We touch your electricity everyday!

# Reference Guide




C&S electric

Protection & Control

# We touch your electricity everyday!

C&S Electric Limited is amongst the leading suppliers of electrical equipment in India. It's wide range of electrical and electronic products find application in power generation, distribution, control, protection & final consumption.

Major National and International Certification agencies have repeatedly approved our products for quality assurance system.

C&S electric

## Protection & Control Division

The most versatile range of numeric relays for power protection, control & monitoring for power plants, substations, generators & industries.

We stand strong today, in continuation of the C&S Group philosophy of an Indian company with world-class quality products and cutting edge technology design. We are capable of offering comprehensive range of products to its customers. These can be basically classified as Basic, Functional & Hitech Relays based on the technology transferred from SEG Germany and the Integrated range in partnership with GE Multilin of Canada. Our unit GE- VAR Provides world class control & protection solution with a focus on generator and transmission vertical of the power sector.

Through these different ranges we can offer protections right from 415V distribution to 400KV feeder, from a small generator to a transmission line. In addition, we are geared up for challenges in offering systems for C&R Panels and Substation Automation.

The manufacturing facility are located at the heart of the capital city New Delhi & Noida, India.

## Vision

- Our focus is to ensure customers satisfaction by fulfilling their needs and expectations with supply of state-of-the-art, internationally recognized quality products.
- It is our continued endeavour to "do things right at the first time and every time" ensuring continuous improvement in system and processes, training & development through their active participation and involvement of all the employees and existing users.

## Quality at Source

- The ISO 9001:2008 certificate from DNV reiterates that the standard of design, manufacturing and service provided by us follow most stringent control and supervision procedures.
- Our R&D facilities stand recognized by Govt. of India for the high quality of developments & new products. We are member of FITT (Foundation for Innovation and Technology Transfer) a prestigious technical body run by IIT, New Delhi, India.

ISO 9001:2000 REGISTERED FIRM

NABL

GOVERNMENT OF INDIA
MINISTRY OF SCIENCE & TECHNOLOGY
Department of Scientific & Industrial Research,
Technology Bhavan, New Mehrauli Road, New Delhi -110 016
R&D RECOGNITION BY GOVT. OF INDIA

MEMBER OF FITT

CPRI

# Numerical Protection Relays

## Features

- Fully numerical protection
- High performance
  - High speed Tripping
- - Multi-functions
- High reliability
  - Self supervision
  - CT shoting facility
- Compact and Powerful
  - Draw out modular Design
  - Compact size
  - IP54 Protection
- Metering and recording functions
  - Metering of electrical parameters
  - Disturbance record
  - Event &fault record with time stamp
- Configurable Input, Outputs and programmable logic
- USB/RS232/RS485/RJ45/Fiber optic ports
- Communication with substation automation system
- IRIG-B port for external clock
- Modbus/IEC60870-5-103/IEC61850
- ERTL/CE Certified Design

## Product Line -Up

CSE Series offers the solution for protection for industrial transformer, motor, generator, feeder & distribution system

### CSEZen: Multifunction Comprehensive Smart Protection

| | Type | Description |
|---|---|---|
| HI-Tech Range | ZenF560 | Feeder Protection |
| | ZenG460 | Generator Protection |
| | ZenT370 | Transformer Protection |
| | ZenM410 | Motor Protection |

### CSEPro: Compact & Modular Multifunction Protection

| | Type | Description |
|---|---|---|
| MID Range | ProF200 | Feeder Protection |
| | ProG220 | Generator Protection |
| | ProT140 | Transformer Protection |
| | ProM260 | Motor Protection |

### MR/IR Series for single Protection function

| | Type | Description |
|---|---|---|
| MID Range | MRI | Current Protection |
| | MRU | Voltage Protection |
| | MRF | Frequency Protection |
| | MRP | Power Direction |
| | MRM | Motor Protection |

| | Type | Description |
|---|---|---|
| LOW Range | IRI-Pro | Current Protection |
| | IRU-Pro | Voltage Protection |

