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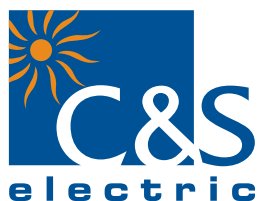
CSEPRO-F 120

Intelligent measuring & protection device

CSEPRO
CSEPRO
CSEPRO
CSEPRO
Series



Catalogue



Advance Feeder Protection & Monitoring Solution

CONTENT

S.No.	Description
1.	Introduction
2.	Application
3.	Hardware
4.	Protections
5.	Supervision Functions
6.	Functional Diagram
7.	Protection Functions
8.	Data Acquisition Functions
9.	Fault Record
10.	Event Record
11.	Disturbance Record
12.	Human Machine Interface
13.	Communication
14.	Setting Ranges
15.	Technical Data
16.	Standards
	16.1 High Voltage Tests
	16.2 EMC Immunity Tests
	16.3 Environmental Tests
	16.4 Mechanical Tests
17.	TCS Diagram
18.	Connection Diagram
19.	Dimension Details
20.	Model Selection Table
21.	Ordering Information

1.0 Introduction

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

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

In this family of CSEPRO series, the CSEPRO-Fxxx is an advanced feeder protection solution which has fast, sensitive and secure protection for feeder faults.

CSEPRO-Fxxx 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.

CSEPRO-Fxxx offers following model based features to cover requirements of the wide range of users.

- ❖ Draw out enclosure have modular design
- ❖ Measurement & Protection
- ❖ SCADA Communication (Local & Remote)
- ❖ Disturbance Record
- ❖ DI/DO Matrix Programmability
- ❖ Intelligent key for DI status & DO status, details of fault pickup & status of last fault occurred.
- ❖ Last 10 fault record (non-volatile memory) with time stamp
- ❖ Last 100 event record (non-volatile memory) with time stamp
- ❖ CSEPRO-F relays are equipped with self supervision function
- ❖ Star & Delta configuration 63.5/110V.

2.0 Application

The CSEPRO-F relay has 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.

CSEPROF Model

CSEPROF is available in following models: -

- CSEPROF120 : Voltage Protection
- CSEPROF220 : Non Directional Sensitive Current Protection
- CSEPROF240 : Non Directional Current Protection
- CSEPROF300 : Current + Voltage Protection
- CSEPROF350 : Directional Current + Voltage Protection
- CSEPROF400 : Voltage + Frequency Protection
- CSEPROF500 : Current + Voltage + Frequency Protection

3.0 Hardware

- ❖ Digital Signal Processor based numeric design
- ❖ Measures true RMS with DFT filter.
- ❖ 4 Voltage Analog Input
- ❖ Max. 6 Digital Inputs
- ❖ Max. 6 Digital Outputs
- ❖ 8 LED's at Pickup & Trip on fault + 3 LED's with special function of 3 control keys
- ❖ LAN-RJ45 / RS-485 / USB ports for Communication
- ❖ 16x4 Alpha numeric LCD
- ❖ 8 Push button on the front for HMI

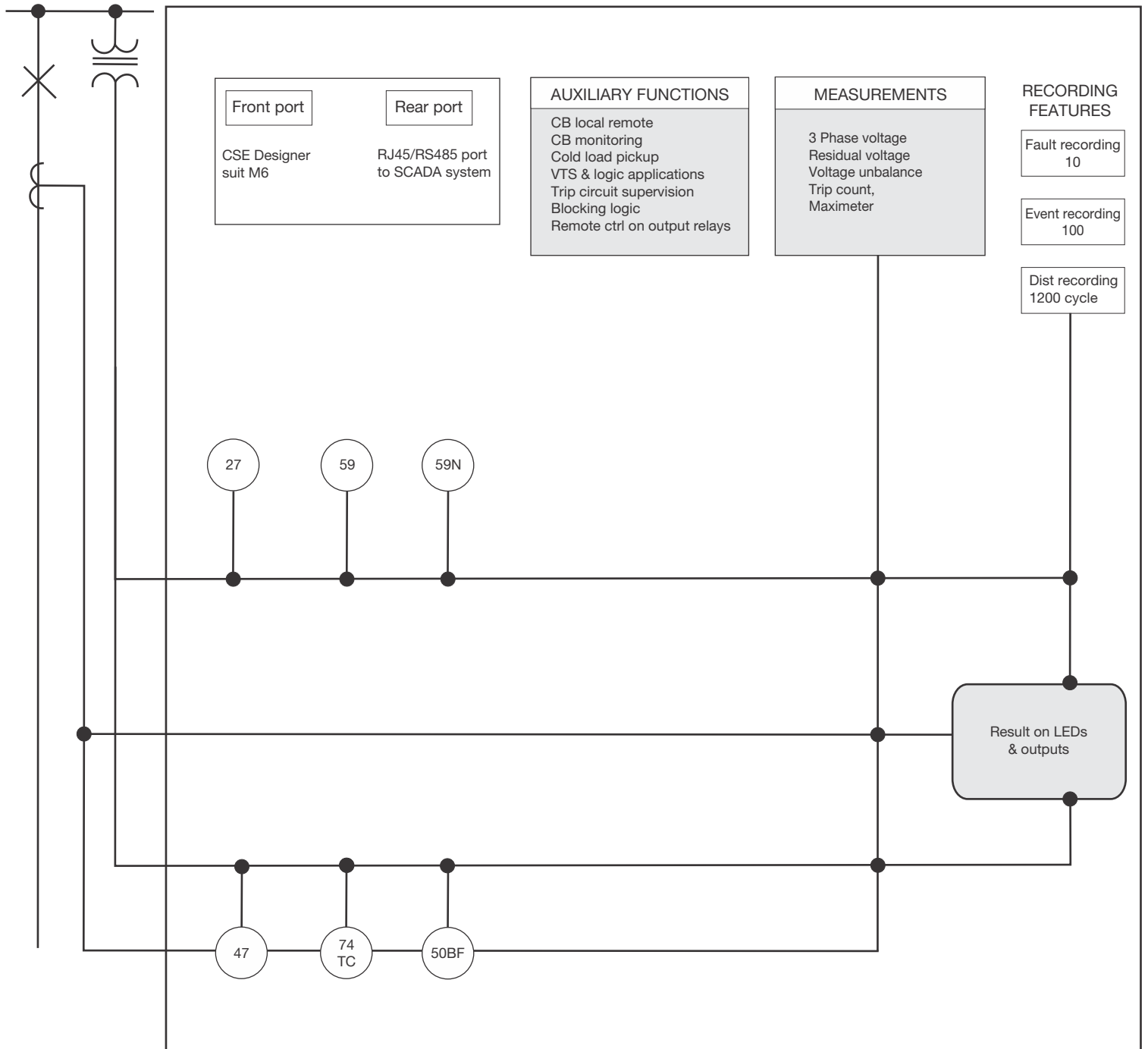
4.0 Protections

- ❖ Under / Over Voltage (27/59)
- ❖ Residual Voltage / Voltage Unbalance (59N/47)

5.0 Supervision Functions

- ❖ Lock out Relay
- ❖ Open-Close Breaker Command
- ❖ Trip Circuit Supervision (74TC)

6.0 Functional Diagram



(Figure-2) CSEPROF Functional Diagram

7.0 Protection Functions

1) Voltage Protection

The relay is equipped with an independent over, 2 step over ($U>$, $U>>$) and under voltage supervision ($U<$, $U<<$) simultaneously with separately adjustable tripping values and delay times. Voltage measuring is 3-phase. In this process there is a continuous comparison of the line conductor voltages in case of a delta connection and of the phase voltages in case of a star connection with the preset limit

Values.

