Substation Automation Products

Relion® 670/650 series IEC and ANSI Hardware

Power and productivity
for a better world™

ABB

Relion® 670/650 series hardware
Contents

elion® 670/650 series

- Introduction
- Modules
- I/O Capability
- Mounting Flexibility
- Communication
- IED HMI

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Relion® 670 series
Hardware

Relion® 670 series

- Common hardware (HW) and software (SW) for the entire 670 series

- Function library according to IEC 61850

- Extensive analog and binary I/O capability
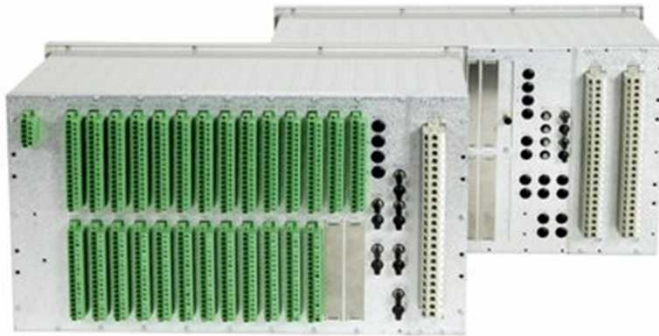
- Type tested platform
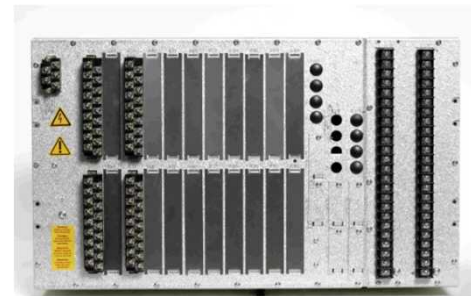
Relion® 670 series

- Few spare parts on modular level

- Type tested platform

- Easy future extensions

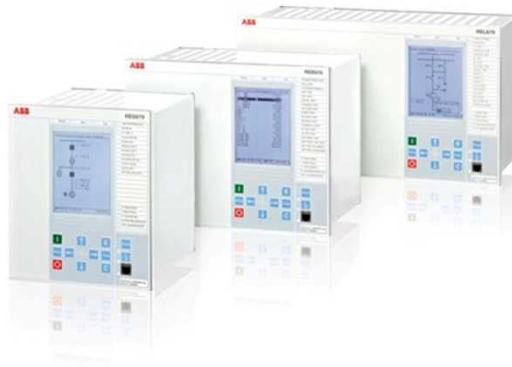**Minimized cost for maintenance**

IEC

ANSI

Relion® 670 series

- Ventilated casing with common look for all products

- 3 sizes - 1/2, 3/4 or 1/1 of 19"

- 6U high (266mm)

- Small or large HMI unit

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Hardware structure
670 series

- Transformer Input Module TRM 6I + 6U, 9I + 3U or 12I

- One or two - TRM1 & TRM2 for 12 or 24 analog CT or VT inputs

- Analog Digital Conversion module ADM1 and ADM2 for TRM inputs

- Central Processing Unit NUM

- GPS time synchronization module GSM (option)