## Specialized Protection and Control

### Self Power Relay for RMU:-

| Type | Description |
|---|---|
| CSDPR | Protection: 50/51/50N/51N / CBFP<br>Powered by USB / Battery /Solar Power/ CT / VT<br>Potential & Potential Free O/P |
| CSPR1 | Protection : 50/51/50N/51N<br>CT Powered Protection |

### Generator Controller /AMF Family

| Type | Description |
|---|---|
| E-Guard | Engine Guard (Genset starter) |
| EC-RXA | control of emergency and stand-by power Relay |
| EC2 | Engine Control Relay |
| EGen+ | Advance AMF Engine controller |
| LB1 | Load Balancing & Management Relay |
| Sr1 | Automatic Synchronizing Relay |

# CSE Generator and Transformer Series

| | FEATURES | ANSI | ProG220 | ProT140 | ZenG380 | ZenT460 |
|---|---|---|---|---|---|---|
| PROTECTION & CONTROL | Volts/Hz(Over excition) | 24 | • | -- | • | • |
| | Phase/ground/ undervoltage | 27P/G | • | -- | • | • |
| | Directional Power | 32 | -- | -- | • | -- |
| | Undercurrent | 37 | • | -- | • | -- |
| | Loss of field/Under excitation | 40 | • | -- | • | -- |
| | Current unbalance | 46 | • | • | • | • |
| | Voltage phase reversal | 47 | -- | -- | • | -- |
| | Thermal overload | 49 | -- | -- | • | -- |
| | Phase/ground/neutral Overcurrent_IOC | 50P/G/N | • | • | • | • |
| | Phase/ground/neutral Overcurrent_TOC | 51P/G/N | • | • | • | • |
| | Voltage restraint overcurrent | 51V | -- | -- | • | • |
| | Breaker Failure | 50BF | • | • | • | • |
| | Overvoltage phase/ Ground/Neutral | 59P/G/N | • | -- | • | • |
| | 100% Stator earth Fault | 27TN/59N | -- | -- | • | -- |
| | Voltage Unbalance | 60V | • | -- | | • |
| | Directional overcurrent phase/Ground | 67P/G | -- | -- | • | -- |
| | Under/Overfrequency | 81U/O | -- | -- | • | • |
| | Rate of Change of Frequency | 81R | -- | -- | • | -- |
| | LockOut | 86 | • | -- | • | • |
| | Current Differential | 87G | -- | • | -- | • |
| | Harmonic Restraint | | • | • | • | • |
| | Restricted Ground Fault | 87RGF | -- | • | -- | • |
| | VT Fuse Failure | VTFF | -- | -- | • | • |
| | CT Ratio Correction | | • | • | -- | • |
| | Interposing Compensation | | • | • | -- | • |
| AUTOMATION | Contact inputs(Max) | | 6 | 6 | 8/16 | 8/16 |
| | Contact output (Max) | | 6 | 6 | 16 | 16 |
| | Analog inputs | | 2 | 2 | 8/16 | 8/16 |
| | Analog Outputs | | 2 | 2 | 4 | 4 |
| | Programmable Logic | | -- | -- | • | • |
| | Trip coil Supervision | | • | • | • | • |
| | User-Programmable LED's | | -- | -- | • | • |
| | User Programmable PushButtons | | • | • | • | • |
| MONITORING & METERING | Current | | • | • | • | • |
| | Voltage | | • | -- | • | • |
| | Frequency | | • | -- | • | • |
| | Power Factor | | • | -- | • | -- |
| | Power Real,Reactive,Apparent | | • | -- | • | -- |
| | Energy | | -- | -- | • | -- |
| | Event Recorder | | • | • | • | • |
| | Oscillography | | • | • | • | • |
| | Fault Record | | • | • | • | • |
| COMMS | USB/RS 232/RS485 communication | | • | • | • | • |
| | Ethernet communications | | • | • | • | • |
| | Fiber Optic | | • | • | • | • |
| PROTOCOLS | Ethernet | | • | • | • | • |
| | Modbus protocol | | • | • | • | • |
| | IEC 60870-5-103 protocol | | • | • | • | • |
| | IEC61850 protocol | | -- | -- | • | • |
| | Peer-to-peer communications (GSSE/GOOSE) | | • | • | • | • |
| | Simple Network timesync protocol | | -- | -- | • | • |
| | IRIG-B input | | -- | -- | • | • |
| | GPRS/GSM | | -- | -- | • | • |