1.1) Under / Over voltage (27/59)

Two thresholds are available for each function: each one can be independently activated or deactivated. For under / over voltage protections settings Refer table 3.

Block on under voltage ($U_{lossBlk}$) in case of power failure is user selectable. if it is enable then for $<10\%$ of U_n (Power Failure) under voltage protection will be blocked.

1.2) Zero Sequence Over voltage (Neutral Displacement) (59N)

CSEPRO-F relays will operate from the zero sequence over voltage functions according to the VT configuration

♦ VT configuration = $3V_{pn} + V_r$, then the [59N] will operate based on the residual voltage measured on the relay terminals (Refer figure 7 for connection diagram)

♦ VT configuration = $3V_{pn}$, then [59N] will operate based on the zero sequence voltage

$$\vec{U}_0 = 1/3 | (\vec{U}_{L1} + \vec{U}_{L2} + \vec{U}_{L3}) | \text{ calculated internally.}$$

1.3) Negative Sequence over voltage (47)

This function is based on the negative-sequence component of the voltage, which is calculated internally and displayed on the screen of the front panel: It is designed to detect any voltage unbalance condition.

$$\vec{U}_2 = 1/3 | (\vec{U}_{L1} + a^2 \vec{U}_{L2} + a \vec{U}_{L3}) |$$

for negative sequence over voltage protections settings Refer Table 4.

1.4) Positive Sequence Under voltage

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

$$\vec{U}_1 = 1/3 | (\vec{U}_{L1} + a \vec{U}_{L2} + a^2 \vec{U}_{L3}) |$$

For positive sequence under voltage protections settings Refer Table 4.

2) Trip Circuit Supervision (74TC)

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. Refer table-2 for this protections settings.

Automation

Protection Function Locking

Each protection function can be locked via a digital input as selected and assigned in HMI.

8.0 Data Acquisition Function

Measurement

- ❖ 3 Phase Star Voltage
- ❖ Residual Voltage
- ❖ 3 Phase Delta Voltage
- ❖ Negative / Positive / Zero Sequence Voltage
- ❖ Trip counter
- ❖ Origin of last fault
- ❖ Maxi meter

9.0 Fault Record

CSEPRO-F records last 10 faults in its non volatile memory with its time stamp. Each record has the following information:

Fault Format	U0	:	XX.XXV		
UL1	:	XX.XXV	U1	:	XX.XXV
UL2	:	XX.XXV	U2	:	XX.XXV
UL3	:	XX.XXV	HR MIN	:	HH:MIN
UL12	:	XX.XXV	SEC Ms	:	Sec: mSec
UL23	:	XX.XXV	DATE	:	DD:MM:YR
UI31	:	XX.XXV	F-TYPE	:	Type of fault

Sr No	Fault Name	Time Stamp	UL1	UL2	UL3	UL12	UL23	UL31	I0	U1	U2
1	Overvoltage Fault in L3 Phase	05/11/2012 16:44:03.711	75.00 V	73.67 V	74.05 V	118.99 V	127.08 V	129.81 V	0.00 V	5.16 V	67.83 V
2	Undervoltage Hiset Fault in L1 Phase	05/11/2012 16:44:04.926	46.09 V	46.26 V	46.06 V	79.92 V	79.96 V	79.90 V	0.00 V	0.00 V	46.22 V
3	Undervoltage Fault in L3 Phase	05/11/2012 16:44:05.731	16.86 V	17.07 V	17.03 V	29.42 V	29.44 V	29.56 V	0.00 V	0.00 V	17.07 V
4	Negative Phase Sequence Voltage Fault	05/11/2012 16:44:06.969	45.96 V	46.01 V	46.10 V	79.73 V	79.83 V	79.80 V	0.00 V	0.00 V	46.20 V
5	Overvoltage Fault in L3 Phase	05/11/2012 16:44:07.595	75.15 V	75.09 V	75.28 V	130.13 V	130.15 V	130.22 V	0.13 V	8.70 V	65.35 V
6	Undervoltage Hiset Fault in L3 Phase	05/11/2012 16:44:09.166	46.17 V	46.06 V	46.21 V	79.88 V	79.90 V	80.09 V	0.00 V	0.00 V	46.27 V
7	Undervoltage Fault in L1 Phase	05/11/2012 16:44:09.792	17.01 V	17.09 V	17.01 V	29.52 V	29.52 V	29.52 V	0.00 V	0.00 V	17.13 V
8	Undervoltage Hiset Fault in L1 Phase	05/11/2012 16:43:30.912	46.08 V	46.10 V	46.13 V	80.02 V	79.64 V	79.91 V	0.06 V	0.31 V	46.25 V
9	Undervoltage Fault in L1 Phase	05/11/2012 16:43:31.899	17.09 V	16.97 V	17.06 V	29.69 V	29.44 V	29.62 V	0.09 V	0.00 V	17.12 V
10	Negative Phase Sequence Voltage Fault	05/11/2012 16:43:34.288	29.16 V	29.07 V	29.18 V	50.39 V	50.40 V	50.46 V	0.00 V	0.00 V	29.21 V

