CSC-101

Line Distance Protection IED

Product Guide

BEIJING SIFANG AUTOMATION CO., LTD.

Version：V3.01

Issued Date：2025.11

Note: the company reserves the right to amend the instruction. If equipment does not agree with the instruction at anywhere, please contact our company in time. We will provide you with corresponding service.

This document has been carefully checked. If the user nevertheless detects any errors, he is asked to notify us as soon as possible.

The data contained in this manual is intended solely for the product description and is not to be deemed to be a statement of guaranteed properties. In the interests of our customers, we constantly seek to ensure that our products are developed to the latest technological standards as a result; it is possible that there may be some differences between the hardware/software product and this information product.

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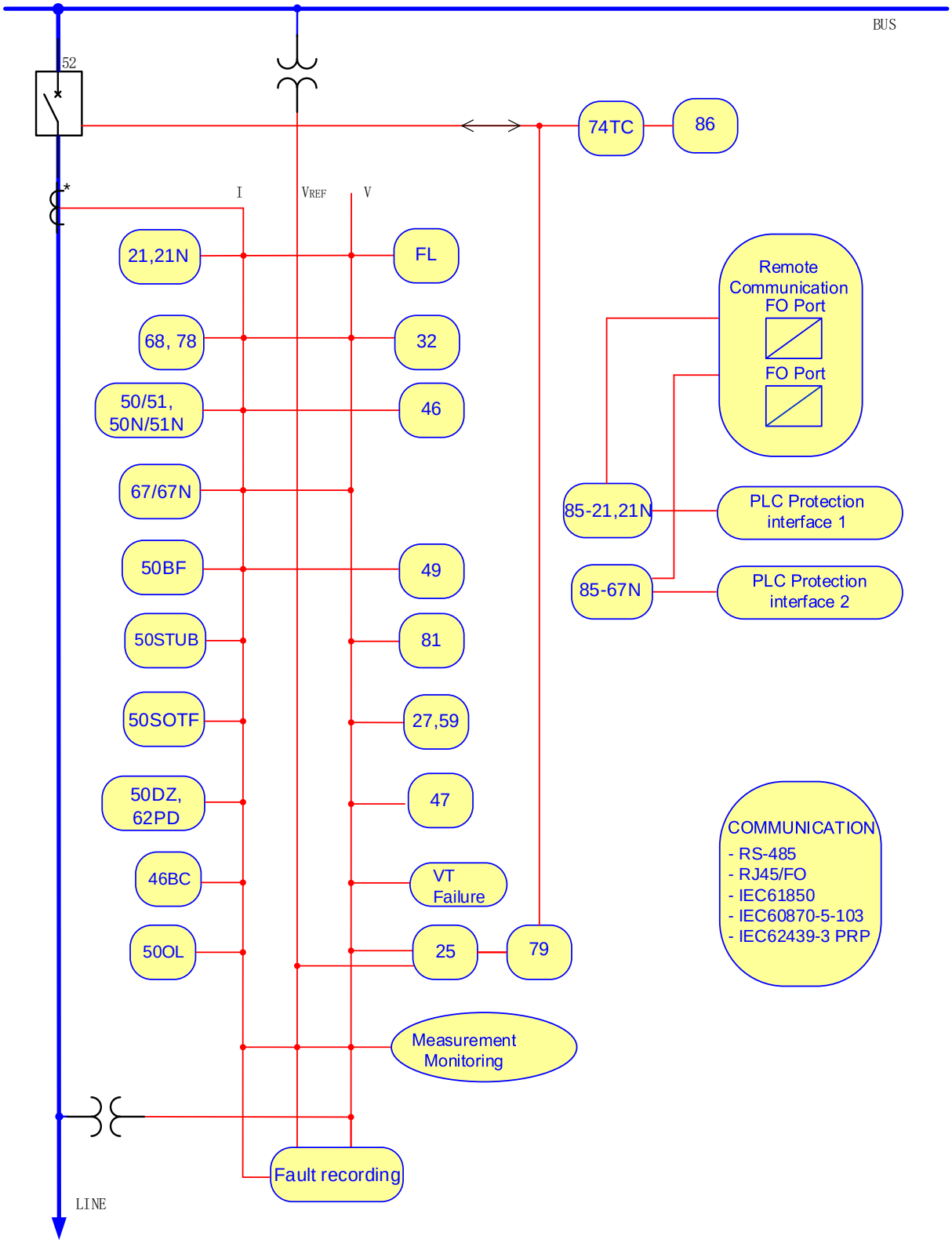
CSC-101 Line Distance Protection IED

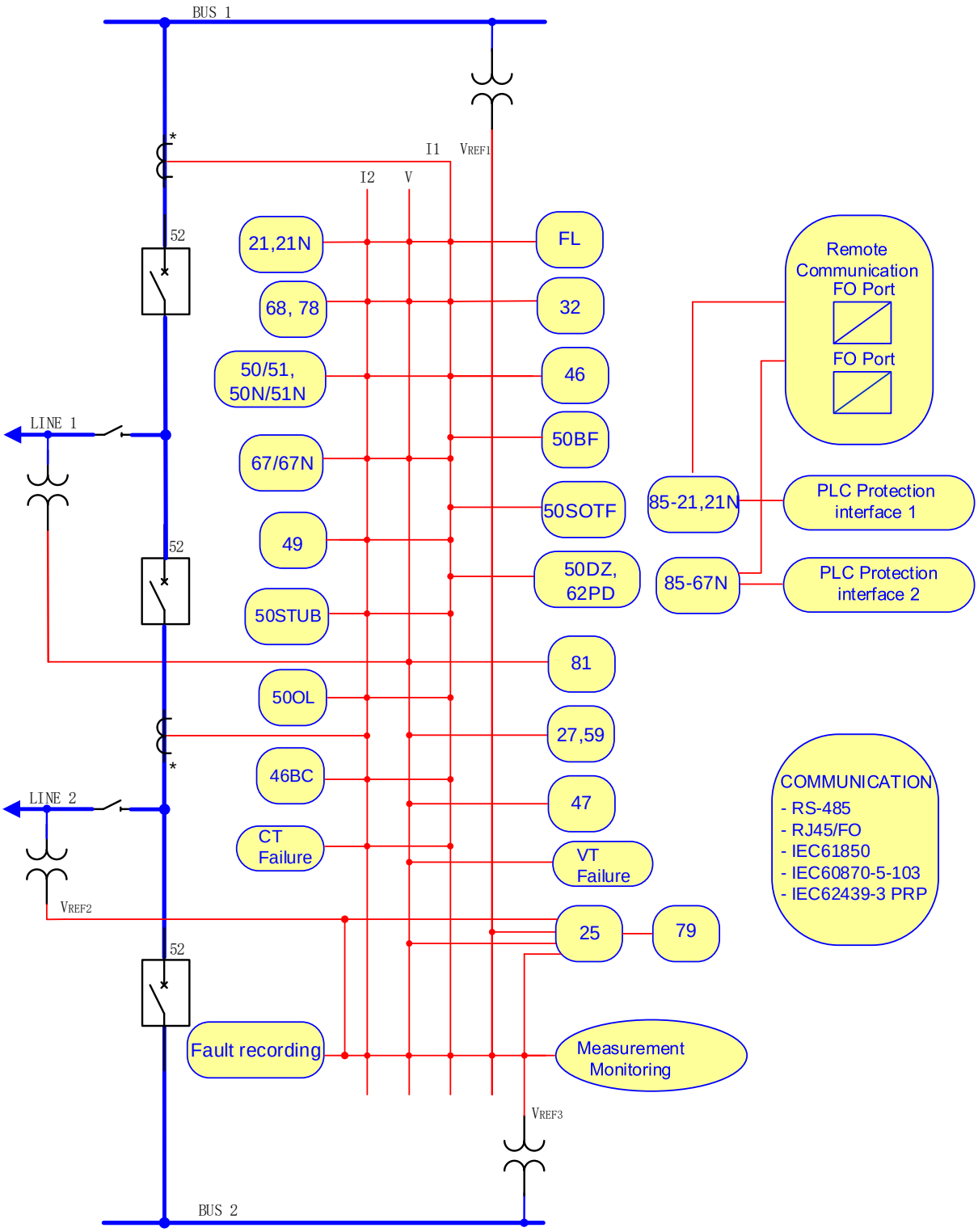
CSC-101 is selective, reliable and high speed protection IED for transmission line, with powerful capabilities to cover following applications:

- For 35kV to 1000kV transmission lines, W/O serial compensation equipment for extra-long lines , or W/O parallel lines, heavy loaded lines, extreme long lines or short lines;
- Support two groups of CT inputs of multi-breaker arrangement;
- Fully proven protection functions library;
- Customized protection function scheme, all in one or main protection unit only
- Mixable Binary inputs & output relays / GOOSE inputs or outputs;
- Robust hardware with excellent EMC performance and IP54 protection under -40℃ to +70℃ operating temperature;

Application



Application



Function

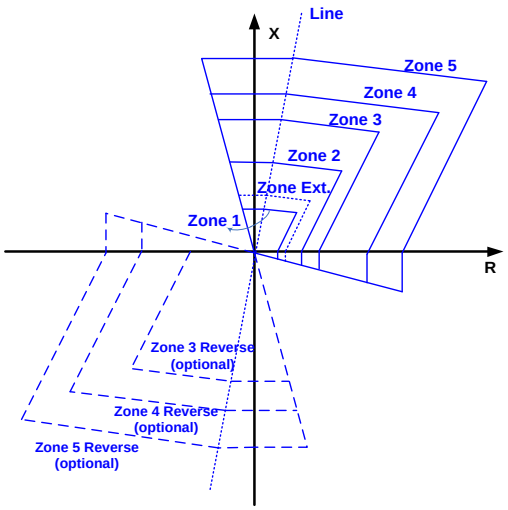
Function	ANSI Code	Qty.	Description
Distance protection	21/21N	1	5 zone + 1 extended zone Polygonal characteristic and MHO characteristic Load encroachment Power swing blocking
Tele-protection scheme	85-21/21N 85-67N	1	PUTT, POTT, Blocking mode, DTT Permissive and blocking mode，DTT
Directional overcurrent protection	50,51,67	1	4 stages; Forward/reverse/non-directional; Definite time/ Inverse time characteristic; Inrush block
Directional earth fault protection	50N, 51N, 67N	1	4 stages; Forward/reverse/non-directional; Definite time / Inverse time characteristic; 3 phase current inputs or single current input
Negative sequence overcurrent protection	46	1	4 stages; Definite time/ Inverse time characteristic
Thermal overload	49	1	2 stages for alarm; 1 stage for tripping
Overvoltage	59	1	4 stages; Definite time / Inverse time characteristic
Undervoltage	27	1	4 stages; Definite time / Inverse time characteristic
Negative sequence overvoltage	47	1	4 stages; Definite time / Inverse time characteristic
Overpower protection	32	1	2 stages
Out of step protection	78	1	1 stage for alarm; 1 stage for tripping
Under frequency protection	81U	1	4 stages
Over frequency protection	81O	1	4 stages
Frequency rate protection	81DF	1	4 stages
Breaker failure protection	50BF	1	2 stages; DTT in stage 2
Dead zone protection	50DZ	1	1stage；DTT
Poles discrepancy protection	62PD	1	1stage
Broken conductor detection	46BC	1	1stage
Synchro-check & Energizing check	25	1	
Auto-reclosing	79	2	4 shots
Stub-bus overcurrent protection	50STUB	1	1stage
Switch-on-to-fault protection.	50SOTF	1	1stage
CT secondary circuit supervision		1	

VT secondary circuit supervision	97FF	1	
Disturbance recording		1	Max. 5s in 1 recording, and up to 32 recordings
Trip circuit supervision	74TC		On TCS module
Programmable logic			
Measurement			V, I, F, COSΦ, P, Q, Wp, Wq
Automation			

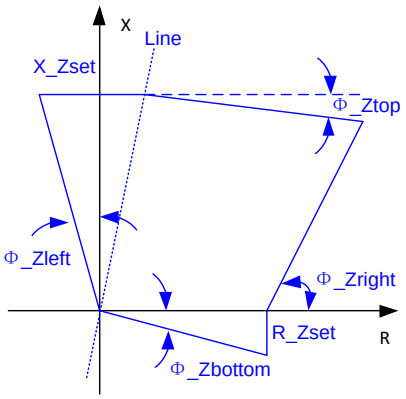
Note 1: the number in "Qty." column is the maximum quantity of function module that can be offered.