- Time synchronization via binary signal and communication ports IRIG-B

- Binary Input / Output modules BIM, SOM, BOM, IOM, MIM

- Power supply module PSM

Hardware platform
670 series

Relion 670 series

Introduction

Modules

I/O Capability

Mounting Flexibility

Communication
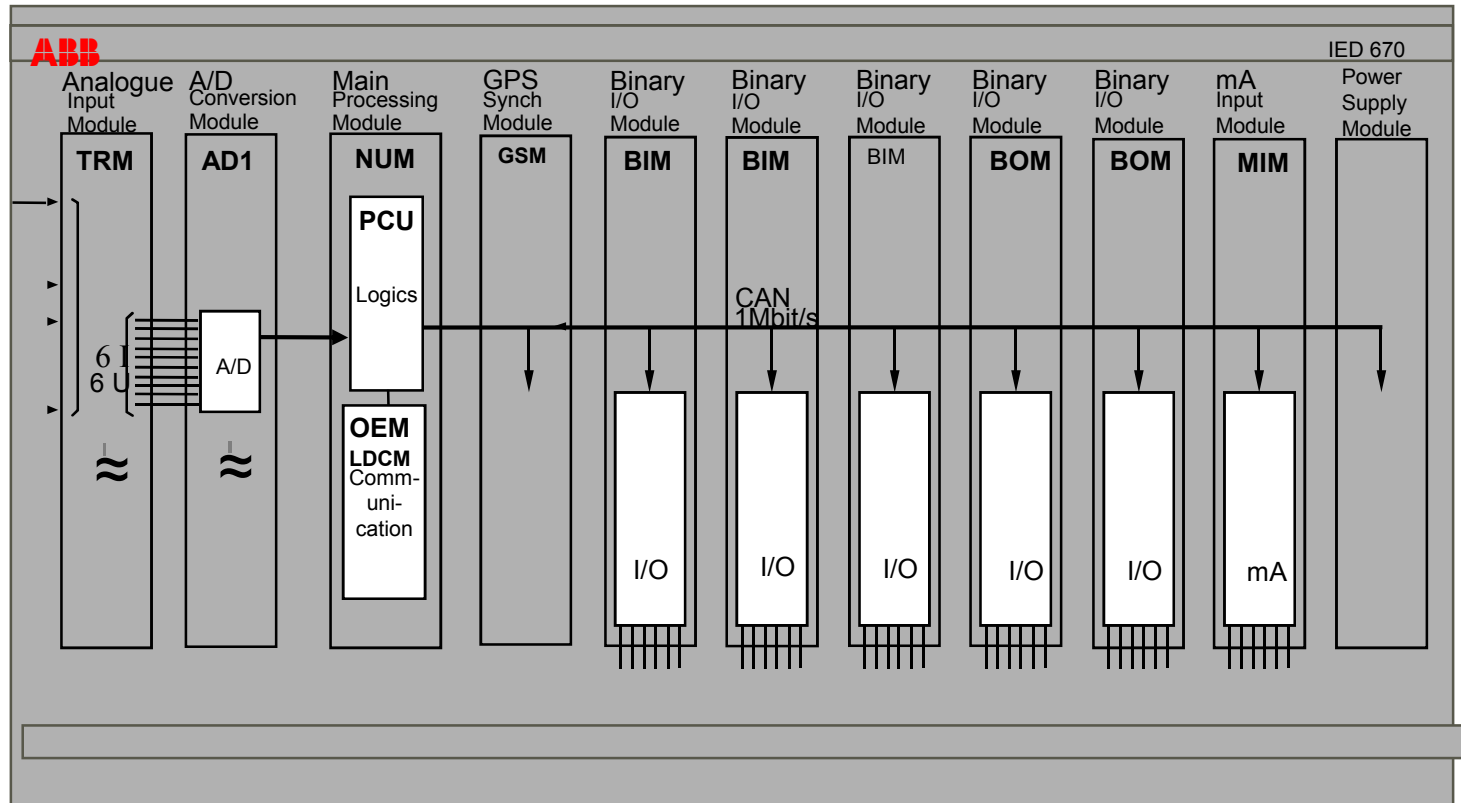
IED HMI

View from rear side with contacts
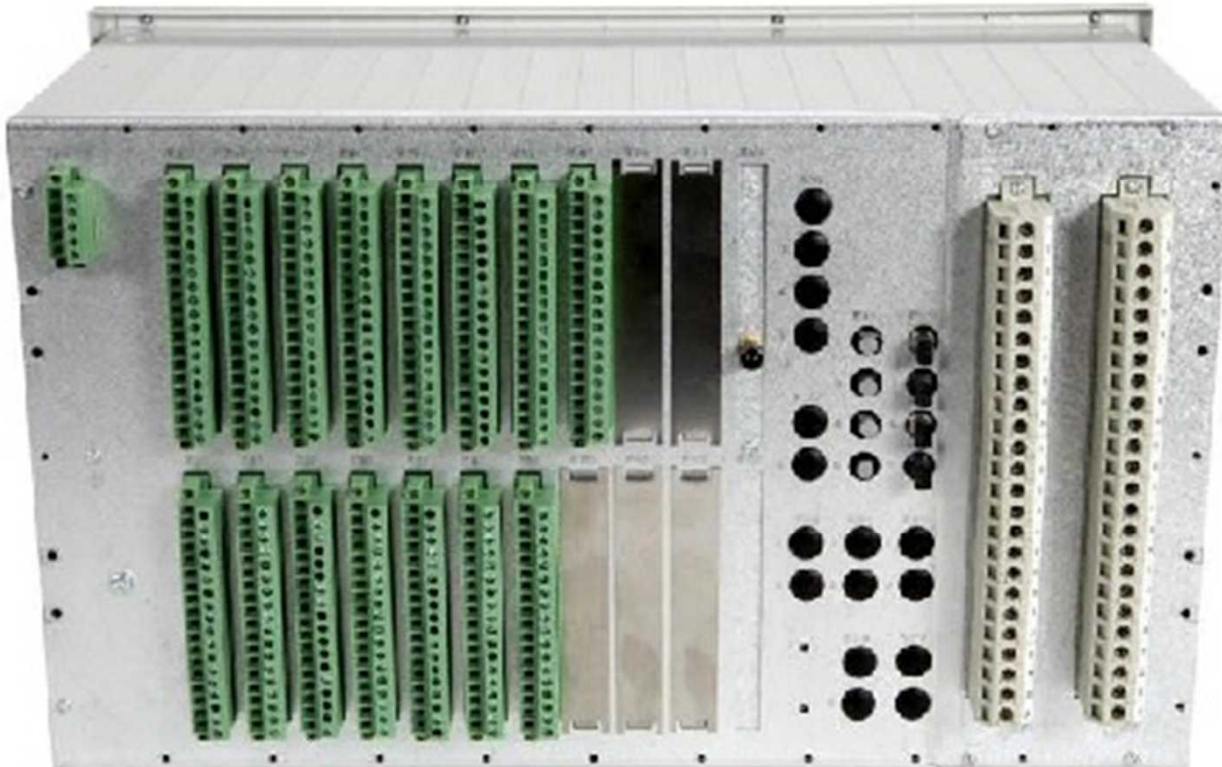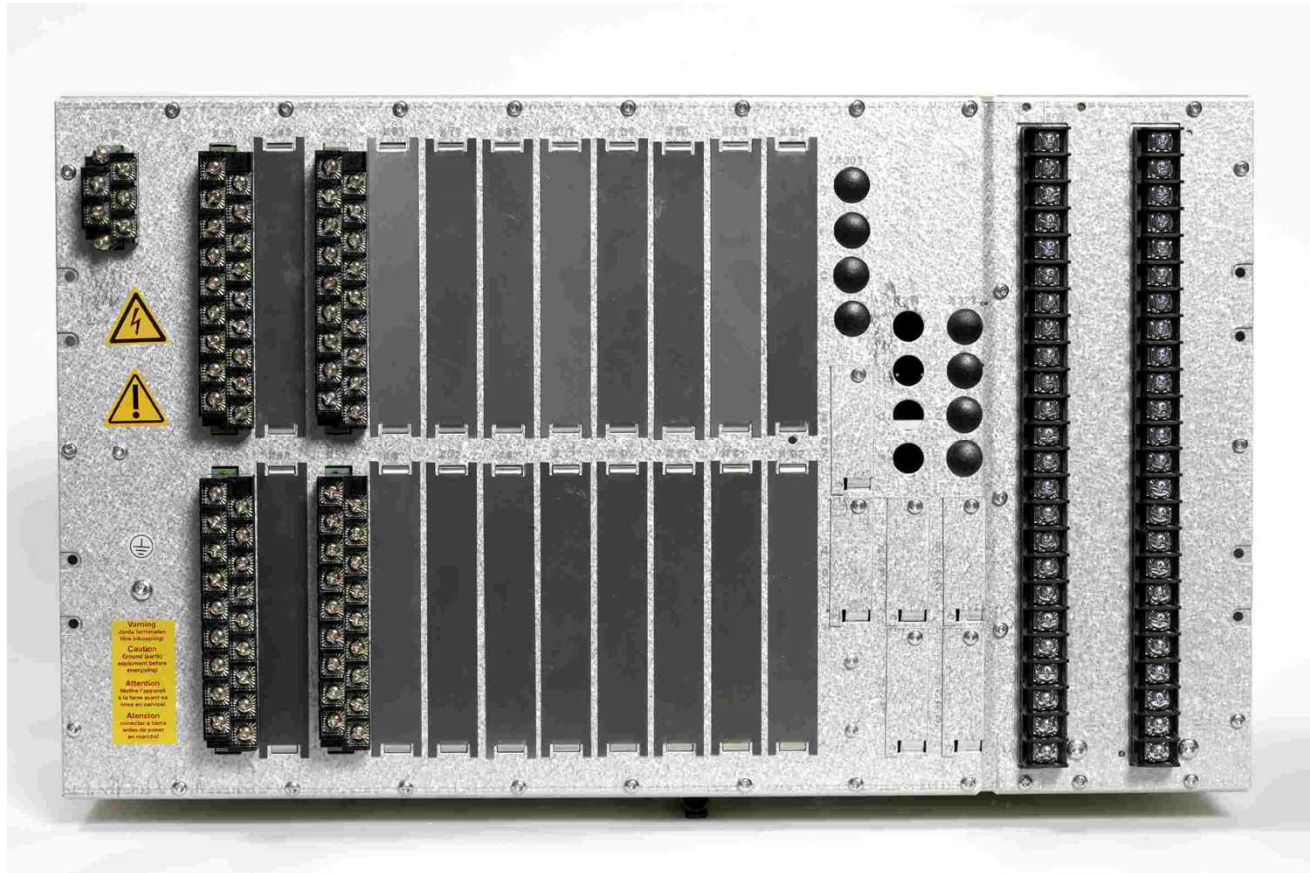## 670 series

Relion 670 series

Introduction

Modules

I/O Capability

Mounting Flexibility

Communication

IED HMI

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View from rear side with ringlugs
670 series

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Numerical module
670 series

- Main Controller/CPU type IBM 3200 PowerPC 750FX/GX, 600 MHz

- Internal communication with cPCI bus 100 Mbit/s

- Memory

  - Up to 128 Mb FLASH

  - Up to 256 Mb DRAM

- Cycle time in 670 series

  - 1 or 3 ms for protection

  - 8 or 100 ms for logic

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Interfaces on the numerical module
670 series