(Figure-3) Fault Data recording on PC software

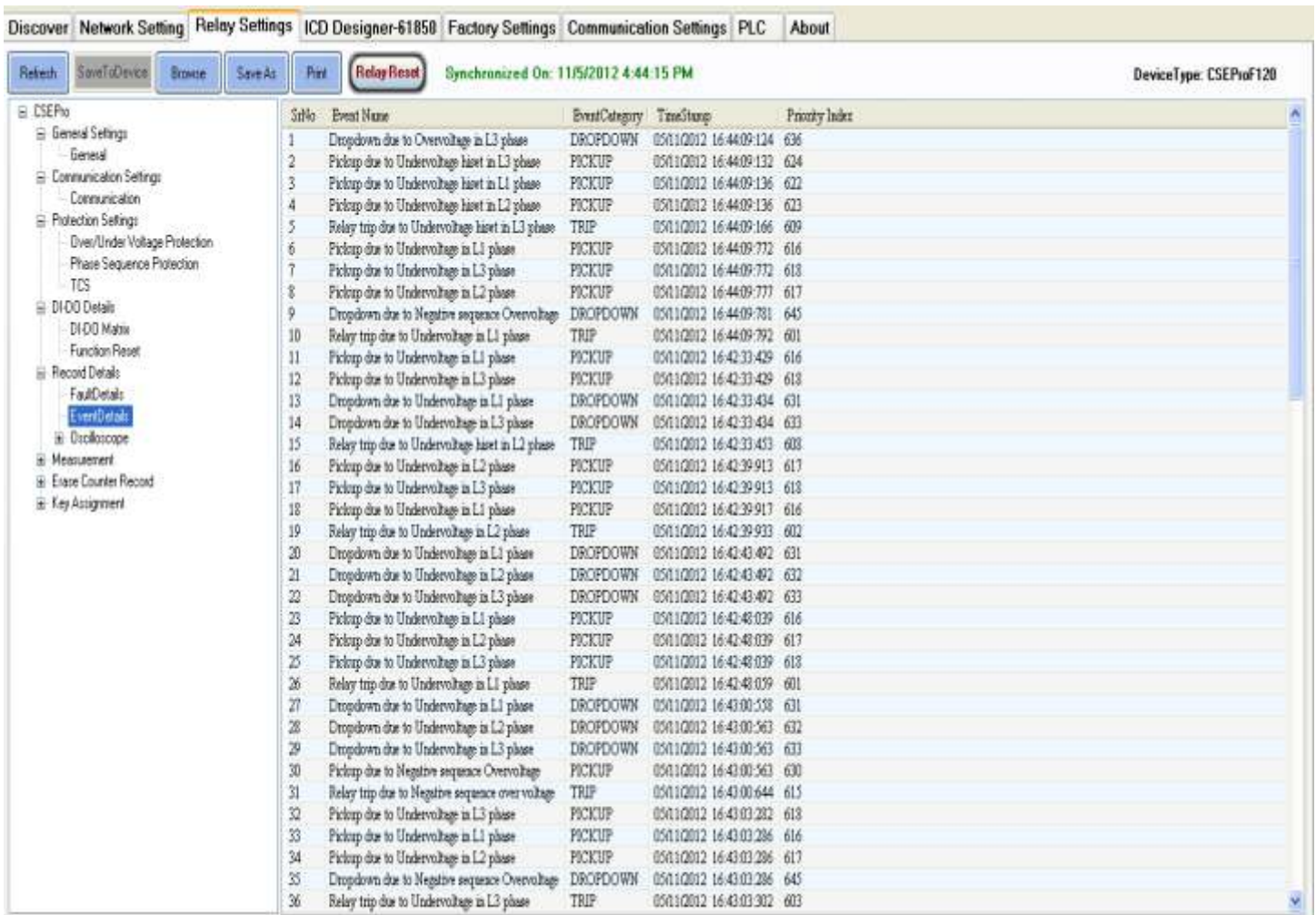
10.0 Event Record

The unit stores in non volatile memory the last 100 events with it's time stamp. 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.



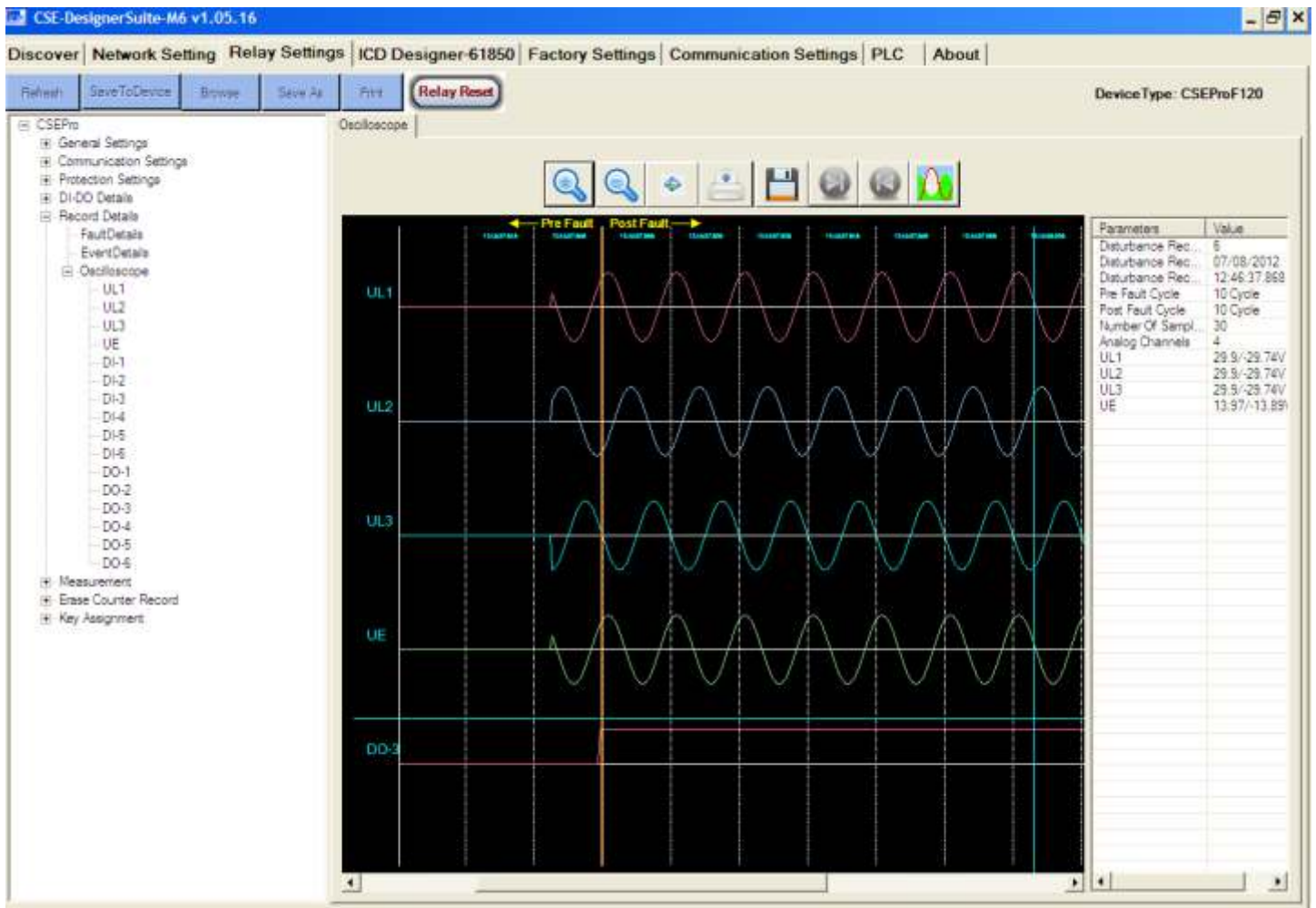
SNo	Event Name	Event Category	TimeStamp	Priority Index
1	Dropdown due to Overvoltage in L3 phase	DROFDOWN	05/11/2012 16:44:09:124	636
2	Pickup due to Undervoltage in L3 phase	PICKUP	05/11/2012 16:44:09:132	624
3	Pickup due to Undervoltage in L1 phase	PICKUP	05/11/2012 16:44:09:136	622
4	Pickup due to Undervoltage in L2 phase	PICKUP	05/11/2012 16:44:09:136	623
5	Relay trip due to Undervoltage in L3 phase	TRIP	05/11/2012 16:44:09:166	609
6	Pickup due to Undervoltage in L1 phase	PICKUP	05/11/2012 16:44:09:772	616
7	Pickup due to Undervoltage in L3 phase	PICKUP	05/11/2012 16:44:09:772	618
8	Pickup due to Undervoltage in L2 phase	PICKUP	05/11/2012 16:44:09:777	617
9	Dropdown due to Negative sequence Overvoltage	DROFDOWN	05/11/2012 16:44:09:781	645
10	Relay trip due to Undervoltage in L1 phase	TRIP	05/11/2012 16:44:09:792	601
11	Pickup due to Undervoltage in L1 phase	PICKUP	05/11/2012 16:42:33:429	616
12	Pickup due to Undervoltage in L3 phase	PICKUP	05/11/2012 16:42:33:429	618
13	Dropdown due to Undervoltage in L1 phase	DROFDOWN	05/11/2012 16:42:33:434	631
14	Dropdown due to Undervoltage in L3 phase	DROFDOWN	05/11/2012 16:42:33:434	633
15	Relay trip due to Undervoltage in L1 phase	TRIP	05/11/2012 16:42:33:453	603
16	Pickup due to Undervoltage in L2 phase	PICKUP	05/11/2012 16:42:39:913	617
17	Pickup due to Undervoltage in L3 phase	PICKUP	05/11/2012 16:42:39:913	618
18	Pickup due to Undervoltage in L1 phase	PICKUP	05/11/2012 16:42:39:917	616
19	Relay trip due to Undervoltage in L2 phase	TRIP	05/11/2012 16:42:39:933	602
20	Dropdown due to Undervoltage in L1 phase	DROFDOWN	05/11/2012 16:42:43:492	631
21	Dropdown due to Undervoltage in L2 phase	DROFDOWN	05/11/2012 16:42:43:492	632
22	Dropdown due to Undervoltage in L3 phase	DROFDOWN	05/11/2012 16:42:43:492	633
23	Pickup due to Undervoltage in L1 phase	PICKUP	05/11/2012 16:42:48:039	616
24	Pickup due to Undervoltage in L2 phase	PICKUP	05/11/2012 16:42:48:039	617
25	Pickup due to Undervoltage in L3 phase	PICKUP	05/11/2012 16:42:48:039	618
26	Relay trip due to Undervoltage in L1 phase	TRIP	05/11/2012 16:42:48:039	601
27	Dropdown due to Undervoltage in L1 phase	DROFDOWN	05/11/2012 16:43:00:538	631
28	Dropdown due to Undervoltage in L2 phase	DROFDOWN	05/11/2012 16:43:00:563	632
29	Dropdown due to Undervoltage in L3 phase	DROFDOWN	05/11/2012 16:43:00:563	633
30	Pickup due to Negative sequence Overvoltage	PICKUP	05/11/2012 16:43:00:563	630
31	Relay trip due to Negative sequence over voltage	TRIP	05/11/2012 16:43:00:644	615
32	Pickup due to Undervoltage in L3 phase	PICKUP	05/11/2012 16:43:03:282	618
33	Pickup due to Undervoltage in L1 phase	PICKUP	05/11/2012 16:43:03:286	616
34	Pickup due to Undervoltage in L2 phase	PICKUP	05/11/2012 16:43:03:286	617
35	Dropdown due to Negative sequence Overvoltage	DROFDOWN	05/11/2012 16:43:03:286	645
36	Relay trip due to Undervoltage in L3 phase	TRIP	05/11/2012 16:43:03:302	603