21 Distance protection

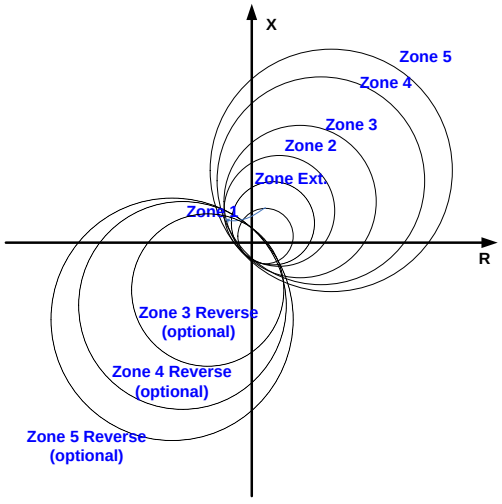
- Full scheme protection with all phase to phase faults and phase to earth faults loops independently for each zones;
- 5 zones + 1 extension zone



- Polygon characteristic

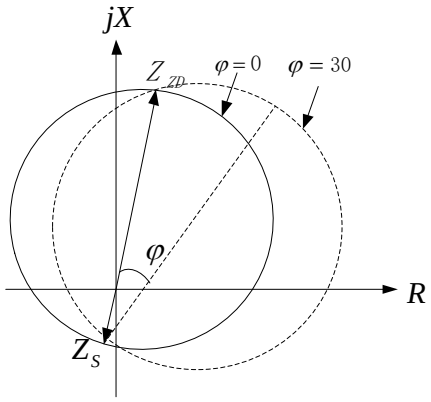


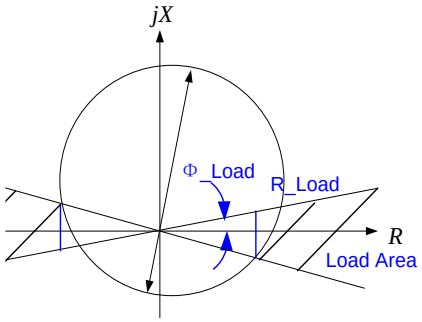
- 5 zones + 1 extension zone



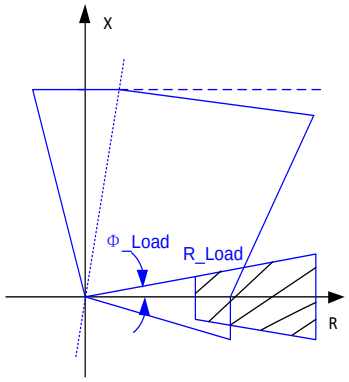
Function

- MHO characteristic





- Load Encroachment



- Power swing blocking logic, which guarantee no wrong operating during power swing, and guarantee fast operating while fault during power swing.

85-21,21N/67N Tele-protection

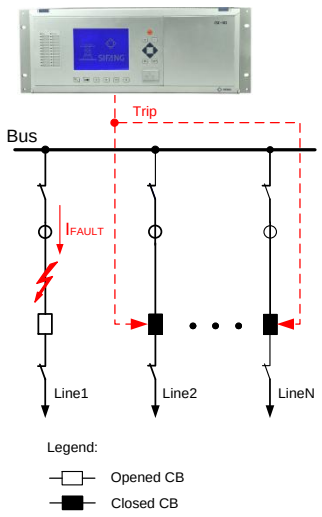
- Based on distance protection element and directional earth fault protection element. The function employs power line carrier （PLC）, or fiber optic channels.
- Support following principle
  - PUTT;
  - POTT;
  - Blocking;
  - DTT;

50DZ Dead zone protection

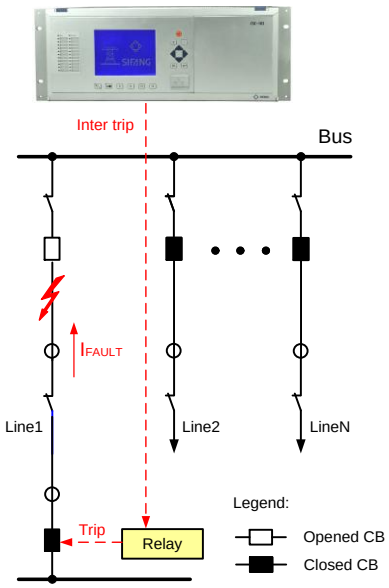
- The IED provides dead zone protection to protect the area between circuit breaker and CT in the case that CB is open.
- Internal/ external initiation
- Self-adaptive for bus side CT or line side CT
- Situation 1: With one bus side CT of feeder

  Once a fault occurs between CT and

breaker, the IED trips the relevant busbar zone CBs, shown as below.



fault. Tripping logic is illustrated below.

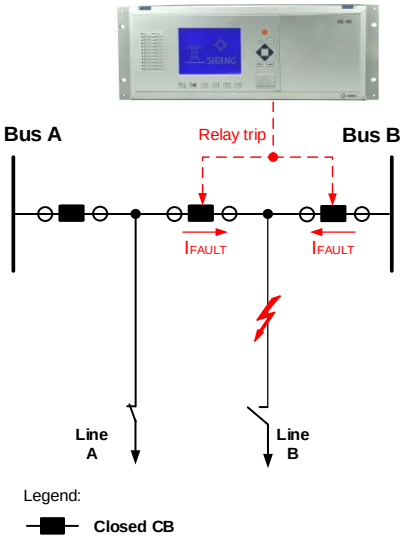


- Situation 2: With one line side CT.

  When a fault occurs between CT and breaker, protection IED sends a transfer trip to remote line end IED to isolate the

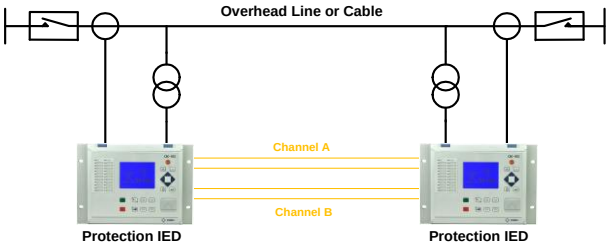
50STUB STUB protection

- The protected zone is between the CTs and the opening disconnector.
- Condition 1: The line side disconnector is open;
- Condition 2: Main line protection IED is out of service.
- The STUB protection is enabled when the open position of the disconnector;
- 1 definite time stage, which related concept is shown below.

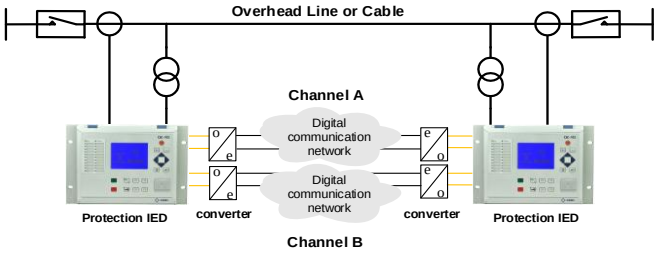


Communication

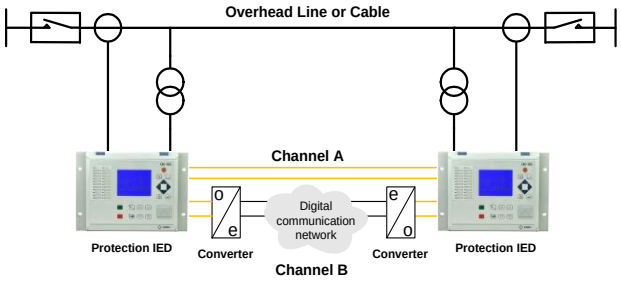
- Up to 2 fiber-optical remote communication ports, work in the redundant transmission route, with advantage of no time-delay channel switch in case of the primary channel broken
- Flexible combinations of the 4 type communication modes with 2 channels
  - Dual directly single mode fiber-optical cable connection mode，duplex LC plug



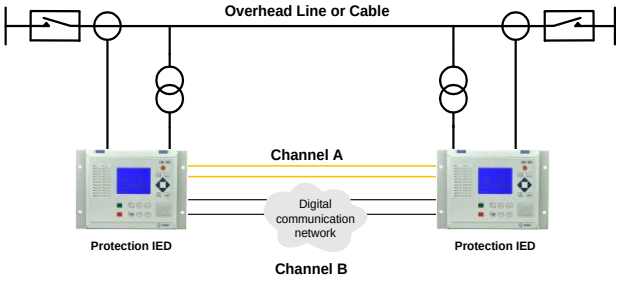
  - Single mode fiber-optical cable connection through dual communication converters with G.703 or G.703E1 interface via SDH/PDH



  - Single mode fiber-optical cable connection ,1 direct connection and 1 converter connection

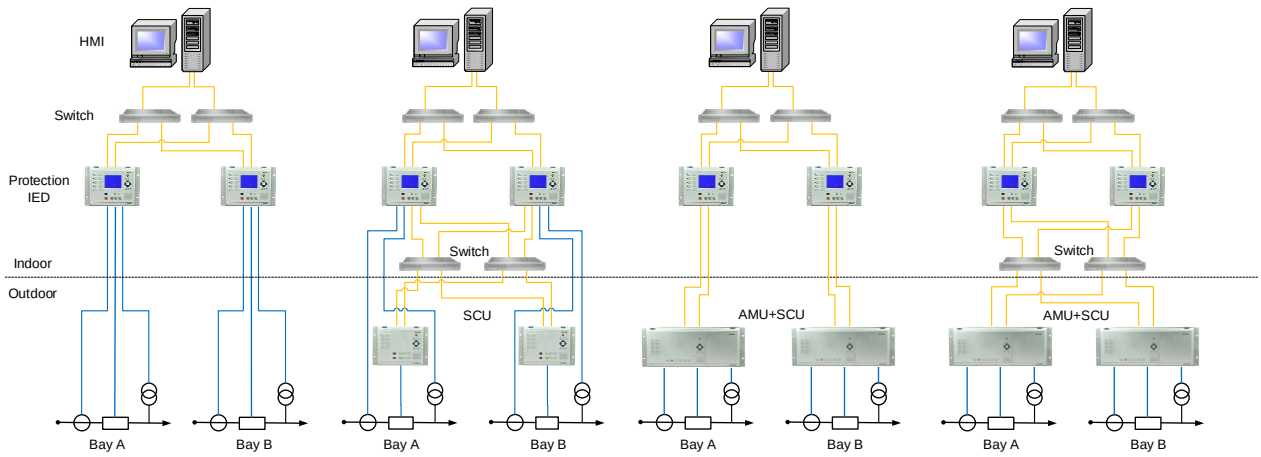


  - 1 single mode fiber-optical cable direct connection and 1 multimode fiber-optical cable connection，LC plug with IEEE C37.94 interface via SDH/PDH



- The distance options of directly single mode fiber-optical cable connection mode:
  - < 40 km;
  - 40 – 60 km;
  - 60-120 km

- Support SV, GOOSE service of process layer application in accordance with IEC61850-8-1, -9-2, -9-2LE,
- Support MMS, GOOSE service of station layer and bay layer application in accordance with IEC61850-8-1,
- Seamless communication by PRP.
- Adaption to the existing automation system with 2 or 3 Ethernet ports or 2 serial communication ports RS-485 in one module
- Support all main protocols, include:
  - IEC 61850-8-1
  - DNP 3.0;
  - IEC 60870-5-103 serial;
  - MODBUS
  - IEC 62439-3 PRP
- Support several time synchronizing way, include:
  - IRIG-B modulated electrical/ optical;
  - Pulse;
  - SNTP;
  - IEEE 1588;
- Proven technology from thousands of operated digital substations;



Station layer: MMS/GOOSE; PRP;
Bay layer: GOOSE; PRP;

Station layer: MMS/GOOSE; PRP;
Bay layer: GOOSE; PRP;
Process layer: Process bus, GOOSE; PRP;

Station layer: MMS/GOOSE; PRP;
Bay layer: GOOSE; PRP;
Process layer: SV/GOOSE; PRP;

Station layer: MMS/GOOSE; PRP;
Bay layer: GOOSE; PRP;
Process layer: Process bus, SV/GOOSE; PRP;

Tools

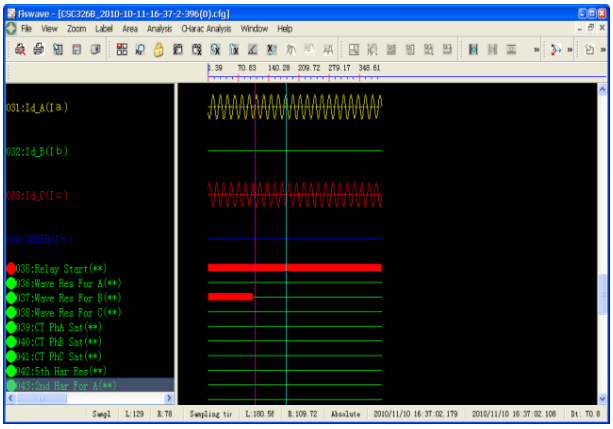
AESP tools

AESP tools is the user-friendly software tool sets. AESP covers all works for the whole life cycle of protection IEDs, include,