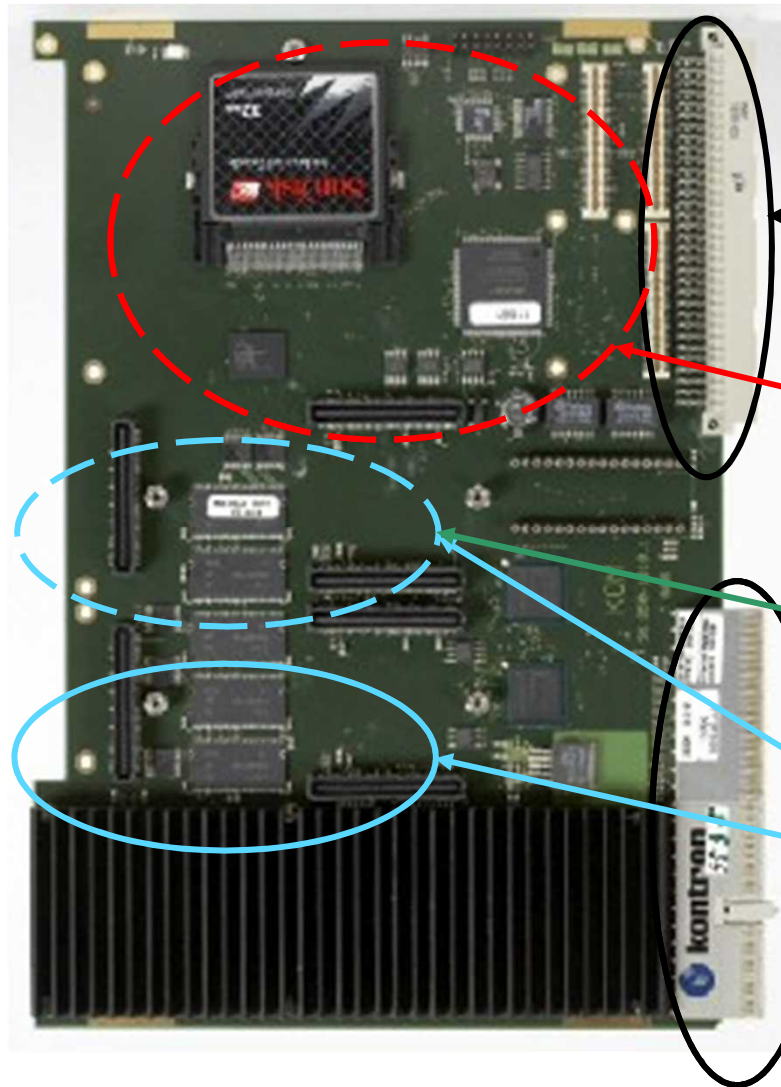Motherboard interface

Mounting position for serial communication module with SPA, LON, IEC -103

Mounting position for IRIG-B module

Mounting positions for two 64 kbit communication modules

Internal communication cPCI bus

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Analog / digital conversion module 670 series
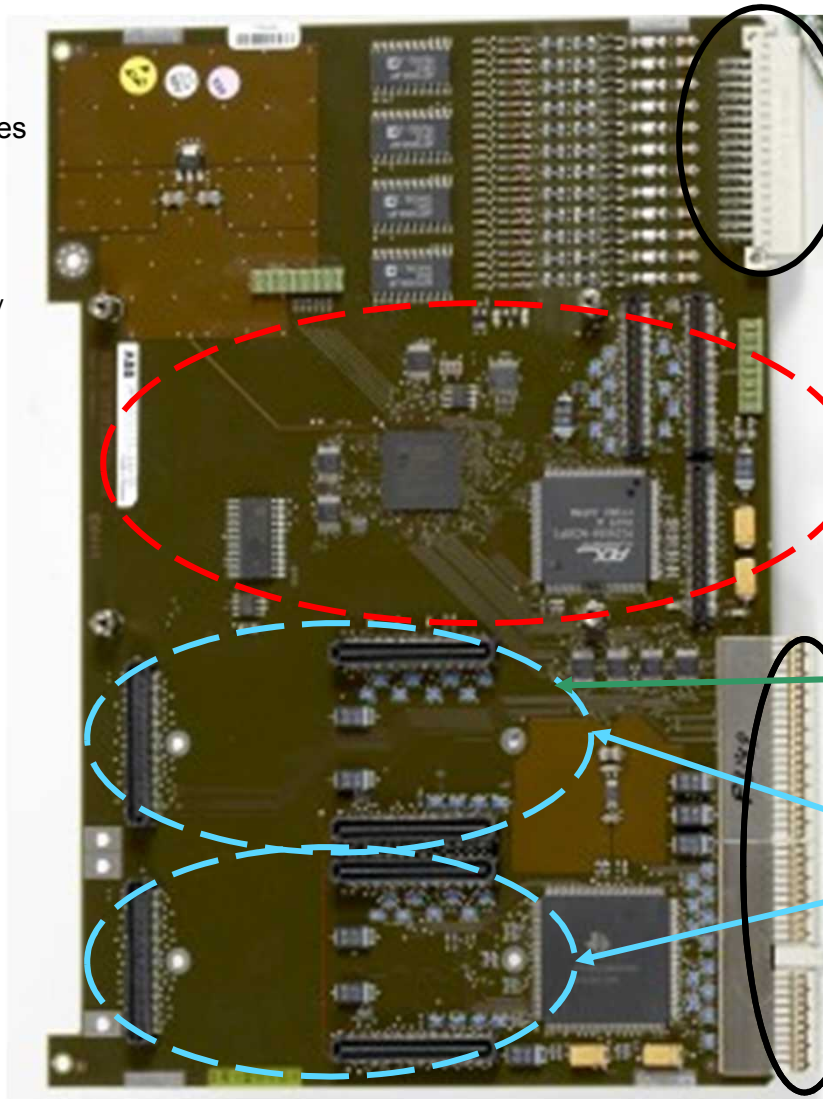
Analog inputs from transformer module