(Figure-4) Event Data recording on PC Software

11.0 Disturbance Record

The CSEPRO-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. 4 analog signals (depends upon the different models) and the status of 6 digital inputs and 6 digital outputs. There will be 30 samples per cycle.
- ❖ Relay saves maximum 1200 cycles, and the number of cycles per record is programmable (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 in comtrade format as per IEC60255-24



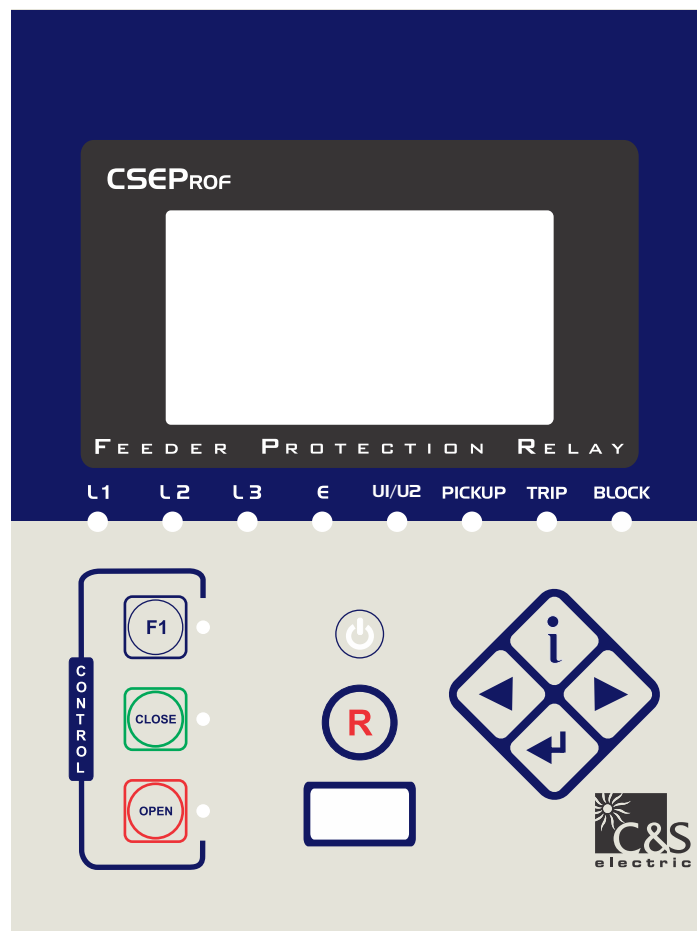
(Figure-5) Oscilloscope recording on PC software

Output Contacts

No. of digital outputs	: 6 (DO1, DO2, DO3, DO4, DO5, DO6)
Type of outputs	: Relay
Programmable (DO Assignment)	: Yes
Relay reset type	: Programmable (Auto/Manual)

Input Contacts

No of digital inputs	: 6 (DI1, DI2, DI3, DI4, DI5, DI6)
Type of inputs	: AC/DC Voltage
Programmable (DI Assignment)	: Yes



(Figure-6)

12.0 Human Machine Interface









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

Human-Machine Interface (HMI)

It comprises of alphanumeric display of 16x4 and 8 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.
- ❖ Eight LEDs for pickup or tripping on fault's & events in any phase.

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

Keys	Manual Key
	is used as intelligent key to see the details of the fault pickup / digital input / output status & last fault details.
	is used as a “ENTER” key.
	is used to manual reset (after pressing for 2 sec).
	is used to scroll in backward direction and for decrement of parameters.
	is used to scroll in forward direction and for increment of parameters.
	To perform the assigned task DO Trip, Relay reset or thermal reset.
	To open the circuit breaker.
	To close the circuit breaker.