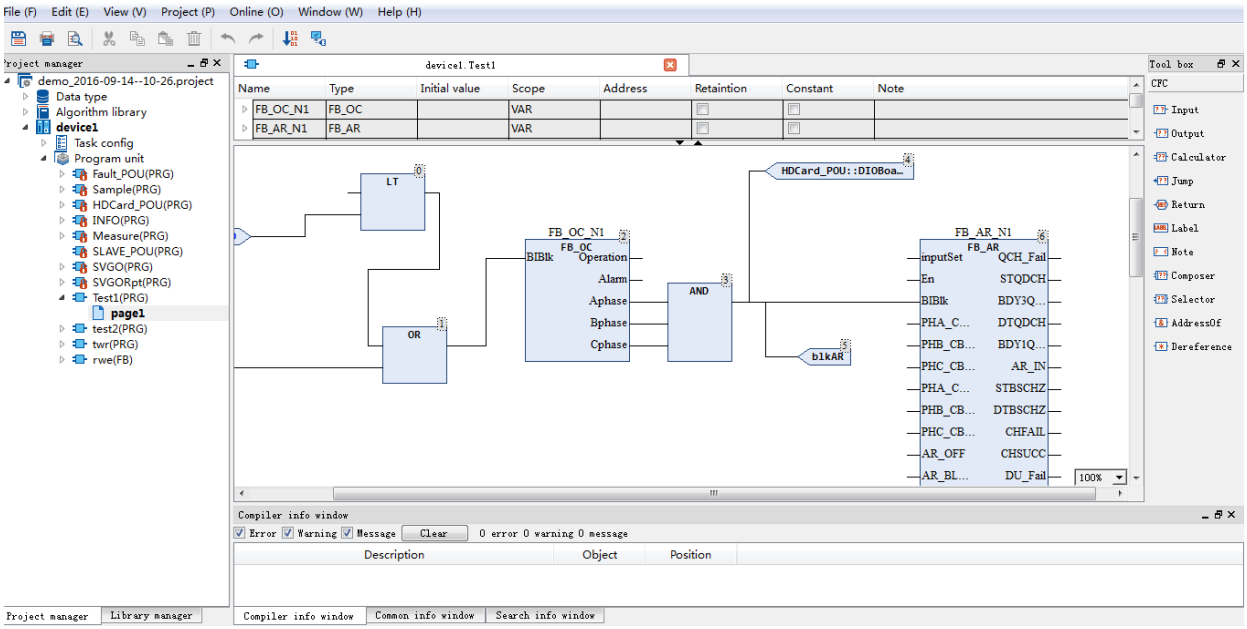
- Setting and parameter
- Disturbance analysis by Fisewave
- Monitoring
- Logic programming by Nuclide
- IED configuration by IO master;
- Single line diagram painter;
- IEC 61850 system engineering manager

Its features are as follows:

- Oriented to IEDs management of whole substation with freely configurable hierarchies based on the substation topology in real project.
- Intelligent validity checks and shadow avoid incorrect input when setting and programming
- Fault analysis with fault records in curves, circle diagrams, vector diagrams, harmonic bar, and protection characteristic diagram graphically and precise data in pointed instant.



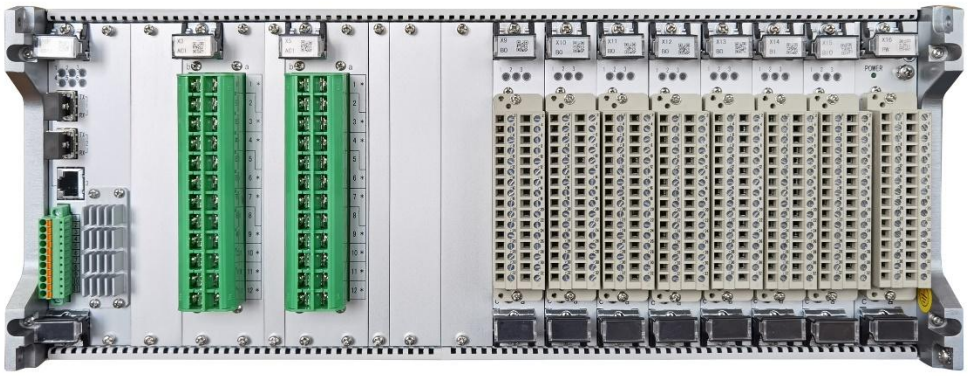
- With integrated logic, the user can set, via a graphic interface, specific functions for the automation of switchgear or substation.
- Password-protected access for different operation and different roles;



Hardware

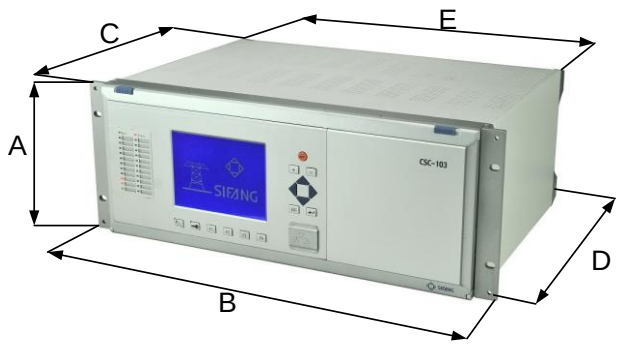
- Up to 8 AC Current Inputs and 6 Voltage Inputs, 1A/ 5A settable;
- Up to 45 Binary Inputs, include independent BIs;
- Up to 92 Output relays, with 5 switchable NO/NC contacts;
- Up to 7 Ethernet optical ports, for SV, GOOSE, MMS and other automation services;
- Up to 3 RJ45 Ethernet ports ;
- Up to 2 RS485 ports;
- 1 IRIG-B / Pulse time synchronization port;
- 1 RJ45 front test port
- 22 programmable LED
- Up to 4 customer defined function key;
- 4U 19” or 4U 1/2 19” case;

Front view of the 4U 19” case



Rear view of the 19” case

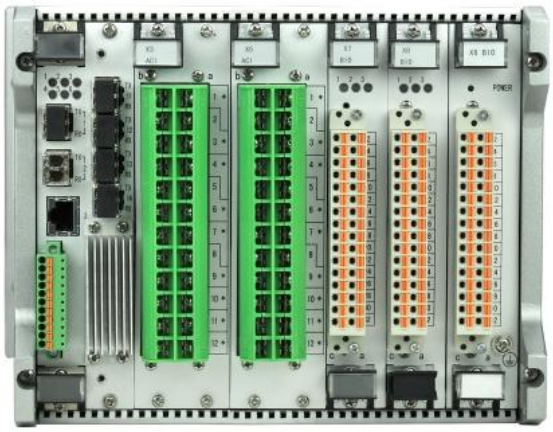
Hardware



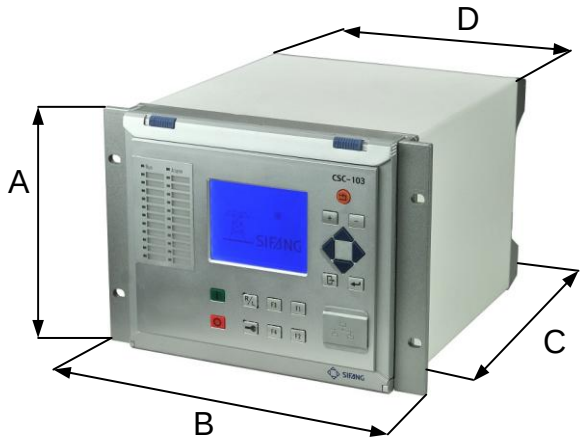
A	177
B	482.6
C	265
D	320
E	437.2
Unit	**mm**

Dimension of the 19” case

Front view of the 4U 1/2 19” case



Rear view of the 1/2 19” case



A	177
B	259.2
C	286
D	226
Unit	**mm**

Dimension of the 1/2 19” case

Specification

AC current measurement

Item	Data
Rated current I_r IEC60255-1	1/5 A, settable
Operating range of protection CT	(0 ~ 100) I_r
Measuring range of protection CT	(0.05 ~ 40) I_r
Reading Accuracy for protection CT	±2.5% I_r or 0.02I_r, at (0.05 ~ 40) I_r
Thermal withstand of protection CT IEC60255-27	4 I_r, continuously; 30 I_r for 30s 100 I_r for 1s
Range for measuring CT	(0.01 ~ 2) I_r
Reading accuracy for measuring CT	±0.5% I_r, at I> I_r ±0.5% I_r, at I≤ I_r
Thermal overload capacity of measuring CT IEC60255-27	4 I_r, continuously; 30 I_r for 30s 100 I_r for 1s
Measurement range for high sensitive CT	0.005A ~ 1.2A
Reading accuracy for high sensitive CT	±0.5% I_r,, at I>10% I_r ±0.5% I_r, at I≤10% I_r
Thermal withstand of high sensitive CT IEC60255-27	3A continuously 100A for 1s
Burden for current (per phase)	≤0.15VA at I_r=1A; ≤0.3VA at I_r=5A
Dynamic thermal overload capacity	250 I_r for 1.5 cycle

AC voltage measurement

Item	Data
Rated voltage $V_{r.ph-ph}$ IEC60255-1	100/110 V_{ac}, settable
Measuring range of VT V_{ph-e}	0.4V ~ 180V
Reading accuracy for VT V_{ph-ph}	＜ ±2.5% setting or 1V
Burden for voltage IEC60255-1	≤ 0.05VA, at $V_{r.\ ph-ph}$ = 110V
Thermal withstand V_{ph-e} IEC60255-27	200V, continuously; 400V for 60s.

Other measurement

Item	Data
Rated frequency	50/60 Hz, settable
Measuring range of frequency	(0.9 ~ 1.1) F_r
Reading accuracy of frequency	±0.02 Hz
Reading accuracy of angle	±1°, at rated AC voltage and AC current
Reading accuracy of active power and reactive power	1%, at rated AC voltage and AC current

Binary inputs

Item	Data
Rated voltage $V_{r.aux}$ IEC60255-1	110/125/220/250 V_{dc}, settable; or 24/48V_{dc} settable;
Max. permissible voltage IEC60255-1	300V, at $V_{r.aux}$=110/125/220/250 V_{dc}; 62V, at $V_{r.aux}$=24/48 V_{dc};
Operating threshold IEC60255-1	≥70% $V_{r.aux}$, guarantee operating ≤55% $V_{r.aux}$, guarantee not to operating
Pickup time	Approx. 1ms, intrinsic
Dropout time	Approx. 2ms, intrinsic
Burden for binary input IEC60255-1	≤0.25W, at $V_{r.aux}$=110V_{dc} ≤0.5W, at $V_{r.aux}$=220V_{dc}

Output relay

Item	Data
Rated contact voltage IEC60255-1	24/48/110/125/220/250 V_{dc} 110/220 V_{ac}
Maximum contact voltage IEC60255-1	250$V_{ac/dc}$
Mechanical endurance IEC60255-1	Unload, 10000 times Load, making, ≥ 1000 times

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Specification

	Load, breaking, ≥ 1000 times
Current carrying capacity IEC60255-1	General relay: 5A continuous, 30A, 200ms on,15s off Power relay: 10A continuous, 30A, 200ms on,15s off
Making capacity IEC60255-1	General relay: 1000W, at $V_{r.aux}$=220V_{dc} L/R=40ms Power relay: 1250W, at $V_{r.aux}$=220V_{dc} L/R=40ms
Breaking capacity IEC60255-1	General relay: 30W, at $V_{r.aux}$=220V_{dc} L/R=40ms 0.4A, at $V_{r.aux}$=110 V_{dc}, L/R≤40ms; Power relay: 55W, at $V_{r.aux}$=220V_{dc} L/R=40ms; 0.45A, at $V_{r.aux}$=110 V_{dc}, L/R≤40ms;
Contact insulation test (AC dielectric voltage) IEC60255-1	2kV_{ac}, 1min
Pick up time IEC60255-1	≤5ms
Drop off time IEC60255-1	≤10ms

Auxiliary power

Item	Data
Rated voltage $V_{r.aux}$ IEC60255-1	110V to 250$V_{dc/ac}$ 24/48V_{dc}
Input voltage range IEC60255-1	(0.8 ~ 1.2) $V_{r.aux}$
Burden for power supply unit IEC60255-1	≤20W, at quiescent ≤50W, at 50% loaded
Insulation test (AC dielectric voltage) IEC60255-1	2kV_{ac}, 1min

Ethernet communication

Item	Data
Max. ports number	3
Electrical Ethernet port type	RJ45
Maximum transmission distance of Ethernet cable	100M
Optical Ethernet port type	LC
Fiber optic cable type	Multi-mode
Optic wavelength	1310 nm
Optic received sensitivity	-33 dBm
Emitter electric level	>-20 dBm;
Maximum transmission distance of optical fiber	2kM with 62.5/125μm MMF
Transmission rate for IEC61850	100Mbit/s
Transmission rate for DNP 3.0	100Mbit/s

Serial communication

Item	Data
Number	2
Port type	RS-485
Maximum transmission distance	1.0km
Voltage withstand test	500V earthing AC voltage
Transmission rate for IEC60870-5-103	Default setting 9600 bps; Minimum: 1200bps; maximum: 19200bps

Time synchronization

Item	Data
Synchronization mode	SNTP IRIG-B time sync Minute or second pulse IEEE 1588
IRIG-B signal format	IRIG-B000
IRIG-B Port type	Twisted-pair connection

	or multi-mode optical fiber
IRIG-B signal voltage level	Differential signal input/ modulated

Inter-substation communication

Item	Data
Ports number	1 ~ 2
Fiber optic cable type	Single-mode or multi-mode
Optic wavelength	1310 nm, single-mode 850 nm, multi-mode
Optic received sensitivity	-34 dBm
Emitter electric level	>-11 dBm, at length <40 kM >-4 dBm, at length 40~60 kM >-5 dBm, at length 60~80 kM >-3 dBm, at length 80~100 kM >-0 dBm, at length 100~120 kM
Fiber optic connector type	LC
Data transmission rate	64 kbit/s, G703 2,048 kbit/s, G703-E1 N*64kbps, N=1~12, C37.94
Max. transmission distance	120 kM 62.5/125μm MMF

