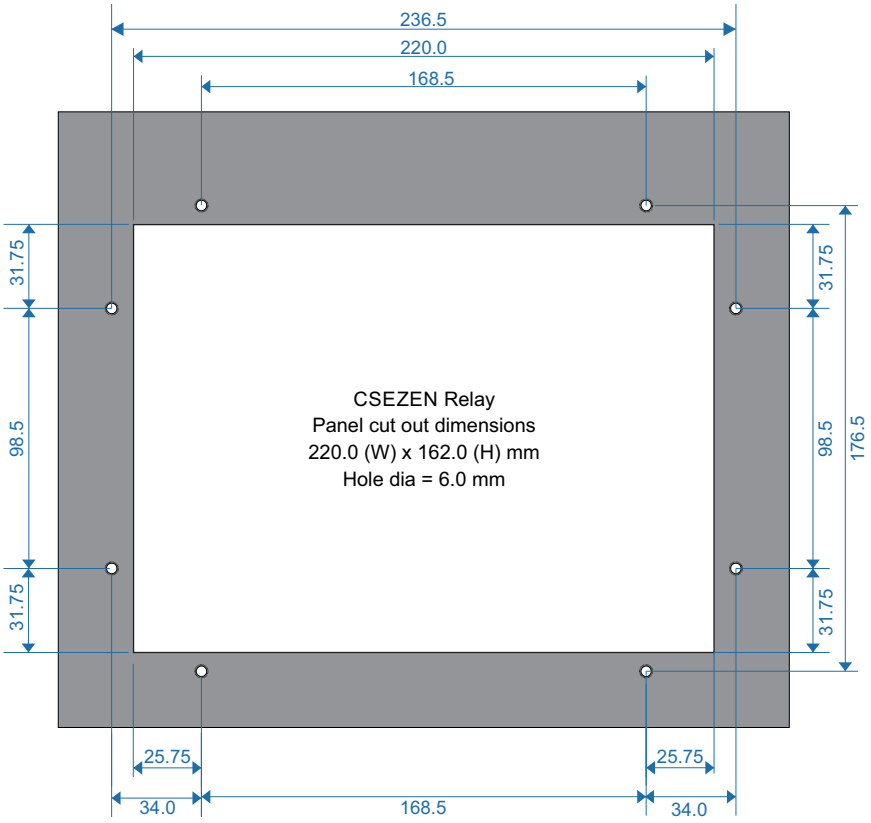
Side View



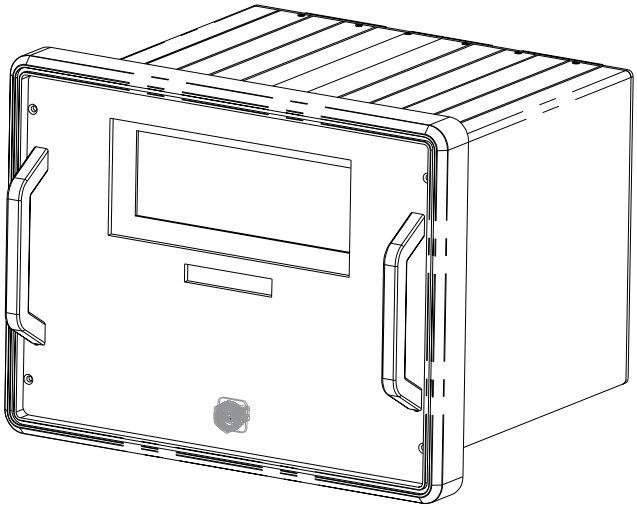
Panel mounting of the Relay

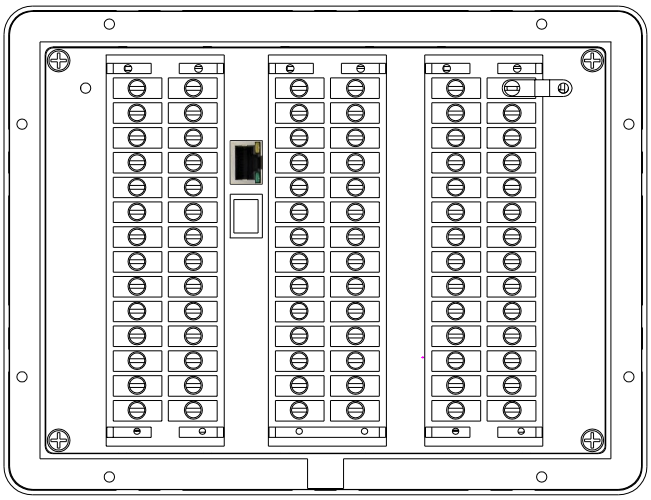
for Panel mounting		
Screw	:	M4x12mm
Qty	:	8 Nos.





Different views of the Relay





25.0 Ordering Information

CSEZEN	-	F	-	550x	-	x	-	x	-	D	-	x	-	x	-	x	-	x	-	E	-	H

Voltage Input	
1	110V
4	400V

Earth Fault	
S	Sensitive Earth Fault
N	Non-Sensitive Earth Fault

Digital Input / Digital Output	
0	8 DI /DO
1	16 DI /DO

Auxiliary Supply	
L	18V-150V DC
H	80V-280V AC / 90V-300V DC
U	40V-280V AC / 18V-300V DC

Communication Protocol	
A	MODBUS on RS-485
B	IEC 60870-5-103 on RS-485
C	IEC 61850 Single RJ-45 port Ed-2
D	IEC 61850 PRP-Dual RJ-45 port Ed-2

Time Synchronisation	
0	None
S	SNTP on RJ-45

Issue Date : 01.07.20
Rev. No : 09
Rev. Date : 18.12.24

CSEZEN- E Cat al ogue

Technical Question or After-sales Service

Customer Center Quick Response Service, Excellent Technical Support

1800 572 2012

NOTE

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Revision History

S.No.	Rev.No.	Details	Date
01	01	Fault, Event, Disturbance, PSL screen shots change & OC & EF diagram changed with the new one	02.12.20
02	02	Change in ordering information and communication details include FO options in the catalog	06.05.22
03	03	Change in ordering information for communication details (removed Ed1 & Ed2 options)	15.09.22
04	04	Include VT Fuse failure (VTFF) with VTS in supervision functions Pg 5 & in functional diagram Pg 6	22.06.23
05	04	Include MODBUS TCP-IP on RJ-45 in communication heading of Ordering Information	22.06.23
06	05	Change in description of Programmable scheme logic on page-34	17.08.23
07	07	Include Edition-1 & Edition 2 Communication protocol option in ordering information on page-63	29.11.23
08	08	Include U range of Aux supply in ordering information on page-63	25.04.24
09	09	Change in IEC 61850:Rear Communication protocol details of ordering information details on page-63	18.12.24