13.0 Communication (Local & Remote)

The unit has:

- ❖ 1 Front USB port for direct connection to a PC.
- ❖ 1 Rear RS-485 communication port.
- ❖ 1 Rear terminal can be for: RJ-45 or plastic F.O.

Rear Communication (RS-485)

The protocol for the rear port is based on ordering information. It can be either MODBUS or IEC 870-5-103 for RS-485 communication.

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.

14.0 Setting Ranges

Active Group Setting

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Active Group	ACTIVE	Group1	Group3	1	Group1
Group Toggle Step	TOGGLE STEP	+1	+2	1	+1

(Table-1)

Trip Circuit Supervision

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Trip circuit supervision	TCS	0.03 Sec	2 Sec	0.01 Sec	Disable

(Table-2)

(1) Refer following formula for IDMT characteristics for over/under voltage & residual over voltage

$$\text{Very Inverse} \quad t = \frac{\text{TMS}}{(V/V_s) - 1}$$

Where

t = Operating time in seconds

TMS = Time multiplier setting

V = Applied Input Voltage

V_s = Relay Setting Voltage

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

Under Voltage / Over Voltage Setting

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Under voltage characteristics	U<char	DEFT	IDMT		DEFT
Blocking on loss of voltage	UlossBlk	Enable	Disable		Disable
Under voltage threshold setting	UV-THRE	5%Un	100%Un	1%Un	10%Un
Under voltage pickup setting	U<Pkup	5%Un	120%Un	1%Un	Disable
Under voltage TMS setting	U<Ti	0.05	2	0.01	0.05
Under voltage definite time	U<Td	0.03 sec	20.00 sec	0.01 sec	0.03 sec
Under voltage hi-set pickup setting	U<<Pkup	5%Un	120%Un	1Un	Disable
Under voltage definite time	U<<Td	0.03 sec	20.00 sec	0.01 sec	0.05 sec
Over voltage characteristics	U>char	DEFT	IDMT		DEFT
Over voltage pickup setting	U>Pkup	20%Un	150%Un	1%Un	Disable
Over voltage TMS setting	U>Ti	0.05	2	0.01	0.05
Over voltage definite time	U>Td	0.03 sec	20.00 sec	0.01 sec	0.05 sec
Over voltage hi-set pickup setting	U>>Pkup	20%Un	150%Un	1%Un	Disable
Over voltage definite time	U>>Td	0.03 sec	20.00 sec	0.01 sec	0.05 sec

(Table-3)

U0 / U1 / U2 Setting

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Neutral voltage pickup setting	U0>Pkup	2%Un	100%Un	1%Un	Disable
Neutral voltage characteristic	U0>Char	DEFT	IDMT	-	DEFT
Neutral voltage TMS setting	U0>Ti	0.05	2	0.01	0.05
Neutral voltage definite time	U0>Td	0.03 sec	20.00 sec	0.01 sec	0.05 sec
Positive sequence voltage pickup setting	U1<Pkup	10%Un	100%Un	1%Un	Disable
Positive sequence voltage definite time	U1<Td	0.03 sec	10.00 sec	0.01 sec	0.10 sec
Negative sequence voltage pickup setting	U2>Pkup	10%Un	100%Un	1%Un	Disable
Negative sequence voltage definite time	U2>Td	0.03 sec	10.00 sec	0.01 sec	0.10 sec

(Table-4)

DO Assignment

Parameters	Display
Under voltage protection	U<
Under voltage hi set protection	U<<
Over voltage protection	U>
Over voltage hi set protection	U>>
Zero sequence over voltage protection	U0>
Positive sequence under voltage protection	U1<
Negative sequence over voltage protection	U2>
Trip circuit supervision	TCS
Self supervision	SELF SUP
Circuit breaker open	CB open
Circuit breaker close	CB close
Remote trip	Rmt trip

(Table-5)

DI Assignment

Parameters	Display
Circuit breaker close	CB Close
Circuit breaker open	CB Open
Remote trip	Rmt TRP
Group toggle	GRP togg
Remote reset	RMT RSET
Oscillator trigger	OSC Trig
Under voltage block	U< BLK
Under voltage hi set block	U<<BLK
Over voltage block	U>BLK
Over voltage hi set block	U>>BLK
Zero phase sequence over voltage block	U0>BLK
Positive phase sequence under voltage block	U1<BLK
Negative phase sequence over voltage block	U2>BLK

(Table-6)

Function Reset

Parameters	Display
Under voltage protection	U<
Under voltage hiset protection	U<<
Over voltage protection	U>
Over voltage hi set protection	U>>
Zero sequence over voltage protection	U0>
Positive sequence under voltage protection	U1<
Negative sequence over voltage protection	U2>
Trip circuit supervision	TCS
Remote trip	Rmt Trip

(Table-7)

Erase Counter Record

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Trip Count	Trip-Cntr	NO	YES	1	NO
Erase Maxi-meter	MaxMetrRset	NO	YES	1	NO
Erase Events	EventsErase	NO	YES	1	NO
Erase Faults	FaultErase	NO	YES	1	NO
Oscillator Record Erase	OscRcrdEras	NO	YES	1	NO

(Table-8)

Common Setting

These are the setting's common for all the protections:

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
PT ratio	PTRatio	1	9999	1	1
Phase selection	PHASE	1	3	-	1
Wire configuration	Wire config	STAR	DELTA	-	star
VT configuration	VT config	3 Vpn + Vr	3 Vpn	-	3 Vpn + Vr
Nominal frequency	FREQ(Fn)	50 Hz	60 Hz	-	50 Hz
Fault Message Status	[F]Stats	DISABLE	ENABLE	-	ENABLE

(Table-9)

Oscilloscope (Disturbance) Record Setting

These are the settings for Oscilloscope recording

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Oscilloscope recording selection	RECORD	NO	YES	-	NO
Pre-fault cycle	PRE CYCLE	2 cycles	298 cycles	1	2 Cycle
Post-fault cycle	POST CYCLE	2 cycles	298 cycles	1	2 Cycle
Triggering mode	TRIG. MODE	PK-UP	PK-UP/TRIP/DI/ Anyone	-	PK-UP

(Table-10)

Communication

RS-485 Communication		Default Setting
Baud rate selection (programmable)	9600 / 19200 / 38400 bps	19200 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	-----

(Table-11)

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

USB Communication	
Protocol	CSE Proprietary Protocol: available with front software
Baud rate	19200 bps
Cable required for Interface	USB cable type (A to A)

(Table-12)

15.0 Technical Data

Measuring Input

Rated data	Rated voltage Vn 63.5/110V Rated frequency Fn : 50Hz / 60Hz
------------	----------------------------------------------------------------

(Table-13)

Trip Time Accuracy

Parameters	Accuracy
Trip time accuracy for protections	+5% + 30mSec OR inaccuracy in Trip Timing in reference to + 2% error in measured voltage.