Product safety test

Item	Data
Overvoltage category IEC60255-27	Category III
Pollution degree IEC60255-27	Degree 2
Insulation type IEC60255-27	Basic insulation
Degree of protection (IP) IEC60255-27 IEC60529	Front plate: IP54 Side plate: IP52 Rear plate: IP30
Power frequency high voltage withstand test IEC60255-5 EN60255-5 ANSI/IEEE C37.90 GB/T15145-2001 DL/T478-2013	2kV, 50Hz, at rated voltage > 63V, Tested on: Auxiliary power supply port; Enclosure port; Input and output ports; Functional earth port; 500V, 50Hz, at rated voltage ≤63V, Tested on: Communication port;
Impulse voltage IEC60255-1 IEC60255-27 EN60255-5 ANSI/IEEE C37.90 GB/T15145-2001 DL/T478-2013	5kV, at rated voltage>60V, Tested on: Auxiliary power supply port; Current and voltage transformer ports; Input and output ports; Functional earth ports; 1kV, at rated voltage≤60V, Tested on: CPU ports;
Insulation resistance IEC60255-1 IEC60255-27 EN60255-5 ANSI/IEEE C37.90 GB/T15145-2001 DL/T478-2013	≥550 MΩ, 500 V_{dc}
Protective bonding resistance IEC60255-27	≤0.1Ω
Fire withstand/flammability IEC60255-27	Class V0

EMC test

Item	Data
Electrostatic discharge immunity test IEC60255-26 IEC61000-4-2	Criteria A; Level IV; ±6kV contact discharge; ±8kV air gap discharge;
Radiated interference, radio-frequency electromagnetic field immunity test	Criteria A; Class IV; 10 V/m, 80% AM (1 kHz) Frequency sweep:

Specification

IEC60255-26 IEC61000-4-3	80 MHz ~1 GHz; 1.4 GHz ~2.7 GHz spot frequencies (MHz): 80; 160; 380; 450; 900; 1850; 2150.
Electrical fast transient/burst immunity test IEC60255-26 IEC61000-4-4 ANSI/IEEE C37.90	Class A 4kV peak voltage; Tested on: Auxiliary power supply port; Current and voltage transformer ports; Input and output ports; Functional earth port; 2kV peak voltage; Tested on: Communication port;
Surge (impact) immunity test IEC60255-26 IEC61000-4-5	Class A，Level IV 4.0kV, Line-to-earth; 2.0kV, Line-to-line; Tested on: Auxiliary power supply port; Current and voltage transformer ports; Input and output ports; Functional earth port; 4.0kV, Line-to-earth; Tested on: Communication ports;
Test for immunity to conducted disturbance induced by radio-frequency fields IEC60255-26 IEC61000-4-6	10 V/m, 80% AM (1 kHz) Frequency sweep: 150kHz–80MHz Spot frequencies: 27MHz and 68MHz; Tested on: Auxiliary power supply port; Current and voltage transformer ports; Input and output ports; Functional earth port; Communication ports;

Power frequency magnetic field immunity test IEC60255-26 IEC61000-4-8	Criteria A 100 A/m Continuous; Criteria B 1000 A/m 3s;
Power frequency immunity test IEC60255-26 IEC61000-4-16	Zone A 300V, CM; 150V, DM; Test on: Binary input ports;
Slow damped oscillatory wave immunity test (1MHz) IEC60255-26 IEC61000-4-18 ANSI/IEEE C37.90	Class III 2.5 kV CM; 1 kV DM; Tested on: Auxiliary power supply port; Current and voltage transformer ports; Input and output ports; 1 kV CM; 0 kV DM; Tested on: Communication ports
Fast damped oscillatory wave immunity test IEC61000-4-18	Level 4 4 kV, at 3MHz, 10MHz, 30MHz. Tested on: Auxiliary power supply port; Current and voltage transformer ports; Input and output ports;
Pulse magnetic field immunity test IEC61000-4-9	Class V 1000A/m
Damped oscillation magnetic field immunity test IEC61000-4-10	Class V 100A/m
Conducted emission IEC60255-1 IEC60255-26 CISPR 11, CISPR 22	Class A; 0.15MHz to 0.50MHz; 0.50MHz to 30MHz; Tested on: Auxiliary power supply port; Communication ports
Radiated emission	Class A;

IEC 60255-1 IEC 60255-26 CISPR 11, CISPR 22	30MHz to 230MHz; 230MHz to 1GHz; Tested on: Auxiliary power supply port;
Voltage dips and voltage interruptions on DC power supply IEC 60255-26 IEC 61000-4-11 IEC 61000-4-29	Criteria A 150 ms at 0% residual voltage; 200 ms at 40% residual voltage; 500 ms at 70% residual voltage; 5s at 0% residual voltage
Voltage dips and voltage interruption on AC power supply IEC 60255-26 IEC 61000-4-11 IEC 61000-4-29	Criteria A At 50 Hz: 5 cycles at 0% residual voltage; 10 cycles at 40% residual voltage,; 25 cycles at 70% residual voltage; 250 cycles at 0% residual voltage
Voltage ripple on DC power supply IEC 60255-26 IEC 61000-4-17	15% at twice rated frequency;
Gradual shut-down/ start-up for power supply IEC 60255-26	5 min power off 42V_{DC} at 60 s shut down ramp 78V_{DC} at 60 s start-up ramp
Reversal of DC power supply IEC 60255-27	60 s

Mechanical test

Item	Data
Vibration response test IEC 60255-21-1 EN 60255-21-1	Class 1 Relay energized 10-60 Hz: ± 0.035 mm amplitude 60-150 Hz: 0,5 g acceleration Frequency sweep: 1 sweep cycle in each axis，3 axis
Vibration endurance test IEC 60255-21-1 EN 60255-21-1	Class 1 Relay non-energized 10 to 150 Hz: 1 g acceleration 20 sweep cycles in each axis，3 axis
Shock response test IEC 60255-21-2 EN 60255-21-2	Class 1 Relay energized Duration 11 ms : 5 g acceleration 6 shocks in each axis, 3 axis
Shock withstand test IEC 60255-21-2 EN 60255-21-2	Class 1 Relay non-energized Duration 11 ms : 15 g acceleration 6 shocks in each axis, 3 axis
Bump test IEC 60255-21-2 EN 60255-21-2	Class 1 Relay non-energized Duration 16 ms : 10 g acceleration 2000 bumps in each axis, 3 axis
Sinusoidal sweep seismic test IEC 60255-21-3	Class 1 Relay energized 1-8 Hz: ± 3.5 mm amplitude (horizontal axis) 1-8 Hz: ± 1.5 mm amplitude (vertical axis) 8-35 Hz: 1g acceleration (horizontal axis) 8-35 Hz: 0,5g acceleration (vertical axis) Frequency sweep： 1 sweep cycle in each axis, 3 axis

Environmental test

Item	Data
Cold test - operational IEC 60255-27 IEC 60068-2-1	-40°C, 96 hours, relay energized
Cold test – Storage IEC 60255-27	-40°C, 96 hours, relay non-energized

Specification

IEC 60068-2-1	
Dry heat test – operational IEC 60255-27 IEC 60068-2-2	+70°C, 96 hours, relay energized
Dry heat test – Storage IEC 60255-27 IEC 60068-2-2	+70°C, 96 hours, relay non-energized
Change of temperature IEC 60255-27 IEC 60068-2-14	-40°C / +70°C, 6 cycles relay energized
Damp heat steady-state test IEC 60255-27	+40°C, 93% r.h. 10 days, relay energized

IEC 60068-2-78	
Cyclic temperature with humidity test IEC 60255-27 IEC 60068-2-30	+55°C, 93% r.h. 6 cycles, relay energized

CE Certification

Item	Data
EMC	EN 61000-6-2 and EN 61000-6-4 (EMC steering committee 2004/108/EC)
LVD	EN 60255-27(LVD 2006/95EC)

21, Distance protection

Item	Data
Number of zones	5 zones
Distance characteristic	Polygonal and MHO
Resistance setting range	0.05 / I_r ~ 600 / I_r Ω, step 0.01 Ω, when I_r = 5 A / 1 A
Reactance setting range	0.05 / I_r ~ 600 / I_r Ω, step 0.01 Ω, when I_r = 5 A / 1 A
Delay time of distance zones	0.00s~60.00 s, step 0.01 s ≤±1% or ≤+20 ms, at setting time > 60 ms
Minimum operating time	≤20 ms, zone 1 at fault within 64% operating zone
Operation time	22 ms typically, zone 1 at fault within 70% operating zone
Dynamic overreaching for zone 1	≤±5%, at 0.5< SIR <30
Measuring tolerance of fault locator (not including errors caused by factors outside product)	≤+3% when fault current is greater than 0.01 I_r at metal fault, error will become bigger when fault occurs with greater transition resistance

85, Tele-protection scheme

Item	Data
Minimum operation time	≤25 ms Permission mode for 21/21N/67N, when fault at the middle of the transmission line.
Operation time	25 ms typically

50, 51, 67, Directional overcurrent protection

Item	Data
Definite time characteristic	
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02 I_r
Time delay of definite time characteristic	0.00s to 100.00s, step 0.01s ≤ ±1% setting or ≤ +40ms, at 200% operating setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms
Inverse time characteristic	
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Time delay IEC Inverse IEC 60255-151	Normal inverse; Very inverse; Extremely inverse; Long time inverse ≤ ±5% or ≤ +40ms , at 2 <$I/I_{SETTING}$ < 20
Time delay IEEE/ ANSI Inverse IEEE/ ANSI C37.112	Inverse; Short time inverse; Long time inverse; Moderately inverse; Very inverse; Extremely inverse; Definite time inverse ≤ ±5% setting or ≤ +40ms, at 2 <$I/I_{SETTING}$ < 20
Time delay user-defined inverse IEEE/ANSI C37.112	$T=\left(\frac{A}{(\frac{i}{I\_SET})^{P}-1}+B\right)k$ ≤ ±5% setting or ≤ + 40ms, at 2 <$I/I_{SETTING}$ < 20
Time factor of characteristic, A	0.001 to 1000.0s, step 0.001s
Time delay of characteristic, B	0.00s to 100.00s, step 0.01s
Index of characteristic, P	0.01 to 10.00, step 0.01
Time constant of characteristic, k	0.025 to 1.50, step 0.001
Min inverse operate time	Instantaneous
Reset ratio	≥ 0.95
Reset time	≤ 40ms
Directional element	
Angle range of operating area	170°
Characteristic angle	0° to 90°, step 1° ≤ ±1°, at phase to phase voltage >2V
Inrush current blocking element	
Max. current setting without inrush current blocking	0.05 I_r to 40.00 I_r ≤ ±2% setting or ±0.02I_r
Ratio of second	0.07 to 0.50, step 0.01

Specification

harmonics to fundamental current	
Time period of cross phases blocking	0.00s to 100.00s, step 0.01s ≤ ±1% setting or ≤+40ms

50N, 51N, 67N Directional earth fault protection

Item	Data
Current inputs	Three phase currents or single current
Definite time characteristic	
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02 I_r
Time delay	0.00s to 100.00s, step 0.01s ≤ ±1% setting or ≤ +40ms, at 200% operating setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms
Inverse time characteristic	
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Time delay IEC Inverse IEC 60255-151	Normal inverse; Very inverse; Extremely inverse; Short time inverse Long time inverse ≤ ±5% setting or ≤ + 40ms, at 2 <$I/I_{SETTING}$ < 20
Time delay IEEE/ANSI inverse IEEE/ANSI C37.112	Inverse; Short time inverse; Long time inverse; Moderately inverse; Very inverse; Extremely inverse; Definite inverse ≤ ±5% setting or ≤ + 40ms, at 2 <$I/I_{SETTING}$ < 20
Time delay user-defined inverse IEEE/ANSI C37.112	$T=\left(\frac{A}{\left(\frac{i}{I\_SET}\right)^{P}-1}+B\right)k$ ≤ ±5% setting or ≤ + 40ms, at 2 <$I/I_{SETTING}$ < 20
Time factor of characteristic, A	0.001 to 1000.0s, step 0.001s
Time delay of characteristic, B	0.00s to 100.00s, step 0.01s
Index of characteristic, P	0.01 to 10.00, step 0.01
Time constant of characteristic, k	0.025 to 1.500, step 0.001
Min inverse operate time	instantaneous
Reset ratio	≥ 0.95
Reset time	≤ 40ms
Zero sequence directional element	
Operating area range	160°;
Characteristic angle	0° to 90°, step 1° ≤ ±1°, at 3U0≥1V
Negative sequence directional element	
Operating area range	160°
Characteristic angle	0° to 90°, step 1° ≤ ±1°, at 3U2≥2V

46, Negative-sequence overcurrent protection

Item	Data
Definite time characteristic	
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02 I_r
Time delay	0.00s to 100.00s, step 0.01s ≤ ±1% setting or ≤ +40ms, at 200% operating setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms
Inverse time characteristic	
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Time delay IEC Inverse IEC 60255-151	Normal inverse; Very inverse; Extremely inverse; Short time inverse Long time inverse ≤ ±5% setting or ≤+ 40ms, at 2 <$I/I_{SETTING}$ < 20
Time delay IEEE/ANSI inverse IEEE/ANSI C37.112	Inverse; Short time inverse; Long time inverse; Moderately inverse; Very inverse; Extremely inverse; Definite inverse ≤ ±5% setting or ≤ +40ms, at