Mounting position for Optical Ethernet module (only on AD1)

cPCIbus

Mounting positions for EIA-485 module (only on AD1)

Mounting positions for 2 extra LDCM modules (only on AD1)

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Transformer input module
670 series

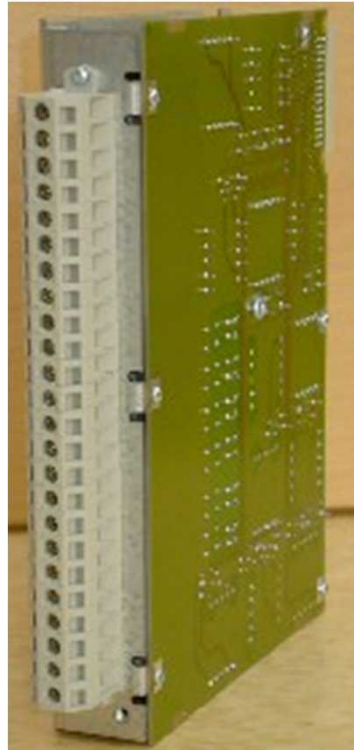- Up to 12 analog inputs can be connected
  - 0 - 6 U, 110-220 V rated range 50/60 Hz
  - 6 -12 I, 1 A or 5 A rated current

- Isolation barrier preventing disturbances to enter into IED

- Adapt measured values to static circuitry

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Standardized transformer modules
670 series

Transformer module (TRM 12)	1 A	5 A	110/220 V
6I and 6U	6		6
6I and 6U		6	6
9I + 3U	9		3
9I + 3U		9	3
9I + 3U	5	4	3
12I	12		
12I		12	
6I	6		
5I + 5U		5	5

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Power supply module
670 series

- Input range: 24-60 V DC

- Input range: 90-250 V DC

- Internal fail relay output

- DC/DC Converter provides full isolation between IED and external battery system

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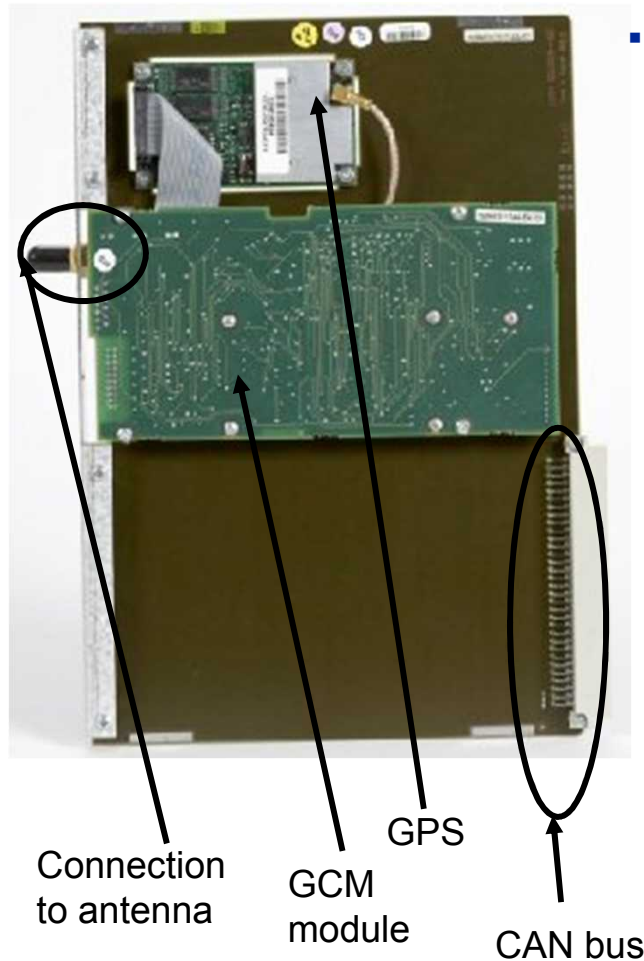# GPS time synchronization module
670 series