(Table-14)

Measurement Accuracy

Parameters	Range	Frequency Range	Accuracy
Voltage	5-150%Un	50-60Hz	Less than+2%

(Table-15)

Trip 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
Breaking characteristics	
Breaking capacity AC	1500VA resistive 1500VA inductive (PF=0.5) 220V AC, 5A(cos ϕ =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	10000 operation minimum
Unloaded contact	30000 operation minimum

(Table-16)

Auxiliary Supply

Rated auxiliary voltage UH	For 'L' Model	18V-60V DC
	For 'H' Model	85V-280V AC / 110V-300V DC
Rated supply for digital input	Normal Voltage UN	80V-260V AC (Active)
	For 'H' Model	48V-300V DC (Active)
		<30V DC (Inactive)
		<50V AC (Inactive)
	Normal Voltage UN	24V - 60V DC (Active)
	For 'L' Model	<18V DC (Inactive)
Power consumption	Quiescent approx. 3W	Operating approx. <7W

(Table-17)

Common Data

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

(Table-18)

Date & Time setting

Parameters	Display	Setting Range		Step Size	Default Setting
		Min	Max		
Hour	HOUR	0	23	1	---
Minute	MIN	0	59	1	---
Second	SEC	0	59	1	---
Date	DATE	1	31	1	---
Day	DAY	SUN	SAT	1	---
Month	MONTH	1	12	1	---
Year	YEAR	0	99	1	---

(Table-19)

16.0 Standards

Design Standards

IEC 60255-22-[1-6]

IEC 60255-5

16.1 HIGH VOLTAGE TESTS:

High Frequency Interference Test

IEC 60255-22-1	:		
Class 3	:	Auxiliary Supply	2.5 kV/2 s
	:	Circuit to Earth	2.5 kV/2 s
Dielectric Voltage Test			
IEC 60255-5/EN 50178	:	i) All Input / Output circuits to Earth	2.5 kV (eff)/50Hz, 1 min.
		ii) Between Input & Output Circuits	
Impulse Voltage Test			
IEC 60255-5	:	i) All Input/ Output circuits to Earth	5kV / 0.5J, 1.2/50 μ s
		ii) Between Input & Output Circuits	

16.2 EMC IMMUNITY TESTS

Fast Transient Disturbance Immunity Test (Burst)

IEC 60255-22-4	:	Power supply, mains inputs	+4 kV, 2.5 kHz
IEC 61000-4-4			
Class 4	:	Other in and outputs	+2 kV, 5 kHz
Surge Immunity Test			
IEC 61000-4-5	:	Within one circuit	2 kV, Differential Mode, Level 4
Class 4	:	Circuit to Earth	4 kV, Common Mode, Level 4
Electrical Discharge Immunity Test			
IEC 60255-22-2	:	Air discharge	8 kV
IEC 61000-4-2			
Class 3	:	Contact Discharge	6 kV
Radiated Immunity Test			
EN 61000-4-3 / IEC60255-22-3 :		Level 3, 10V/m 80MHz to 1GHz @ 1kHz 80% AM	
Conducted Immunity Test			
EN 61000-4-6 / IEC60255-22-6 :		Level 3, 10V rms @ 1kHz 80% AM, 150KHz to 80Mhz	
Power Frequency Magnetic Field Immunity Test			
IEC61000-4-8 :		Level 5, 100A/m applied continuously, 1000A/m for 3s.	

EMC Emission Tests

Radio Interference Suppression Test

IEC-60255-25/EN55011/CISPR11 Limit value class A

0.15 - 0.5MHz, 79dB μ V (quasi peak) 66dB μ V (average)

0.5 - 30MHz, 73dB μ V (quasi peak) 60dB μ V (average)

Radio Interference Radiation Test

IEC 60255-25 / EN55011 / CISPR11 Limit value class A

30 - 230 MHz, 40 dB V/m at 10m measurement distance

230 - 1 GHz, 47 dB V/m at 10m measurement distance

16.3 ENVIRONMENTAL TESTS

Temperature

IEC 60068-2-1 : Storage : -25°C to + 85°C
 IEC 60068-2-2 : Operation : -25°C to + 70°C

Test Bd: Dry Heat

IEC 60068-2-2 : Temperature 55°C
 : Relative humidity <50%
 : Test duration 72 h

Test Bd: Dry Heat

IEC 60068-2-2 : Temperature 70°C
 : Relative humidity <50%
 : Test duration 2h
 (The clearness of the display is constricted)

Test Db: Damp Heat (Cyclic)

IEC 60068-2-30 : Temperature 55°C
 : Relative humidity 95%
 : Cyclic duration (12 + 12 Hours) 2

16.4 MECHANICAL TESTS

Test: Vibration Response Test

IEC 60068-2-6 : (10Hz – 59 Hz) 0.035 mm
 IEC 60255-21-1 displacement
 Class 1 : (59Hz-150Hz) 0.5 gn
 Acceleration
 : No. of cycles in each axis 1

Test: Vibration Endurance Test

IEC 60068-2-6 : (10Hz-150Hz) 1.0 gn
 IEC 60255-21-1 Acceleration
 Class 1 : No. of cycles in each axis 20