	2 <I/$I_{SETTING}$ < 20,
Time delay user-defined inverse IEEE/ANSI C37.112	$T=\left(\frac{A}{(\frac{I}{I\_SET})^{P}-1}+B\right)k$ ≤ ±5% setting or ≤ + 40ms, at 2 <I/$I_{SETTING}$ < 20
Time factor of characteristic, A	0.001 to 1000.0s, step 0.001s
Time delay of characteristic, B	0.00s to 100.00s, step 0.01s
Index of characteristic, P	0.01 to 10.00, step 0.01
Time constant of characteristic, k	0.025 to 1.500, step 0.001
Min inverse operate time	instantaneous
Reset ratio	≥ 0.95
Reset time	≤ 40 ms

49, Thermal overload protection

Item	Data
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Heating time constant	6-9999 s
Cooling time constant	0.1-10
IEC low temperature curve IEC 60255-149	$t=\tau\ln\left\{\frac{I_{eq}^2}{I_{eq}^2-I_{\theta}^2}\right\}$ ≤ ±5% setting or ≤+40ms
IEC high temperature curve IEC 60255-149	$t=\tau\ln\left\{\frac{I_{eq}^2-I_P^2}{I_{eq}^2-I_{\theta}^2}\right\}$ ≤ ±5% setting or ≤+40ms

59, Overvoltage protection

Item	Data
Voltage input	Phase to phase voltage or phase to earth voltage
Definite time characteristic	
phase-to-earth voltages	40.0V to 100.0 V, step 0.01 V ≤ ±2.5% setting or ± 1V
Phase to phase voltage	80.0V to 200.0 V, step 0.01 V ≤ ± 2.5% setting or ± 1V
Reset ratio	0.95 to 1, step 0.01 ≤ ±3 % setting
Time delay	0.00s to 120.00s, step 0.01s
	≤ ±1 % setting or ≤ +50ms, at 120% voltage setting
Reset time	≤ 40ms
Inverse time characteristic	
phase-to-earth voltages	40.0V to 100.0 V, step 0.01 V ≤ ±2.5% setting or ± 1V
Phase to phase voltage	80.0V to 200.0 V, step 0.01 V ≤ ±2.5% setting or ± 1V
Time delay IEC Inverse IEC 60255-127	Normal inverse; Very inverse; Extremely inverse; Short time inverse; Long time inverse; ≤ ±5% setting or ≤ + 50ms, at 2 <U/U_{set} < 20
Time delay IEEE/ANSI inverse IEEE/ANSI C37.112	Inverse; Short time inverse; Long time inverse; Moderately inverse; Very inverse; Extremely inverse; Definite inverse ≤ ±5% setting or ≤ +50ms, at 2 <U/U_{set} < 20
Time delay user-defined inverse IEEE/ANSI C37.112	$t=\left[\frac{A}{\left[\frac{U_{\Phi}}{\text{Uset}}\right]^{P}-1}+B\right]\cdot T$ ≤ ±5% setting or ≤ +50ms, at 2 <U/Uset < 20.
Time factor of characteristic, A	0.001 to 10.000, step 0.001
Time delay of characteristic, B	0.00s to 100.00s, step 0.01s
Index of characteristic, P	0.01 to 10.00, step 0.01
Time constant of characteristic, T	0.025 to 1.500, step 0.001
Min inverse operate time	instantaneous
Reset ratio	≥ 0.95
Reset time	≤ 40ms

Specification

47, Negative-sequence overvoltage protection

Item	Data
Voltage input	Calculated from 3 phase to earth voltages
Definite time characteristic	
Voltage	40 to 100 V, step 0.01 V ≤ ±2.5% setting or ± 1V
Time delay	0.00s to 100.00s, step 0.01s ≤ ±1 % setting or ≤ +50ms, at 120% voltage setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms
Inverse time characteritic	
Voltage	1 to 100 V, step 0.01 V ≤ ±2.5% setting or ± 1V
Time delay IEC Inverse IEC 60255-127	Normal inverse; Very inverse; Extremely inverse; Short time inverse; Long time inverse; ≤ ±1% setting or ≤ + 50ms, at 120% voltage setting
Time delay IEEE/ANSI inverse IEEE/ANSI C37.112	Inverse; Short time inverse; Long time inverse; Moderately inverse; Very inverse; Extremely inverse; Definite inverse ≤ ±1% setting or ≤ +50ms, at 120% voltage setting
Time delay user-defined inverse IEEE/ANSI C37.112	$t=\left[\frac{A}{\left[\frac{U_{\Phi}}{\text{Uset}}\right]^{P}-1}+B\right]\cdot T$ ≤ ±1% setting or ≤ +50ms, at 120% voltage setting
Time factor of characteristic, A	0.001 to 10.000, step 0.001
Time delay of characteristic, B	0.00s to 100.00s, step 0.01s
Index of characteristic, P	0.01 to 10.00, step 0.01
Time constant of characteristic, T	0.025 to 1.500, step 0.001
Min inverse operate time	instantaneous
Reset ratio	≥ 0.95
Reset time	≤ 40ms

27, Undervoltage protection

Item	Data
Voltage input	Phase to phase voltages or phase to earth voltages
Permitted current setting	0.04-40.00 I_r, step 0.01A ≤ ±2.5% setting or ±0.02I_r
Definite time characteristic	
phase-to-earth voltages	5.0 to 75.0 V, step 0.1 V ≤ ±2.5% setting or ± 1 V
Phase to phase voltage	10.0 to 150.0 V, step 0.1 V ≤ ±2.5% setting or ±1 V
Reset ratio	1.00 to 2.00, step 0.01
Time delay	0.00s to 120.00s, step 0.01s ≤ ±1 % setting or ≤ +50ms， at 80% voltage setting
Reset time	≤ 40ms
Inverse time characteritic	
phase-to-earth voltages	5.0 to 75.0 V, step 0.1 V ≤ ±2.5% setting or ± 1V
Phase to phase voltage	10.0 to 150.0 V, step 0.1 V ≤ ±2.5% setting or ± 0.1V
Time delay IEC Inverse IEC 60255-127	Curve 1 Curve 2 Curve 3 ≤ ±1 % setting or ≤ +50ms， at 80% voltage setting
Time delay user-defined curve IEC 60255-127	$t=\left[\frac{A}{1-\left[\frac{U}{\text{Uset}}\right]^{P}}+B\right]\cdot T$ ≤ ±1 % setting or ≤ +50ms， at 80% voltage setting
Time factor of characteristic, A	0.001 to 10.000, step 0.001
Time delay of	0.00s to 100.00s, step 0.01s

characteristic, B	
Index of characteristic, P	0.010 to 10.000, step 0.005
Time constant of characteristic, T	0.025 to 1.500, step 0.001
Min inverse operate time	instantaneous
Reset ratio	1.00 to 2.00, step 0.01
Reset time	≤ 40ms

32, Directional overpower protection

Item	Data
Power	0W to 500W ≤ ±3% setting or ±0.5Pn
Time delay	0.00s to 100.00s, step 0.01s ≤ ±1 % setting or ≤ +40ms at 120% operating setting
Reset time	≤ 55ms

50CBF, Circuit breaker failure protection

Item	Data
Phase current Negative sequence current Zero sequence current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Time delay of stage 1	0.00s to 100.00 s, step 0.01s ≤ ±1% setting or ≤ +40 ms, at 200% operating setting
Time delay of stage 2	0.00s to 100.00 s, step 0.01s ≤ ±1% setting or ≤ +40 ms, at 200% operating setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms

50DZ, Dead zone protection

Item	Data
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Time delay	0.00s to 100.00s, step 0.01s ≤ ±1% setting or ≤ +40 ms, at 200% operating setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms

50STUB, STUB protection

Item	Data
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Time delay	0.00s to 100.00s, step 0.01s ≤ ±1% setting or ≤ +40 ms, at 200% operating setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms

62PD, Pole-discrepancy protection

Item	Data
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Time delay	0.00s to 100.00s, step 0.01s ≤ ±1% setting or ≤ +40 ms, at 200% operating setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms

46BC, Broken conductor protection

Item	Data
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Time delay	0.00s to 100.00s, step 0.01s ≤ ±1% setting or ≤ +40 ms, at 200% operating setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms

81U, Under frequency protection

Item	Data
Frequency	45.00 to 50.00Hz, step 0.01Hz at F_r = 50Hz 54.00 to 60.00Hz, step 0.01Hz at F_r = 60Hz

Specification

	≤ ± 20mHz
Time delay	0.1s to 100.00 s, step 0.01s ≤ ±1.5% setting or ≤+60 ms, at 80% setting
Reset Δf = | f_{set} - f_{reset} |	Approx. 20mHz
Change of rate Δf/Δt	0.3 to 20Hz/s ≤±0.5Hz/s
Voltage	10 to 120V, step 0.01V ≤±2.5% setting or ± 1V
Current	0 to 10In ≤±2.5% setting or +0.01In

81O, Over frequency protection

Item	Data
Frequency	50.00 to 55.00Hz, step 0.01Hz at F_r = 50Hz 60.00 to 66.00Hz, step 0.01Hz at F_r = 60Hz ≤ ± 20mHz
Time delay	0.1s to 100.00 s, step 0.01s ≤ ±1.5% setting or ≤ +60 ms, at 80% setting
Reset Δf = | f_{set} - f_{reset} |	Approx. 20mHz
Voltage	10 to 120V, step 0.01V ≤±2.5% setting or ± 1V

81DF, Frequency change rate protection

Item	Data
Change of rate Δf/Δt	0.3 to 20Hz/s ≤± 0.5 Hz/s
Time delay	0.1s to 100.00s, step 0.01s ≤ ±1.5% setting or ≤ +60 ms
Upper limit of frequency change rate	0.1 to 50Hz/s ≤±0.5Hz/s
Lower limit of frequency change rate	0.1 to 50Hz/s ≤±0.5Hz/s
voltage	10 to 120V, step 0.01V ≤±2.5% setting or ± 1V

50SOTF, Switch onto fault protection

Item	Data
Current	0.05 I_r to 40.00 I_r ≤ ±2.5% setting or ±0.02I_r
Time delay	0.00s to 100.00s, step 0.01s ≤ ±1% setting or ≤ +40 ms, at 200% operating setting
Reset ratio	≥ 0.95
Reset time	≤ 40ms

25, Synchro-check & energizing check

Item	Data
Modes of Synchro-check	▪ Synchronization check ▪ Energizing check, and synchronous check after energizing check failure ▪ Override
Modes of Energizing check	▪ Dead line & dead bus ▪ Live line & dead bus ▪ Dead line & live bus
Max dead voltage setting at energizing check mode (Phase to earth voltage)	10V to 50 V, step 0.01 V ≤ ±2.5% setting or ± 1V
Min live voltage setting at synchronization check mode (Phase to earth voltage)	30V to 65 V, step 0.01 V ≤ ±2.5% setting or ± 1V
ΔV- voltage difference (Phase to earth voltage)	1V to 40 V, step 0.01 V ≤ ±2.5% setting or ± 1V
Δf- frequency difference (f2>f1; f2<f1)	0.02 to 2.00Hz, step 0.01Hz ≤ ±20mHz
Δα- angle difference (α2>α1; α2<α1)	1 ° to 80 °, step of 0.01 ° ≤ ±3°
Maximum synchronous check broadening time	0.02s to 100.00 s, step 0.01s ≤ ±1.5% setting or ≤ +60 ms
Disable synchronization check time	0.05s to 100.00 s, step 0.01s ≤ ±1% setting or ≤ +50 ms

79, Auto-reclosing

Item	Data
Shots of reclosing	1 to 4
Reclosing initiated inputs	Internal protection startups External binary input

Dead time for each shot of reclosing	0.05s~600.00s, step of 0.01 s ≤ ±1% setting or ≤ +50 ms
Reclosing confirmation time	0.10 s~100.00s, step of 0.01 s ≤ ±1% setting or ≤ +40 ms
Reclosing charging time	0.05 s~100.00s, step of 0.01 s ≤ ±1% setting or +50 ms
Equal breaking time	0.10 s~100.00s, step of 0.01 s ≤ ±1% setting or ≤ +50 ms
Disable synchronization check time	0.05s to 100.00 s, step 0.01s ≤ ±1% setting or ≤ +50 ms

97FF, VT secondary circuit supervision

Item	Data
Phase current	0.05 I_r to 1.0 I_r, step 0.01A ≤ ±3% setting or ±0.02 I_r
Zero or negative sequence current	0.05 I_r to 1.0 I_r, step 0.01A ≤ ±5% setting or ±0.02 I_r
Phase to earth voltage	7.0V to 20.0V, step 0.01V ≤ ±3% setting or ± 1 V
Phase to phase voltage	10.0V to 30.0V, step 0.01V ≤ ±3% setting or ± 1 V
Operating phase to earth voltage	40.0V to 65.0V, step 0.01V ≤ ±3% setting or ± 1 V