Connection to antenna

GCM module

GPS

CAN bus

- For multi-terminal current differential protection

  - 1 MHz High Accuracy output; < 1µs

  - Minute pulse / IRIG-B

    - Accuracy 1ms (Not suitable for differential protection)

  - IEC 61850-8-1 synchronization

    - Accuracy < 1 ms

  - LON synchronization

    - Accuracy < 2 ms

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IRIG-B
670 series

- The IRIG interface to the IED supplies two possible synchronization methods, IRIG-B and PPS

  - IRIG-B is a protocol used only for time synchronization

  - An optical PPS signal can be supplied to the optical interface of the IRIG module

  - Max 1 IRIG-B module per IED

  - Mounting position for the IRIG-B module is pos 302 on NUM

GPS antenna and coaxial cable
670 series

- Accurate synchronization of sampled data

  - 1 microsecond accuracy

- Line Differential Protection applications with switched communication network

- Wide Area Protection and Phasor Measurement Unit applications

- SMA contact for connection to GSM

Accurate time synchronization for each installation

I/O-modules
670 series

IEC
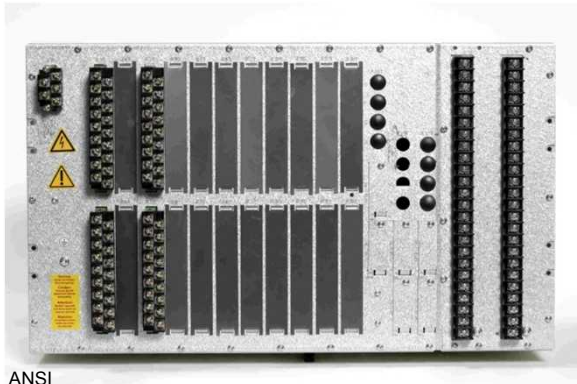
ANSI

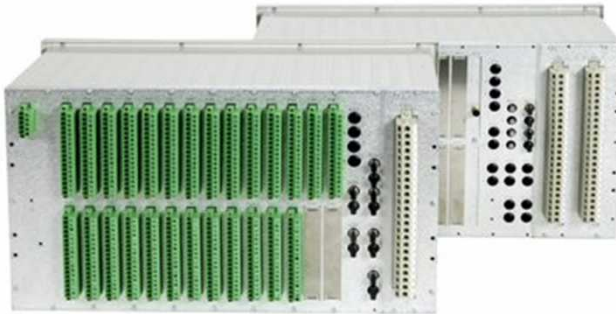- Full 19" case with 24 binary analog inputs and up to 11 (6 with ring lug) I/O modules

- Full 19" case with 12 binary analog inputs and up to 11 (7 with ring lug) I/O modules

- ¾ x 19" case with 24 analog inputs and up to 7 (3 with ring lug) I/O modules

- ¾ x 19" case with 12 analog inputs and up to 7 (4 with ring lug) I/O modules

- ½ x 19" case with 12 analog inputs and up to 3 (2 with ring lug) I/O modules

Extensive I/O capability enables unique function integration

ABB
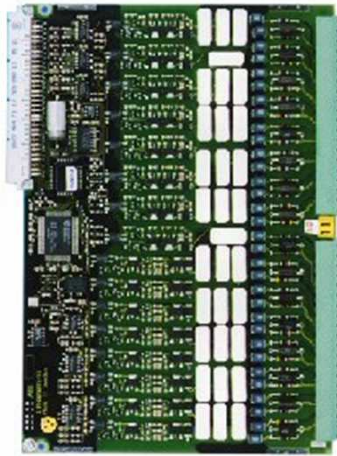
EMC enhanced binary input module
670 series

- 16 independent Binary Inputs

- Increased interference immunity
  2 x IEC requirements for 50 ms

- Debounce filter, T = 5 ms

- Oscillation suppression detection within
  1 s; > 0 - 40 Hz

- No pulse counting Auxiliary voltage

  - 24/30 V DC (± 20 %)

  - 48/60 V DC (± 20 %)

  - 110/125 V DC (± 20 %)

  - 220/250 V DC (± 20 %)

  - Threshold voltage 60 %

Increased interference immunity

[mA]

30

1

35   70

[ms]