Generator Protection

Transformer Protection

## Generator and Transformer Protection

### CSEZenG380

The ZenG380 Generator protection system provides complete protection of small to medium sized generators.

### CSEProG220

The ProG220 Generator protection provides comprehensive protection for medium & large generator. The ProG220 has specified for industrial environments including a draw-out case.

### CSEZenT460

The ZenT460 transformer protection system is designed for various power transformer applications, inducing auto-transformer, generator step up transformer, split-phase, angle regulating trans-formers and reactors. Uses multiple current and voltage inputs to provide primary protection and back up protection of transformers including differential, ground differential phase neutral and ground overcurrent, under and over voltage under and over frequency. Over fluxing and breaker failure protection also provides protection of transformer.

### CSEProT140

The ProT140 transformer protection relay, suitable for application on small, medium and large power transformers. ProT140 can be applied on two winding and transformer. uses multiple current primary protection and back up protection of transformers, including differential ground differential phase natural and ground overcurrent over fluxing The ProT140 also has specific feature for industrial environment, including a draw-out case to limit downtime during maintenance.

# CSE Motor Protection Series

| | FEATURES | ANSI | ProM260 | ZenM410 |
|---|---|---|---|---|
| PROTECTION & CONTROL | Thermal Overload | 49 | • | • |
| | Voltage Dependant Overload Curves | 51V | - | • |
| | Jogging Start/ Starts-Per-Hour | 66 | • | • |
| | Incomplete Sequence Protection | 48 | • | • |
| | Reduced Voltage Starting | 19 | - | • |
| | Emergency Restart | - | • | • |
| | Jam/Stall | 51R | • | • |
| | Phase, Ground, Sensitive Ground,Neutral_IOC | 50P/G/SG/N | • | • |
| | Phase, Ground, Sensitive Ground_TOC | 51P/G/SG/ | • | • |
| | Current -Differential | 87M | - | • |
| | Current Unbalance | 46 | • | • |
| | Loss of Load/Undercurrent | 37 | • | • |
| | Phase, Neutral Overvoltage | 59P/N/X | - | • |
| | Phase, Undervoltage | 27P/X | - | • |
| | Negative Sequence Over voltage | 59_2 | - | • |
| | Voltage Transformer Fuse Failure | VTFF | - | • |
| | Phase Reversal | 47 | - | • |
| | Under/ Over frequency | 81U/O | - | • |
| | Reverse Power | 32R | - | • |
| | Reactive Over Power | | - | • |
| | Power Factor | 55 | - | • |
| | RTD Over temperature | 49 | - | • |
| | Thermistor Over temperature | - | • | • |
| | Breaker Failure | 50BF | - | • |
| AUTOMATION | Contact Inputs (Max) | - | 6 | 16 |
| | Contact Outputs (Max) | - | 6 | 16 |
| | Analog Inputs (Max) | - | 2 | 4 |
| | Analog Outputs (Max) | - | - | 4 |
| | RTD Inputs (Max) | - | - | 4 |
| | Thermistor Input | - | - | 2 |
| | Programmable Logic | - | - | • |
| | Trip / Coil Supervision | - | • | • |
| | User-Programmable LED's | - | - | • |
| | User-Programmable Push Buttons | - | • | • |
| | Digital Counters | - | - | • |
| | Remote Start / Stop Via Communications | - | • | • |
| | Under Voltage Auto-Restart | - | - | • |
| MONITORING & METERING | Current | - | • | • |
| | Voltage | - | - | • |
| | Frequency | - | - | • |
| | Power – Real | - | - | • |
| | Power – Apparent / Reactive | - | - | • |
| | Power Factor | - | - | • |
| | Demand – Current, MW, MVA, Mvar | - | - | • |
| | Event Record | - | • | • |
| | Oscillography Record | - | • | • |
| | Fault Reports | - | • | • |
| | Thermal Capacity Used | - | • | • |
| | Trip Counters | - | • | • |
| | Motor Start Data Logger. | - | • | • |
| COMM | USB/RS232/RS485 | - | • | • |
| | Communications | - | • | • |
| | Ethernet RJ45 | - | • | • |
| | Fiber Optic | - | - | • |
| PROTOCOL | Ethernet / TCP-IP | - | • | • |
| | Modbus Protocol | - | • | • |
| | IEC61870-5-103 Protocol | - | • | • |
| | IEC61850 Protocol | - | - | • |
| | Peer-to-Peer Communications (GSSE/GOOSE) | - | - | • |
| | Simple Network Timesync Protocol | - | - | • |
| | IRIG-B Input | - | - | • |
| | GPRS/GSM | - | - | • |