Ordering Code

	Product type
CSC-101-EB	line distance protection IED
	Hardware architecture
AR	CT/VT Input / BIO/ GOOSE IO
DA	SV Input / GOOSE IO
AG	CT/VT Input / GOOSE IO
AD	CT/VT Input / BIO / SV OUT / GOOSE IO
	Language
EC	English + Chinese
RE	Russian + English + Chinese；
FE	French + English + Chinese；
PE	Portuguese + English + Chinese；
SE	Spain + English + Chinese；
	Protocols
X	Null
1	IEC61850
2	IEC61870-5-103
3	MODBUS
4	DNP 3.0
	Typical function groups of CSC-101
C	Typical function groups of CSC-101-00101 For 150KV and above, overhead line or cable, Tele-protection, as main protection IED; 21&21N: Line Distance Protection, Quadrilateral characteristic, Full scheme, 5 zones + 1 extension; 21&21N: Line Distance Protection, MHO characteristic, Full scheme, 5 zones + 1 extension; 68: Power Swing detection; 85 – 21&21N: Tele-protection based on Distance Protection-Contact interface ; 85 – 67N: Tele-protection based on Directional Earth Fault Protection-Contact interface ; 50, 51&67: Directional Overcurrent Protection, 4 stages, DT/INVT, Directional element, composite voltages block, Inrush block; 50N,51N&67N: Directional Earth-Fault Protection, 4 stages, DT/INVT, Directional element, Inrush block; 46: Negative-Sequence Overcurrent Protection, 4 stages, DT/INVT; 49: Thermal Overload Protection, 3 Stages, 2 of 3 stages for alarm, 1 of 3 stages for tripping, for cable; 46BC: Broken Conductor Protection, 1 stage; 97FF: Symmetrical and asymmetrical VT Fuse Fail Detection; CTFF: CT-Secondary Current Supervision ; DR: Disturbance recorder; FP: Faulty phase indication; FL: Fault Locator (FL)，with parallel line compensation for transmission line; 94-1/3: Single- and/or three-pole tripping logic;

D	Typical function groups of CSC-101-00102 For 66-132KV, overhead line or cable, Tele-protection, as main protection IED; 21&21N: Line Distance Protection, Quadrilateral characteristic, Full scheme, 5 zones + 1 extension; 21&21N: Line Distance Protection, MHO characteristic, Full scheme, 5 zones + 1 extension; 68: Power Swing detection; 85 – 21&21N: Tele-protection based on Distance Protection-Contact interface ; 85 – 67N: Tele-protection based on Directional Earth Fault Protection-Contact interface ; 50, 51&67: Directional Overcurrent Protection, 4 stages, DT/INVT, Directional element, composite voltages block, Inrush block; 50N,51N&67N: Directional Earth-Fault Protection, 4 stages, DT/INVT, Directional element, Inrush block; 46: Negative-Sequence Overcurrent Protection, 4 stages, DT/INVT; 49: Thermal Overload Protection, 3 Stages, 2 of 3 stages for alarm, 1 of 3 stages for tripping, for cable; 46BC: Broken Conductor Protection, 1 stage; 97FF: Symmetrical and asymmetrical VT Fuse Fail Detection; CTFF: CT-Secondary Current Supervision ; DR: Disturbance recorder; FP: Faulty phase indication; FL: Fault Locator (FL)，with parallel line compensation for transmission line; 94-1/3: Single- and/or three-pole tripping logic;
E	Typical function groups of CSC-101-00103 For 150KV and above, overhead line or cable, Tele-protection, as main protection IED; 21&21N: Line Distance Protection, Quadrilateral characteristic, Full scheme, 5 zones + 1 extension; 21&21N: Line Distance Protection, MHO characteristic, Full scheme, 5 zones + 1 extension; 68: Power Swing detection; 85 – 21&21N: Tele-protection based on Distance Protection- Fiber interface; 85 – 67N: Tele-protection based on Directional Earth Fault Protection-Fiber interface ; 50, 51&67: Directional Overcurrent Protection, 4 stages, DT/INVT, Directional element, composite voltages block, Inrush block; 50N,51N&67N: Directional Earth-Fault Protection, 4 stages, DT/INVT, Directional element, Inrush block; 46: Negative-Sequence Overcurrent Protection, 4 stages, DT/INVT; 49: Thermal Overload Protection, 3 Stages, 2 of 3 stages for alarm, 1 of 3 stages for tripping, for cable; 46BC: Broken Conductor Protection, 1 stage; 97FF: Symmetrical and asymmetrical VT Fuse Fail Detection; CTFF: CT-Secondary Current Supervision ; DR: Disturbance recorder; FP: Faulty phase indication;

Ordering Code

	FL: Fault Locator (FL)，with parallel line compensation for transmission line; 94-1/3: Single- and/or three-pole tripping logic;
F	Typical function groups of CSC-101-00104 For 66-132KV, overhead line or cable, Tele-protection, as main protection IED; 21&21N: Line Distance Protection, Quadrilateral characteristic, Full scheme, 5 zones + 1 extension; 21&21N: Line Distance Protection, MHO characteristic, Full scheme, 5 zones + 1 extension; 68: Power Swing detection; 85 – 21&21N: Tele-protection based on Distance Protection- Fiber interface; 85 – 67N: Tele-protection based on Directional Earth Fault Protection-Fiber interface ; 50, 51&67: Directional Overcurrent Protection, 4 stages, DT/INVT, Directional element, composite voltages block, Inrush block; 50N,51N&67N: Directional Earth-Fault Protection, 4 stages, DT/INVT, Directional element, Inrush block; 46: Negative-Sequence Overcurrent Protection, 4 stages, DT/INVT; 49: Thermal Overload Protection, 3 Stages, 2 of 3 stages for alarm, 1 of 3 stages for tripping, for cable; 46BC: Broken Conductor Protection, 1 stage; 97FF: Symmetrical and asymmetrical VT Fuse Fail Detection; CTFF: CT-Secondary Current Supervision ; DR: Disturbance recorder; FP: Faulty phase indication; FL: Fault Locator (FL)，with parallel line compensation for transmission line; 94-1/3: Single- and/or three-pole tripping logic;
	Current protection function group
X	No Current protection function group
A	50, 51&67: Directional Overcurrent Protection, 4 stages, DT/INVT, Directional element, composite voltages block, Inrush block; 50N,51N&67N: Directional Earth-Fault Protection, 4 stages, DT/INVT, Directional element, Inrush block; 46: Negative-Sequence Overcurrent Protection, 4 stages, DT/INVT;
	Voltage protection function group
X	No Voltage protection function group
A	59: Overvoltage Protection, 4 stages, DT/INVT; 27: Undervoltage Protection, 4 stages, DT/INVT;
	Power protection function group
X	No Power protection function group
A	32OD: Directional overpower protection, 2 stages, forward/reverse ;
	Out of step protection function
X	Without Out of step protection function

A	78: Out of step protection;
	Frequency protection function group
X	No Frequency protection function group
A	81O: Overfrequency, 4 stages; 81U: Underfrequency, 4 stages; 81DF: df/dt Protection, 4 stages;
	Breaker protection function group
X	No Breaker protection function group
A	50BF: Circuit-Breaker Failure Protection, 2 stages, single/three-pole operating;
B	50BF: Circuit-Breaker Failure Protection, 2 stages, single/three-pole operating; 50DZ: Dead Zone Protection/End-fault protection, 1 stage, DT;
C	50BF: Circuit-Breaker Failure Protection, 2 stages, single/three-pole operating; 50DZ: Dead Zone Protection/End-fault protection, 1 stage, DT; 62PD: Pole-Discrepancy Protection, 1 stage, DT;
D	50BF: Circuit-Breaker Failure Protection, 2 stages, single/three-pole operating; 50STB: STUB protection, 1 stage, DT;
	Autoreclosing & Synchronization function group
X	No Autoreclosing & Synchronization function group
A	79: Single and/or Three-Pole AutoReclosing, 4 shots;
B	25: Synchro-Check with Live/Dead Line/Bus Measurement ; 79: Single and/or Three-Pole AutoReclosing, 4 shots;
C	25: Synchro-Check with Live/Dead Line/Bus Measurement ;
	Control function
X	No Control function
A	CB control; Isolator control; Programmable Interlock logic; Remote/local control switch;
	Case
1	Width of CASE :19" ; Qty. of Slot :17;
2	Width of CASE :1/2 19"; Qty. of Slot :9;
	Power Supply
H	Voltage range of auxiliary power supply: DC/AC250-110V;
L	Voltage range of auxiliary power supply: DC 24-48V;
	Communication port for SAS

Ordering Code

A	RJ45 for SAS:3; RS485/IRIG-B:1; RS485:1; RS232-Printer port:1;
B	RJ45 for SAS:1; Optical Ethernet port for SAS:2; RS485:1; Type of fiber: Multi mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):100; Transmitting distance (kM):2; TD/RD:1/1;
C	Application 1:Support optical channel for protection; RJ45 for SAS:3; RS485/IRIG-B:1; RS485:1; RS232-Printer port:1;
D	Application 1:Support optical channel for protection; RJ45 for SAS:1; Optical Ethernet port for SAS:2; RS485/IRIG-B:1; RS485:1; RS232-Printer port:1; Type of fiber: Multi mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):100; Transmitting distance (kM):2; TD/RD:1/1;
E	Application 1:Support dual CT input of line; RJ45 for SAS:3; RS485/IRIG-B:1; RS485:1; RS232-Printer port:1;

F	Application 1:Support dual CT input of line; RJ45 for SAS:1; Optical Ethernet port for SAS:2; RS485/IRIG-B:1; RS485:1; RS232-Printer port:1; Type of fiber: Multi mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):100; Transmitting distance (kM):2; TD/RD:1/1;
G	Application 1:Support dual CT input of line; Application 2:Support optical channel for protection; RJ45 for SAS:3; RS485/IRIG-B:1; RS485:1; RS232-Printer port:1;
H	Application 1:Support dual CT input of line; Application 2:Support optical channel for protection; RJ45 for SAS:1; Optical Ethernet port for SAS:2; RS485/IRIG-B:1; RS485:1; RS232-Printer port:1; Optical Ethernet port for extension:2; Type of fiber: Multi mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):100; Transmitting distance (kM):2; TD/RD:1/1;
	Communication port 1 for protection
X	NULL-Communication port 1 for protection
A	Qty. of optical Ethernet port for SAS:1; Qty. of optical Ethernet port for IED connection:1; Type of fiber: Multi mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):100; Transmitting distance (kM):2;

Ordering Code

B	Qty. of optical communication ports for protection:1; Application: PROT; Type of fiber: Single Mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):0.064 to 50; Transmitting distance (kM):40;
C	Qty. of optical communication ports for protection:1; Application: PROT; Type of fiber: Single Mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):0.064 to 50; Transmitting distance (kM):40 to 60;
D	Qty. of optical communication ports for protection:1; Application: PROT; Type of fiber: Single Mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):0.064 to 50; Transmitting distance (kM):60 to 120;
	Communication port 2 for protecttion
X	NULL-Communication port 2 for function
A	Qty. of optical Ethernet port for SAS:1; Qty. of optical Ethernet port for IED connection:1; Type of fiber: Multi mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):100; Transmitting distance (kM):2;
B	Qty. of optical communication ports for protection:1; Application: PROT; Type of fiber: Single Mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):0.064 to 50; Transmitting distance (kM):40;

C	Qty. of optical communication ports for protection:1; Application: PROT; Type of fiber: Single Mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):0.064 to 50; Transmitting distance (kM):40 to 60;
D	Qty. of optical communication ports for protection:1; Application: PROT; Type of fiber: Single Mode; Wave length (nm):1310; Type of port: LC; Communication rate (MB/s):0.064 to 50; Transmitting distance (kM):60 to 120;
	Transformer inputs module 1
1	Ip (1A&5A, 40Ir):5; U (180V,star):4;
2	Im(2Ir) :3;
3	Ip (1A&5A, 40Ir):6; U (180V,star):3;
	Transformer inputs module 2
X	NULL-Transformer inputs module 2
1	Ip (1A&5A, 40Ir):5; U (180V,star):4;
2	Im(2Ir) :3;
3	Ip (1A&5A, 40Ir):3; U (180V,star):1;
	Binary inputs & output module 1
A	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
B	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;
C	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;

Ordering Code

D	Qty. of General output relay C, 1 NO: 8; Qty. of General output relay F, 1 NO Latched: 7;
	Binary inputs & output module 2
5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;
G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;
I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Binary inputs & output module 3
X	Null
5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;

G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;
I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Binary inputs & output module 4
X	Null
5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;
G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;
I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Binary inputs & output module 5
X	Null

Ordering Code

5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;
G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;
I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Binary inputs & output module 6
X	Null
5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;
G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;

I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Binary inputs & output module 7
X	Null
5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;
G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;
I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Binary inputs & output module 8
X	Null
5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;

Ordering Code

F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;
G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;
I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Binary inputs & output module 9
X	Null
5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;
G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;
I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;