ABB
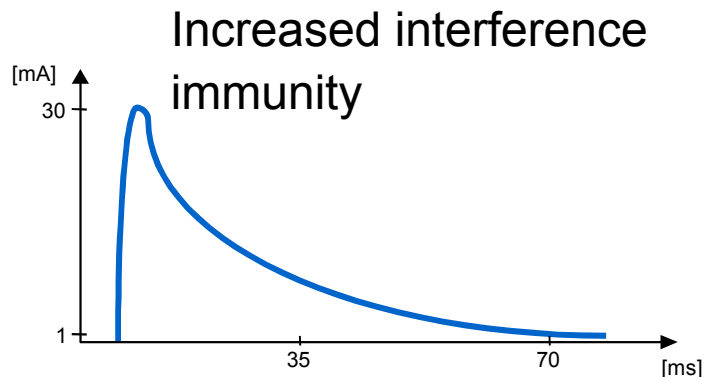
Binary input module for pulse counting
670 series
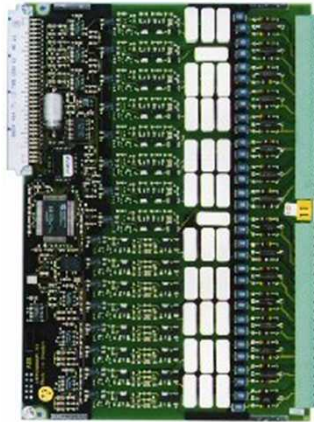
- 16 independent Binary Inputs

- Debounce filter, T = 5 ms

- Oscillation suppression detection within 1 s; > 0 - 40 Hz

- Pulse counting available for all inputs

- Auxiliary voltages

  - 24/30 V DC (± 20 %)

  - 48/60 V DC (± 20 %)

  - 110/125 V DC (± 20 %)

  - 220/250 V DC (± 20 %)

  - Threshold voltage 60 %

Standard interference immunity

ABB
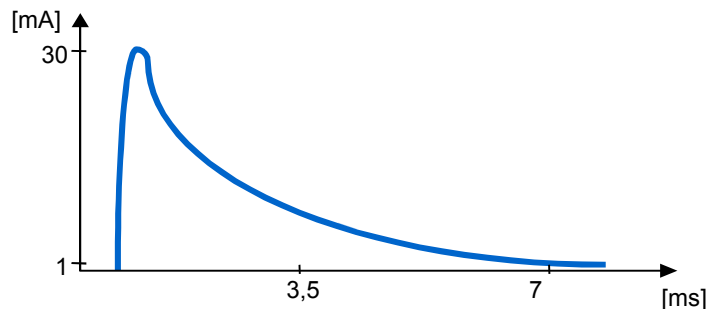
Binary output module
670 series
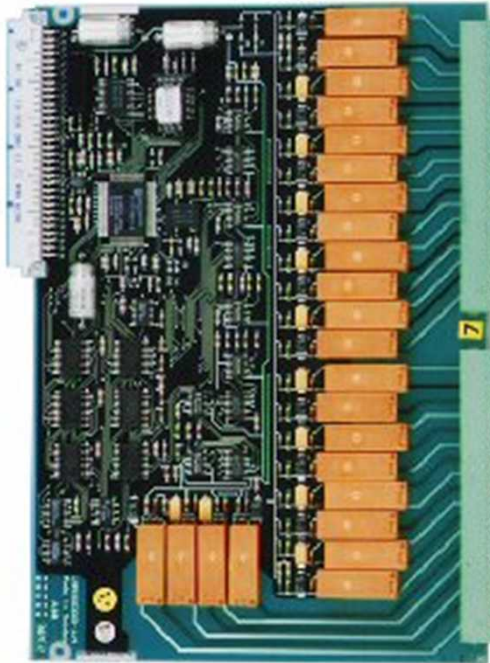
- Two variants

  - 24 single output relays

  - 12 double pole command output relays

ABB

EMC enhanced binary input/output module
670 series
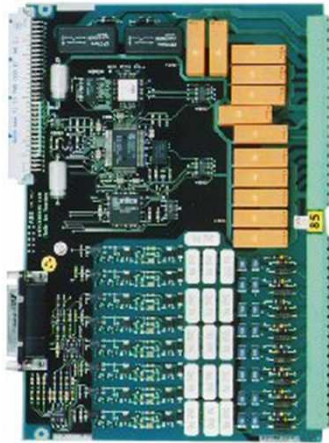
- 8 independent Binary Inputs and 10 + 2 Binary Output relays

- Increased interference immunity 2 x IEC for 50 ms

- Fixed filter time 3/5 ms

- Auxiliary voltage

  - 24/30 V DC (± 20 %)

  - 48/60 V DC (± 20 %)

  - 110/125 V DC (± 20 %)

  - 220/250 V DC (± 20 %)

Increased interference immunity

[mA]

30

1

35   70   [ms]