Motor Protection

Motor Controller

## Motor Protection and control

### CSEZenM410

Comprehensive Motor protection and monitoring three- phase motors and their driven equipment.

The ZenM410 Motors protection & management relay is available with optional RTD module.

### CSEProM260

Protection for industrial motors protection & driven equipment

The ProM260 Motor Relay detects all type of faulty conditions of the motor. This Relay is available in draw-Out enclosure.

### IMC (Intelligent Motor Controller)

Integrated process and electrical control with protection

The IMC Controller can be used in applications where integrated process control with protection for low voltage motors is required. This controller replaces relays, meters, panel indicators and reduces field wiring.

### CSMPM (Digital Controller)

Digital Motor Protection relay for LV application

Multiple protection in small & economical version.

# CSE Distribution Feeder Protection Series

| | FEATURES | ANSI | ProF200 | ProC240 | ZenF540 |
|---|---|---|---|---|---|
| PROTECTION & CONTROL | Undervoltage Phase/Ground | 27 P/G | - | • | • |
| | Directional Power | 32 | - | - | • |
| | Directional Phase/Neutral/Ground | 67 P/N/G | • | • | • |
| | Breaker Failure | 50BF | • | • | • |
| | Phase/Neutral/Ground/Negative Seq_IOC | 50 P/N/G_2 | • | • | • |
| | Sensitive Ground | 50SG | • | • | • |
| | Phase/Neutral/ Ground/Negative Seq_ TOC | 51 P/N/G | • | • | • |
| | Sensitive Ground | 51SG | • | • | • |
| | Overvoltage,phase/Neutral/Negative seq | 59 P/X/N | - | • | • |
| | Auto Recloser | 79 | • | • | • |
| | Under frequency | 81U | - | • | • |
| | Over frequency | 81O | - | • | • |
| | Rate of Change of Frequency | 81D | - | - | • |
| | Broken Conductor Detection | BC | • | • | • |
| | Voltage transformer Fuse failure | - | - | • | • |
| | Cold load pickup | - | • | • | • |
| | Harmonic Block | 68 | • | • | • |
| | Thermal Overload | 49 | • | • | • |
| AUTOMATION | Setting groups | | 2 | 2 | 4 |
| | Contact inputs | | 6 | 6 | 16 |
| | Contact output | | 6 | 6 | 16 |
| | User programmable push Button | - | • | • | • |
| | Graphical Display/alphanumeric | - | • | • | • |
| | Trip/Close coil Supervision | 74TC | • | • | • |
| | Breaker control | - | • | • | • |
| | User programmable LEDs | - | - | - | • |
| | Digital counters | - | - | - | • |
| | Analog inputs/Outputs(Up to) | - | - | - | 2 |
| MONITORING & METERING | Current | - | • | • | - |
| | Voltage | - | - | • | - |
| | Power factor | - | - | - | - |
| | Real,reactive&apparent power | - | - | - | - |
| | Frequency | - | - | • | - |
| | Event record | - | • | • | • |
| | Oscilographic record | - | • | • | • |
| | THD&Harmonic Meter | - | - | - | • |
| COMMS | RS232/USB | - | • | • | • |
| | RS 485 Port | - | • | • | • |
| | Ethernet | - | • | • | • |
| | Fiber(800nm,1300nm,1500nm) | - | - | - | • |
| PROTOCOLS | ModBus(RTU/TCP/IP) | - | • | • | • |
| | IRIG-B Input | - | - | - | • |
| | TCP/IP | - | - | - | • |
| | Simple Network Time Protocol | - | - | - | • |
| | IEC 60870-5-103 | - | • | • | • |