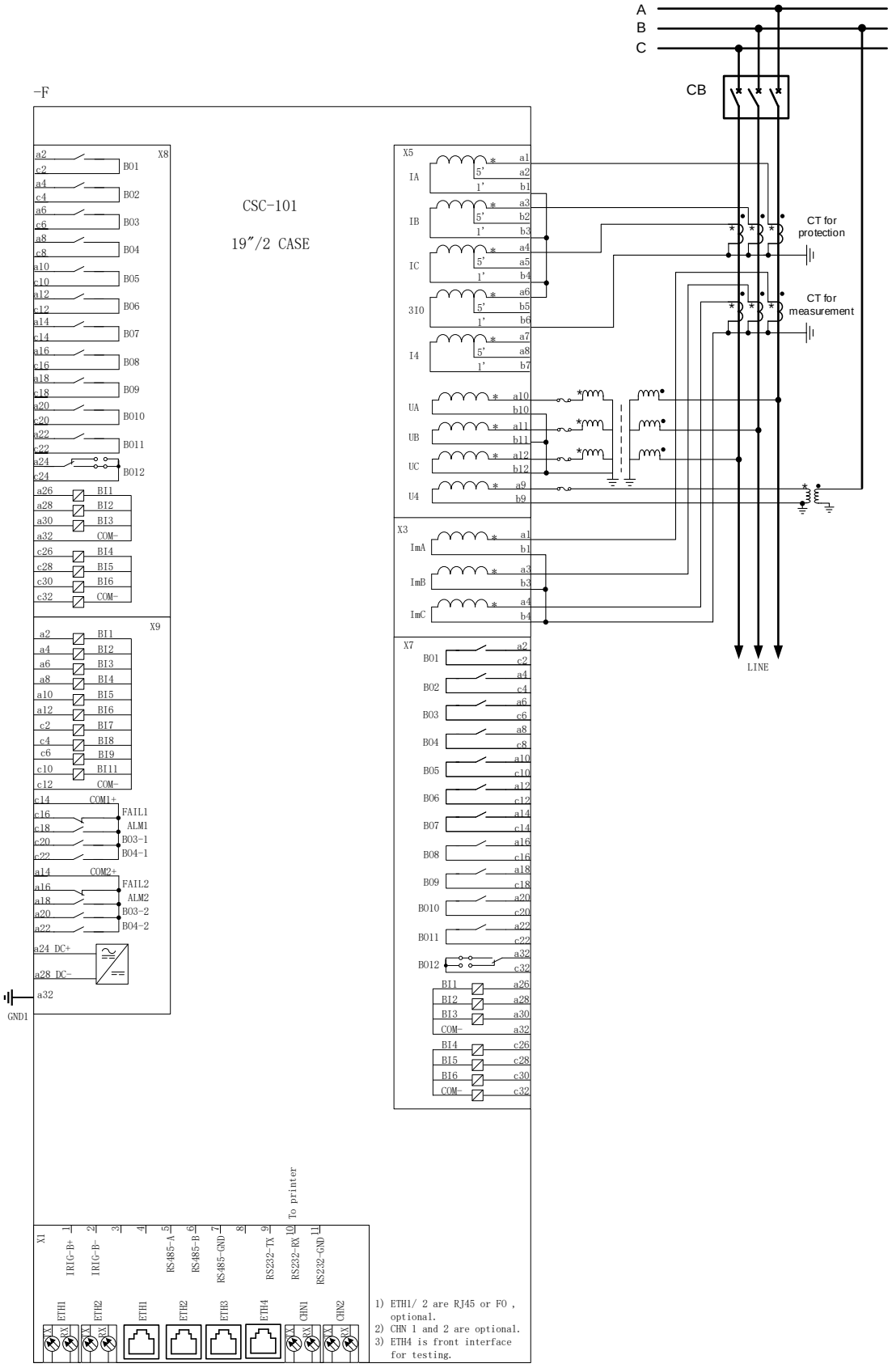
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Binary inputs & output module 10
X	Null
5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;
G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;
I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Binary inputs & output module 11
X	Null
5	Blank plate 5TE
E	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 110-220V;
F	Qty. of BIs with common terminal:6; Qty. of General output relay C, 1 NO:11; Qty. of General output relay D, 1 NO/NC :1; Voltage range of auxiliary power supply: DC 24-48V;

Ordering Code

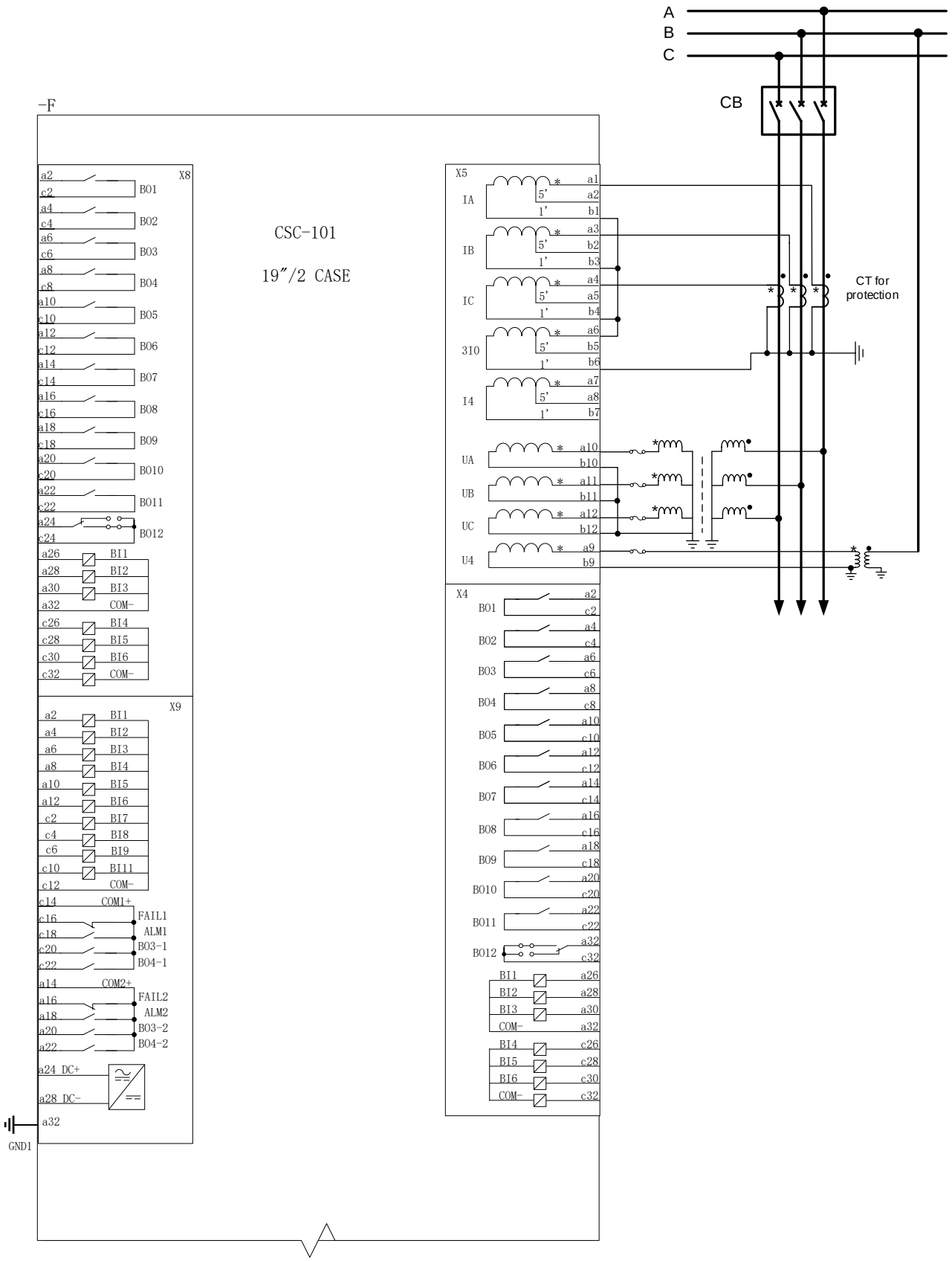
G	Qty. of Power output relay, 1 NO + TCS:1; Qty. of Power output relay, 1 NO:1; Qty. of General output relay A, 2 NO:1; Qty. of General output relay B, 1 NO + 1 NC:1; Voltage range of auxiliary power supply: DC 110-220V;
H	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 110-220V;
I	Qty. of BIs with common terminal:26; Qty. of independent BIs :2; Voltage range of auxiliary power supply: DC 24-48V;
J	Qty. of General output relay C, 1 NO:16;
K	Qty. of General output relay C, 1 NO:15; Qty. of General output relay D, 1 NO/NC :1;
	Front plate
1	Width:19" ; LCD: large; Qty. of LEDs:24; Qty. Configurable buttons:4; Type of front test Port:RJ45;
2	Width:1/2 19"; LCD: Medium; Qty. of LEDs:24; Qty. CB operating buttons:2; Qty. Configurable buttons:4; Type of front test Port:RJ45;