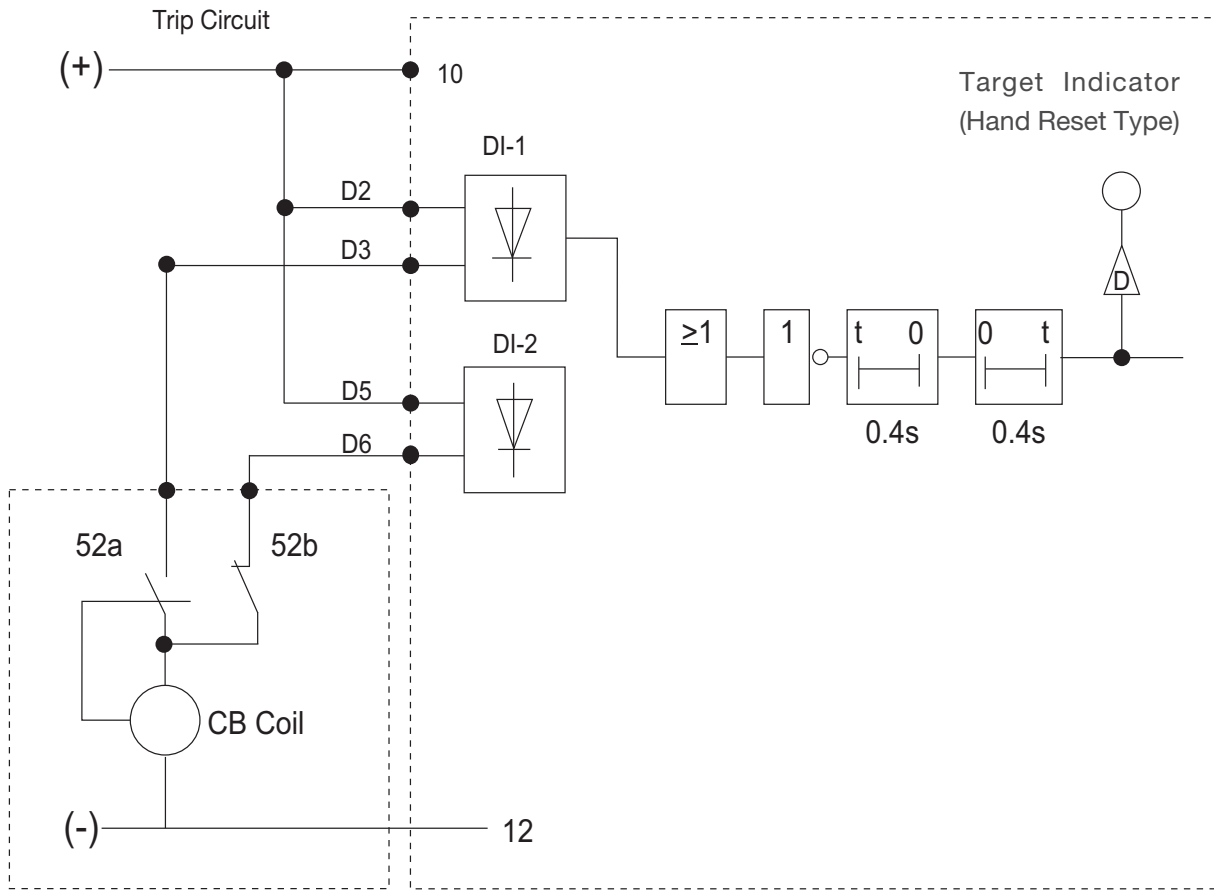
Test: Shock Tests

IEC 60068-2-27 : Shock response test 5 gn, 11 ms, 3 impulses in each direction
 IEC 60255-21-2
 Class 1 : Shock resistance test 15 gn, 11 ms, 3 impulses in each direction

Test: Shock Endurance Test

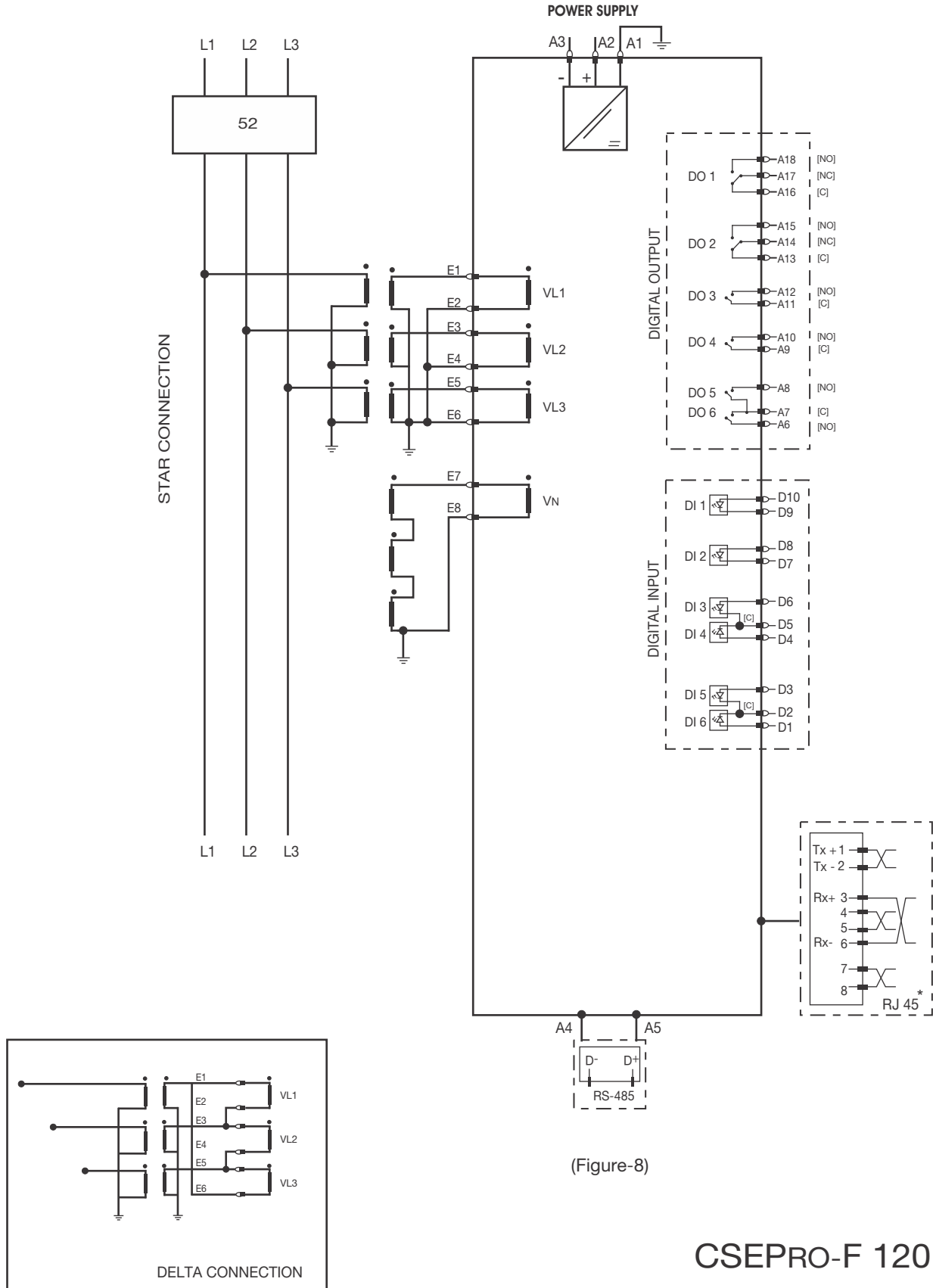
IEC 60068-2-29 : Shock endurance test 10 gn, 16 ms, 1000 impulses in each direction
 IEC 60255-21-2
 Class 1

17.0 Trip Circuit Supervision Diagram



(Figure-7) (Trip Circuit Supervision Function)

18.0 Connection Diagram



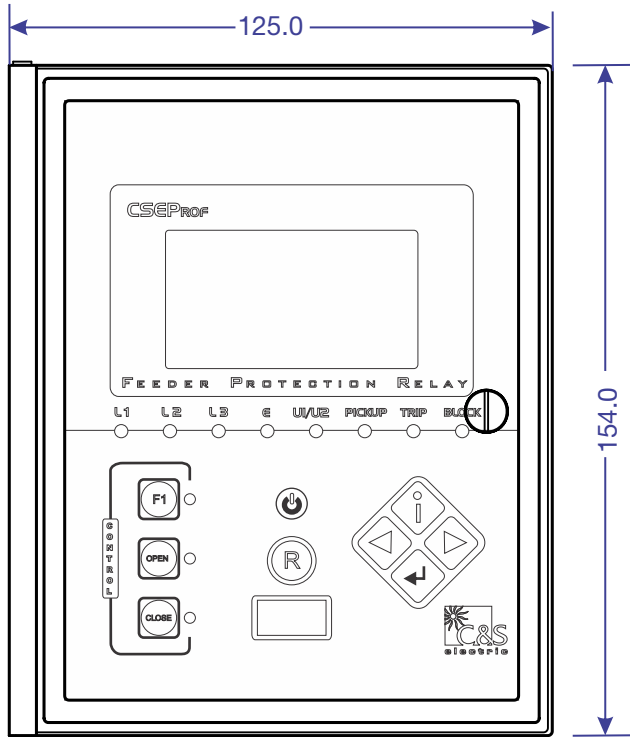
(Figure-8)