## Distribution Feeder Protection

### CSEZenF540/320

Comprehensive Feeder protection

The ZenC540/320 a member of the 650 Family of protection relays incorporates protection, control automation and metering in a economical package.

### CSEProF200

Economical feeder protection with auto recloser

Provides comprehensive over current protections with multi-shot recloser ProF200 can also be utilized to provide backup/auxiliary protection for transformers, generators and motors

### CSEProC240

Three phase and ground feeder protection for medium and low voltage

The ProC240 a member of the pro family of protection relay provides primary protection for distribution feeders. The ProC240 has specific features for industrial environments including a drawout case to limit downtime during maintenance

# Basic Range Protection Series

| Products | Application | Function |
|---|---|---|
| **BU1-AC** | Voltage supervision of 1-phase or 3-phase systems. Effective protection of equipment such as generators, shunt capacitors, induction motors etc. against damage due to over/under voltage. | Undervoltage and Overvoltage supervision. |
| **BU1-DC2** | Voltage supervision of DC Systems e.g. battery bank, AVRs etc. | Undervoltage and Overvoltage supervision. |
| **BUA1/BA1** | Supervision of voltage unbalance in 3-phase systems, phase loss, phase sequence,undervoltage and overvoltage. Also available as BA1 with-out over-/under-voltage settings. BA1 has fixed under | |
| **BF1** | Single phase frequency supervision of networks/ generators. Provides overfrequency protection to prime-mover against over speed. Under frequency protection to field windings from excessive current or voltage regulator from over load. | Under frequency and overfrequency supervision. |
| **BI1** | Provides three phase under and overcurrent protection for distribution circuits, generators, transformers and other major components of power system. | |
| **BP1-R** | Detection of reverse power of gensets in parallel operation against prime mover failure. | |
| **BV1** | Supervision of phase loss, phase sequence and undervoltage in three or four wire systems. | Unbalance & phase loss are detected by measurement of amplitude & angle. Undervoltage element trips below 70% of Un and |
| **XM1** | Digital Relay with DIP switches for Motor Protection | Thermal Over-load Locked Rotor, Earth Fault, Short circuit, Negative Phase Sequence Under-Current, Restart Blocking |