Connection

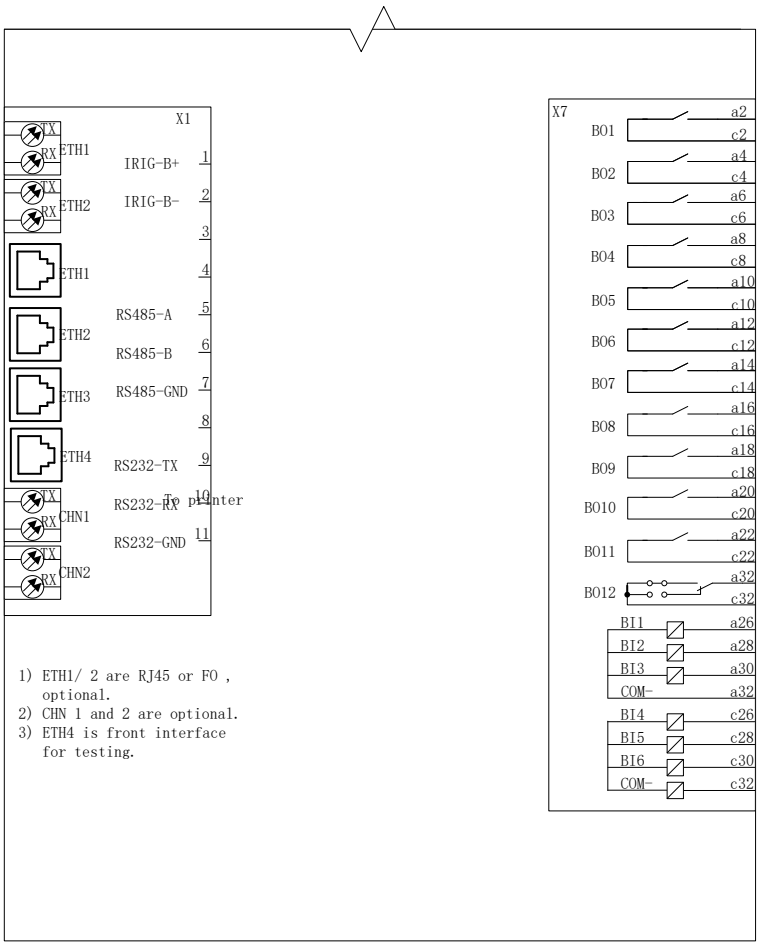
Typical configure 1



Typical configure 2



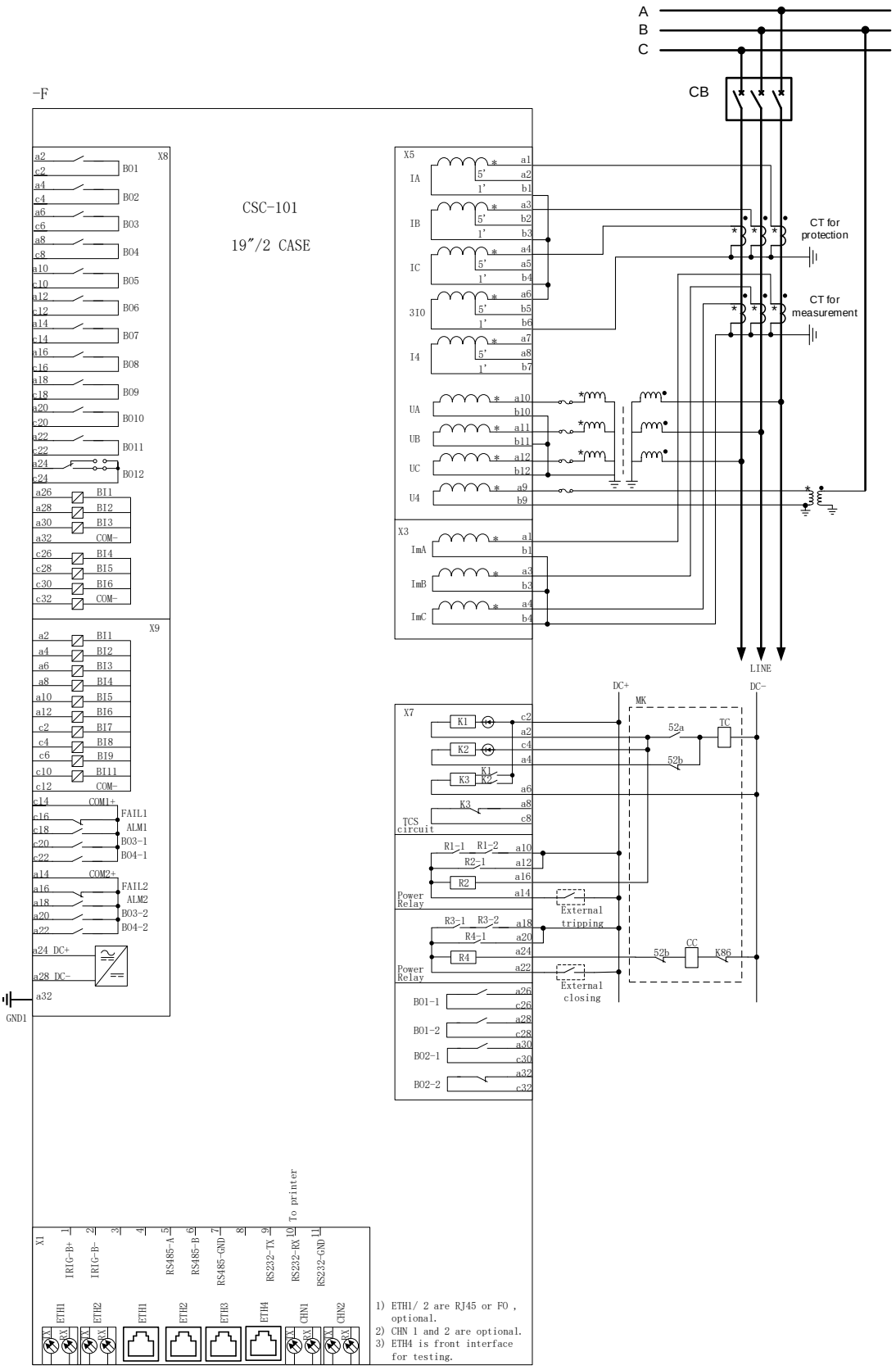
Connection



1) ETH1/ 2 are RJ45 or FO , optional.
2) CHN 1 and 2 are optional.
3) ETH4 is front interface for testing.

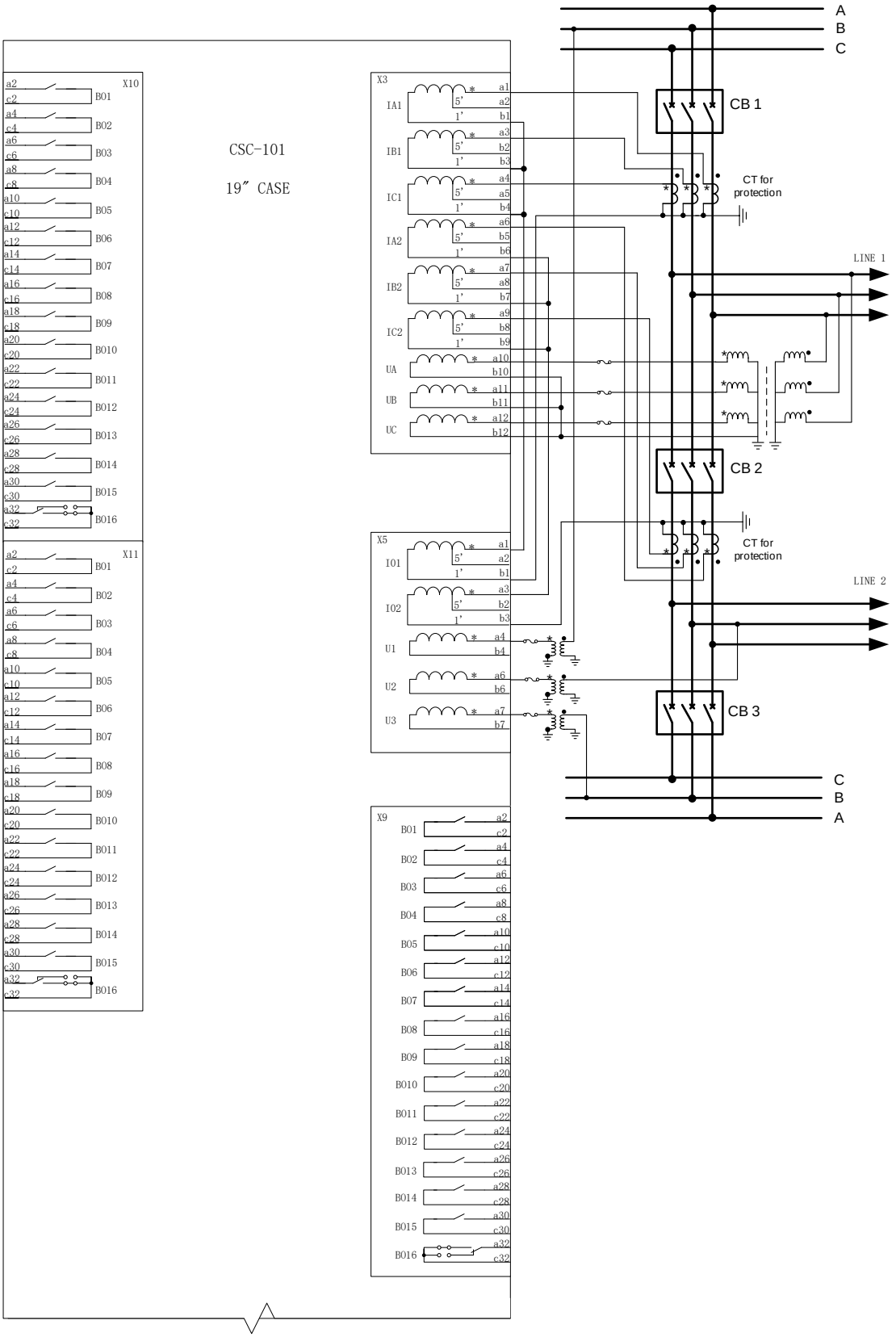
SIFANG

Typical configure 3

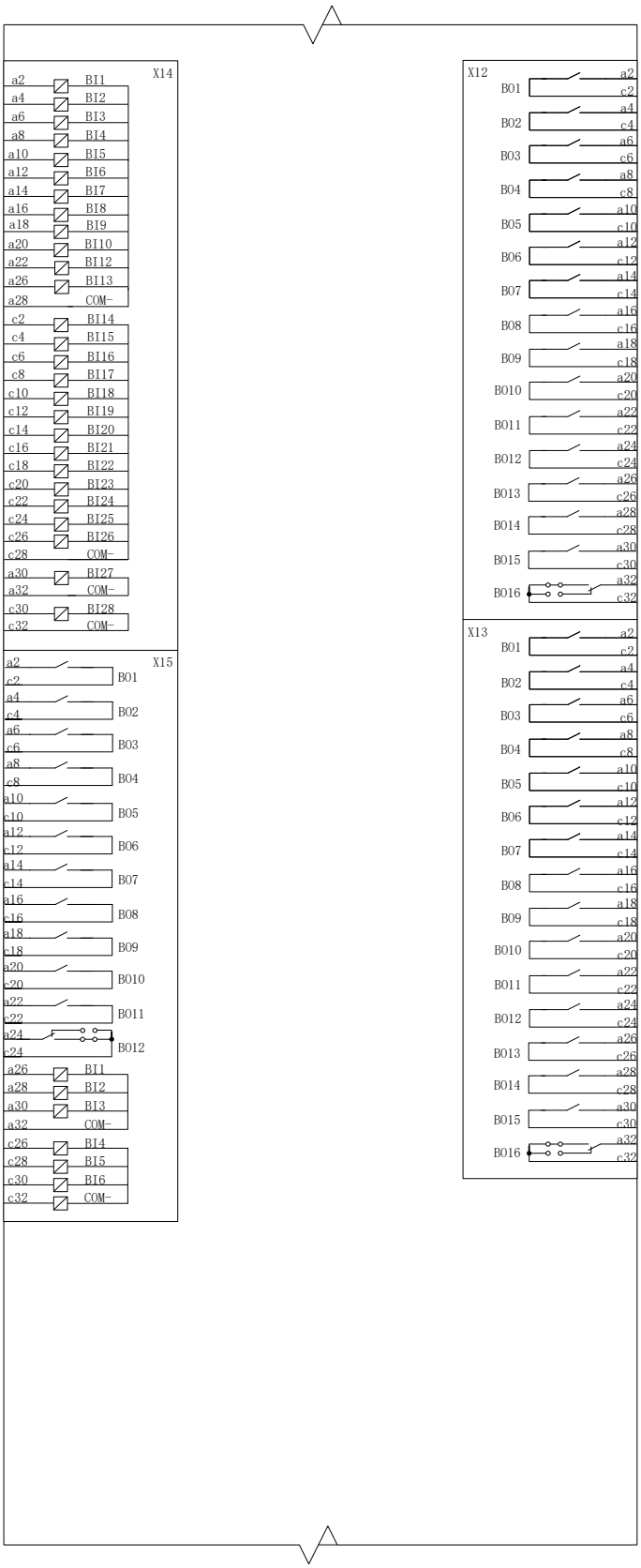


Connection

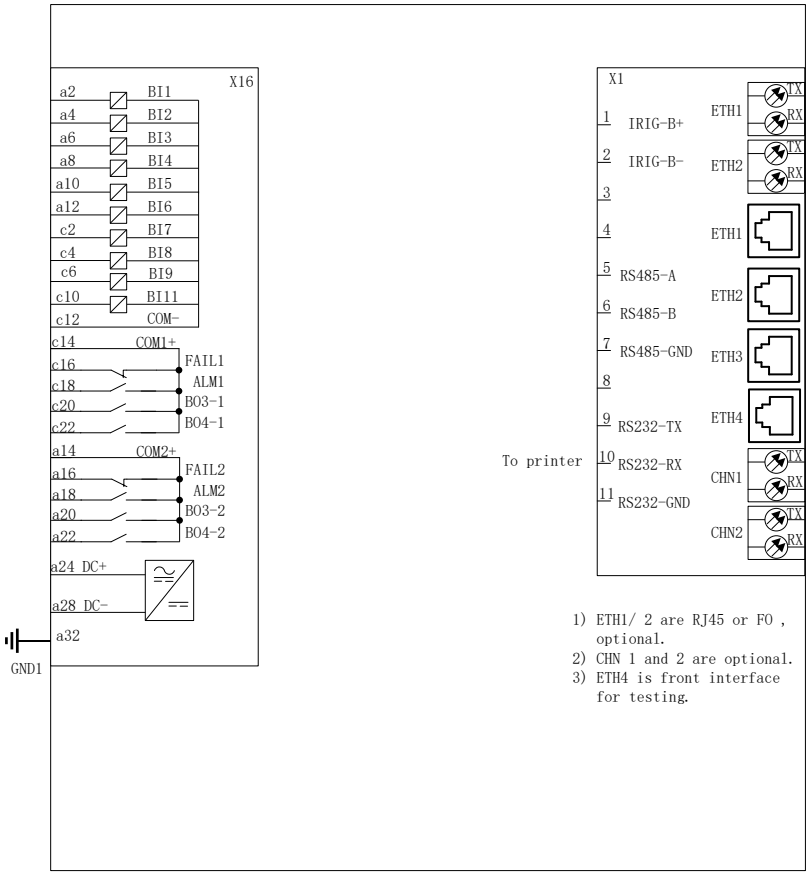
Typical configure 4



SIFANG


X14
a2 BI1
a4 BI2
a6 BI3
a8 BI4
a10 BI5
a12 BI6
a14 BI7
a16 BI8
a18 BI9
a20 BI10
a22 BI12
a26 BI13
a28 COM-
c2 BI14
c4 BI15
c6 BI16
c8 BI17
c10 BI18
c12 BI19
c14 BI20
c16 BI21
c18 BI22
c20 BI23
c22 BI24
c24 BI25
c26 BI26
c28 COM-
a30 BI27
a32 COM-
c30 BI28
c32 COM-
X15
a2 c2 B01
a4 c4 B02
a6 c6 B03
a8 c8 B04
a10 c10 B05
a12 c12 B06
a14 c14 B07
a16 c16 B08
a18 c18 B09
a20 c20 B010
a22 c22 B011
a24 c24 B012
a26 BI1
a28 BI2
a30 BI3
a32 COM-
c26 BI4
c28 BI5
c30 BI6
c32 COM-
X12
B01 a2 c2
B02 a4 c4
B03 a6 c6
B04 a8 c8
B05 a10 c10
B06 a12 c12
B07 a14 c14
B08 a16 c16
B09 a18 c18
B010 a20 c20
B011 a22 c22
B012 a24 c24
B013 a26 c26
B014 a28 c28
B015 a30 c30
B016 a32 c32
X13
B01 a2 c2
B02 a4 c4
B03 a6 c6
B04 a8 c8
B05 a10 c10
B06 a12 c12
B07 a14 c14
B08 a16 c16
B09 a18 c18
B010 a20 c20
B011 a22 c22
B012 a24 c24
B013 a26 c26
B014 a28 c28
B015 a30 c30
B016 a32 c32

Connection



1) ETH1/ 2 are RJ45 or FO , optional.
2) CHN 1 and 2 are optional.
3) ETH4 is front interface for testing.

SIFANG