CSEPRO-F 120

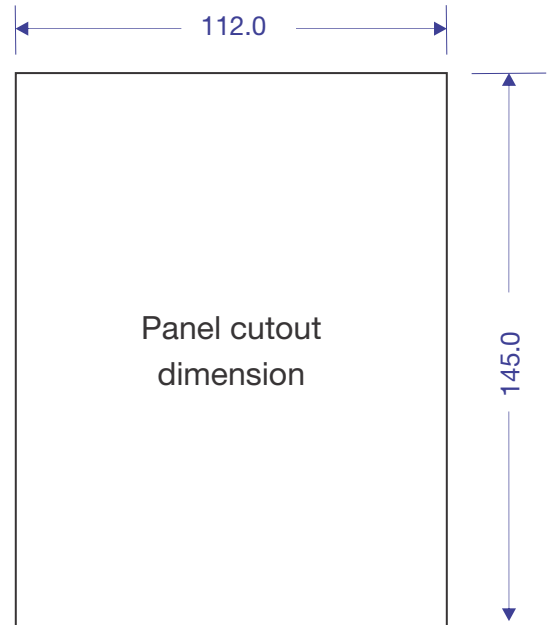
19.0 Dimension Details

(All the dim. are in mm)

Front View

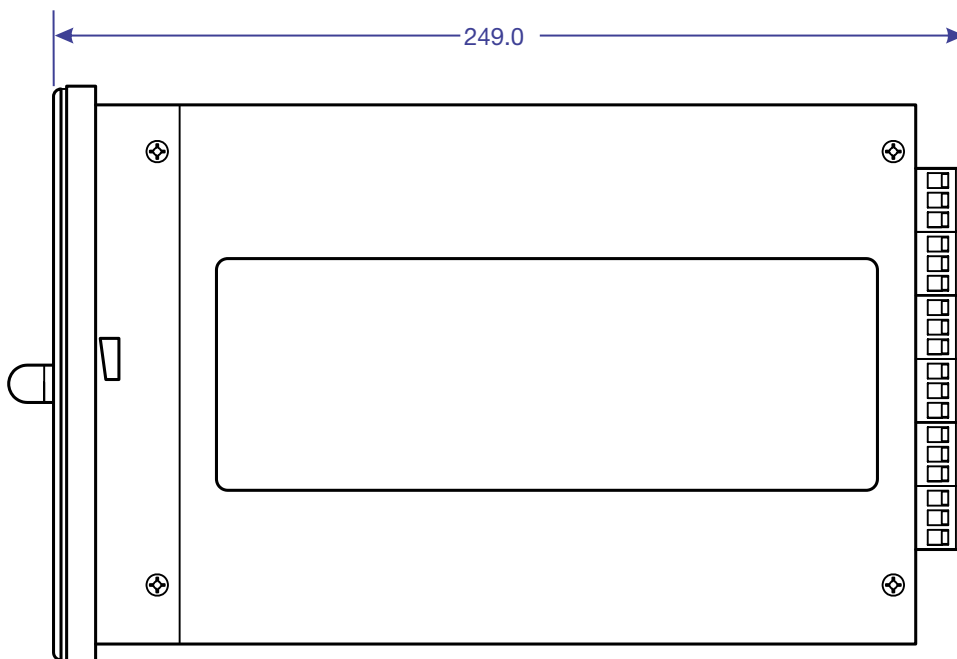


(Figure-9)



(Figure-10)

Side View



(Figure-11)

20.0 Model Selection Table

CSEPRO-F Series	ANSI	F120	F220	F300	F350	F400	F500
CT Inputs		-	4	4	4	-	4
VT Inputs		4	-	3	3	4	4
Opto Inputs (Max)		4	6	6	6	6	6
Output Contacts (Max)		4	6	6	6	6	6
Function Keys/Hot Keys		●	●	●	●	●	●
Programming Logic		-	●	●	●	●	●

Protection							
3 Phase Over-Current	50/51P	-	●	●	●	-	●
Ground Fault	50/51N	-	●	●	●	-	●
Phase Directional	67P	-	-	-	●	-	-
Ground Fault Directional	67N	-	-	-	●	-	-
Sensitive Earth Fault	50/51SN	-	-	-	-	-	-
Restricted Earth Fault	64	-	●	●	●	-	●
Voltage Controlled Over-Current	51V	-	-	●	●	-	●
Negative Sequence Over-Current	46	-	●	●	●	-	●
Thermal Over-Load	49	-	●	●	●	-	●
Under-Current	37	-	●	●	●	-	●
Over/Under Voltage	27/59	●	-	●	●	●	●
Residual Over-Voltage	59N	●	-	●	●	●	●
Negative Sequence Over-Voltage	47	●	-	●	●	●	●
Over/Under Frequency	81O/U	-	-	-	-	●	●
Rate of change of Frequency	81R	-	-	-	-	●	●
Circuit Breaker Failure	50BF	●	●	●	●	●	●
Auto Reclose	79	-	●	●	●	-	●
Broken Conductor	46BC	-	●	●	●	-	●
Cold Load Pick-up		-	●	●	●	-	●
Inrush Blocking		-	●	●	●	-	●
Trip Circuit Supervision	74TC	●	●	●	●	●	●

Communication							
Front (USB)		●	●	●	●	●	●
RS-485 Modbus		●	●	●	●	●	●
Modbus on Fiber Optics		○	○	○	○	○	○
RJ-45 Modbus TCP/IP		○	○	○	○	○	○
IEC 60870-5-103 on Fiber Optics		○	○	○	○	○	○
RJ-45 IEC 60870-5-101		○	○	○	○	○	○
RS-485 IEC 60870-5-103		○	○	○	○	○	○
RJ-45 IEC 61850		○	○	○	○	○	○
SNTP-Time Synch RJ-45		○	○	○	○	○	○
Web Server on RJ-45		○	○	○	○	○	○

○ Optional-Based on ordering information.

(Table-21)

21.0 Ordering Information

CSEPRO-F-120 - X - X - X

PT Secondary	
110V	1
230V	2
400V	3

Rear Communication Protocol	
MODBUS on RS-485	M
IEC 60870-5-103 on RS-485	I 103
IEC 61850 on Ethernet	I 650
MODBUS on TCP/IP RJ45	MT

AUXILIARY SUPPLY	
18 - 60V DC	L
85-280V AC / 110-300V DC	H

Example : CSEPROF-120-1-M-L

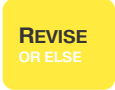
Revision History

S.No.	Rev.No.	Details	Date
01	07	Inclusion of TCS Diagram	05.08.14

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Issue Date: 18.07.12
 Rev. No: 07
 Rev. Date: 06.08.14

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