| | Products | Protection/Function | Relay Type | Application |
|---|---|---|---|---|
| Synchronising | SR1 | Integrated Synchronising & Regulating Unit | Numeric / Micro-controller | The unit compares and issues impulses for balancing the voltage, frequency & phase angle of generatorwith busbar. Issues output impulse to close circuit breakerwhen these parameters are within preset limits. When used for dead bus, it adjusts frequency and voltage to a preset value. |
| | SY/SP | Synchronising Check Relay for Alternators | Static | Checks the voltages, frequencies & phase angle between two power systems for their pre-set limits for manual synchronising and then only permits for closure of the circuit breaker. |
| | SY1 | Auto Synchronising Relay | Static | Used with UN1 & Fn2. Provides output impulses to close the circuit breaker; when voltages, frequencies & phase angle between 2 power systems within the preset limits. |
| Controllers & Regulators | RW1 | Active or Reactive Rev. Power/ Low forward power relay | Static | Provides protection against primemover failure in-case of parallel operation of generators. |
| | IWE | Definite time Earth fault with low pass filter | Static | Provides earth fault Protection for distribution circuits, generators, transformer and other major components of the power systems. |
| | UN1 | Automatic voltage Balancer | Static | Provides output impulses to AVR for matching incoming generator voltage with busbar voltage. |
| | FN2 | Automatic Frequency Balancer | Static | Provides output impulses to Governor motor for matching incoming generator frequency with busbar frequency |
| | LB1 | Automatic Active & Reactive Load balancing, load control | Numeric / Micro-controller | Measures active and reactive power supplied by generator. Controls governor and AVR to adjust active and reactive power respectively. All units communicate on RS485 serial interface |
| | WLA2 | Automatic or Reactive Load Balancer | Static | Tunit compares the active or reactive load of two parallel running generator. Provides output impulses to governor motor or AVR to match the active or reactive power. |
| AMF | EC-RXA | Generator controller relay | Micro-controller | To start the standby generator in case of mains failure/ Unhealthy. Two operating modes, i.e. Auto, manual. Status displays on LED's |
| | EC2 | Automatic Mains Failure Relay | Micro-controller | To start the standby generator in case of mains failure/ unhealthy . Six operating modes, i.e. Auto manual, test all remote & edit. Faults are displayed on LCP display . two line back lit LCD display & 8 LEDs & metering & status indication |
| | Egen+ | Automatic mains failure relay | Numeric/ Micro-controller | To start the standby generator in case of mains failure. Six operating modes i.e. Metering KWH, Voltage, Current, Power, Energy. 16 DI, 12 DO, GPRS / GSM /SMS/Email/TCP/IP COMM with webserver. |

| | | Feeder Protection | | | | | | | | | | | | | | | | Xmer Generator Protection | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ANSI | IRIPro-V2 | IRI-Pro-D | IRI1-WD | IRI1 | IRI1-1ER | IRI1-2ER | MRI1-I | MRI1-IE | CSU1 | MRI1-IREF | MRI1-IREB | MRI1-IU | MRI1-ITE | MRI3-I | CSI-3 | MRIK3 | MRF2 | MRF3 | IEU1 | IEU1-E | MRU1 | MRN2 | MRN3 | IEP1 | MRP2 | MRS1 | MRQ1 | MRR1 | MRO1 | MRN3 | IRD1 | MBA | IRU-Pro |
| **Protection Functions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Time overcurrent Protection | 50/51 | ● | ● | ● | ● | - | - | ● | ● | ● | - | - | - | - | ● | ● | ● | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - |
| Earth Fault Protection Standard | 50N/51N | ● | ● | ● | ● | - | - | - | ● | ● | - | - | - | ● | - | ● | ● | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - |
| Directional Time overcurrent protection | 67 | - | - | - | - | - | - | - | - | ● | ● | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Resistance earthed/solidly earthed | | - | - | - | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Earth fault directional feature | 67N | - | - | - | - | - | - | - | - | ● | ● | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Sensitive EF isolated/compensated | 50SN/51SN | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - |
| Voltage controlled O/C prot. | 50V/51V | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Thermal replica | 49 | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - |
| Circuit breaker failure protection | 50BF | - | ● | - | - | - | - | ● | ● | ● | ● | ● | - | - | ● | ● | ● | - | ● | - | - | - | - | ● | - | ● | - | - | ● | - | ● | - | - | - |
| Voltage protection | 27/59 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | ● | ● | ● | - | - | - | - | - | - | - | - | - | ● |
| Residual Voltage | 59N | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | ● |
| Restricted E/F | 64 Ref. | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Frequency protection | 81U/O | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | - | - | - | ● | ● | - | - | - | - | - | - | - | - | - | - |
| Frequency gradient(df/dt) | 81R | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | - | - | - | ● | ● | - | - | - | - | - | - | - | - | - | - |
| Vector surge | 78 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | - | - | - | - | - | - | - | - | - | - |
| Power Direction | 32/37 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | - | - | - | - | - | - | - | - |
| Rolar earth fault/Exciter current protection/ diode failure | 64N/[40/76] | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - | - |
| Negative sequence protection | 46 | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | ● | - | - | - | - |
| Field failure protection | 40 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - | - | - |
| Locked rotor, incomplete start, max. Number of starts, undercurrent | 51/48/66/37 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - |
| Over excitation V/f | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - | - |
| Differential protection | 87T/87G | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - |
| Inrush Stabilisation | 2ND Harmonic | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - |
| Trip circuit supervision | 74 | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - |
| Lockout Relay | 86 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Special and additional functions** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Auto reclosing | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Reset/Blocking | | - | ● | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | ● | ● | ● | - | - | ● | ● | ● | ● | ● | - | - | - | - |
| Digital I/P | | - | 4 | - | - | - | - | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 2 | 4 | 2 | 4 | - | - | 2 | 2 | 4 | - | 2 | 2 | 2 | 2 | 2 | 4 | - | - | - | - |
| Time + Date | | ● | ● | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | - | ● | - | - | - | - | ● | - | - | - | - | - | - | ● | - | ● | - | ● |
| Parameter sets | | ● | ● | ● | - | - | - | ● | ● | - | ● | ● | - | - | ● | ● | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | - | - | - | ● |
| Fault recorder | | ● | ● | ● | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | ● | ● | ● | - | ● | ● | ● | ● | ● | ● | - | - | - | ● |
| Disturbance recorder | | - | - | - | - | - | - | - | - | - | - | - | - | - | ● | ● | ● | - | ● | - | - | - | - | ● | - | - | - | - | - | - | ● | - | - | - | - |
| Output Relay matrix | | ● | ● | - | - | - | - | ● | ● | ● | ● | ● | ● | - | ● | ● | ● | ● | ● | - | - | ● | ● | ● | - | ● | ● | ● | ● | ● | ● | - | - | - | ● |
| Communication RS 485 | | - | ● | - | - | - | - | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | - | - | ● | ● | ● | - | ● | ● | ● | ● | ● | ● | - | - | - | - |
| Communication RS 232 | | ● | ● | - | - | - | - | - | - | ● | - | - | - | - | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● |
| Event Record | | - | ● | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | ● |

# World Class Protection Systems

Our offerings of Protection and Control solutions are complemented through our venture with GE Multilin of Canada who are renowned for their Relays and are market Leaders in this field throughout the World. Our Unit GE – VAR (Value adding Reseller) provides world class Control and Protection solutions using the GE Multilin Relays at an affordable prices with a focus on Generation and Transmission Verticals of the Power Sector.

The growth and deregulation of the Power Sector and the ensuing complexity generates an urgent requirement to ensure the system reliability and availability. The venture brings world class tried and tested IEC 61850 compliant Protection, Control and Automation technology, an enabler for Smart Grid & Process Bus, from GE coupled with the Design, Engineering, manufacturing, Testing and commissioning expertise from C&S Electric. C&S Electric with its deep understanding of the Indian Power Scenario and technology from GE is singularly poised to provide value added solutions and services to its ever expanding customer base.

The list of our valued customers includes most of the Electricity Boards, NTPC, Hydel units & private industry.

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**C&S Electric Ltd.**

44, Okhla Industrial Estate, Phase -III, New Delhi -110 020
Tel : +91 11- 66602414, 30883745/54/64 Fax: +91 11- 6660 2413 E-mail: cspc@cselectric.co.in

Corporate Office : 222, Okhla Industrial Estate, New Delhi -110 020
Tel : +91 11- 3088 7520 - 29, Fax: +91 11- 2684 7154, 2682 9063