ABB
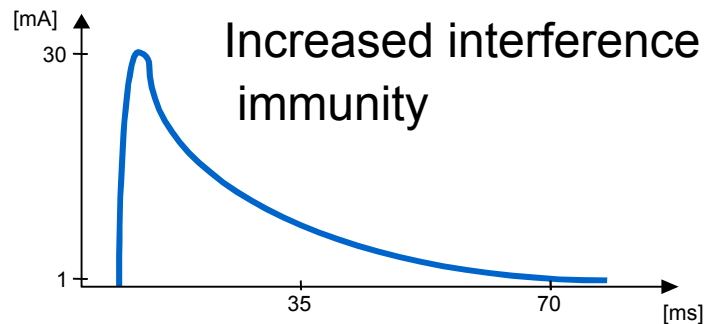
Static output module
670 series
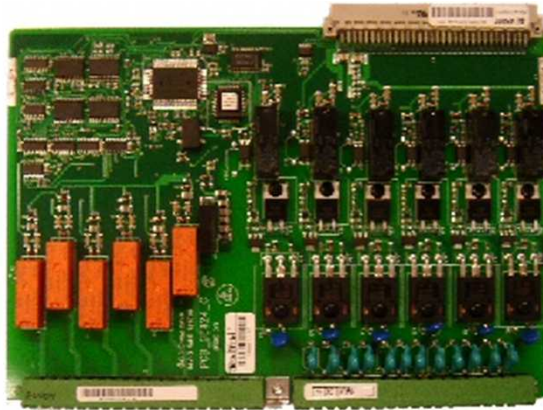
- ## High Speed Applications

  - 6 static binary outputs

  - 6 change-over contacts

ABB

mA input module
670 series
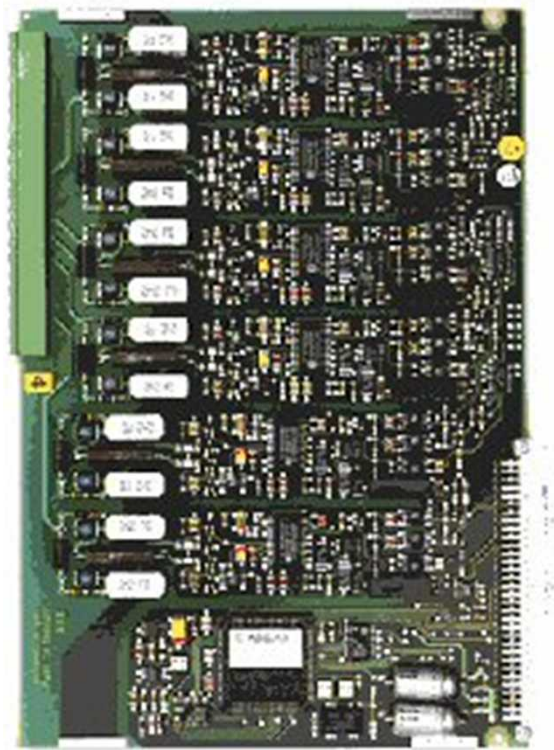
- 6 independent input channels
- Software selected input ranges
    - 0-5, 0-10, 0-20, mA
    - 1-5, 2-10, 4-20, mA
    - $\pm 5, \pm 10, \pm 20$ mA
- Resolution: 16 bit
- Accuracy: 0,1 %
- Independent settable digital filters
- Supervision of
    - Limits
    - Overflow
    - Max/Min Range

Mounting arrangements
670 series
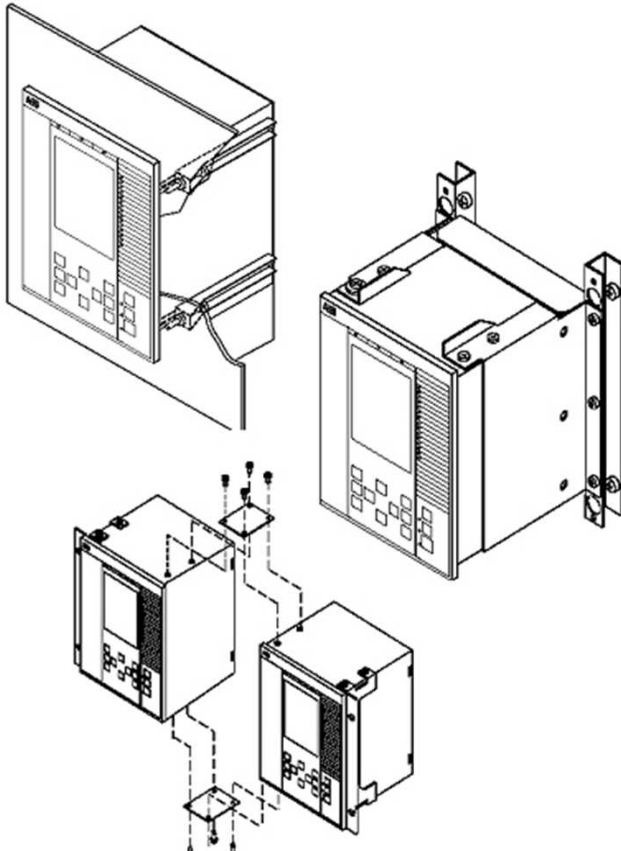
Several mounting alternatives

- ½, ¾ and 1/1 rack size

- Flush-, Semi-flush, wall- and rack mounting

- IP 54 front protection flush mounting

- Side by side

Rack, panel or surface mounting
670 series

Wiring cover

xx04000449.vsd
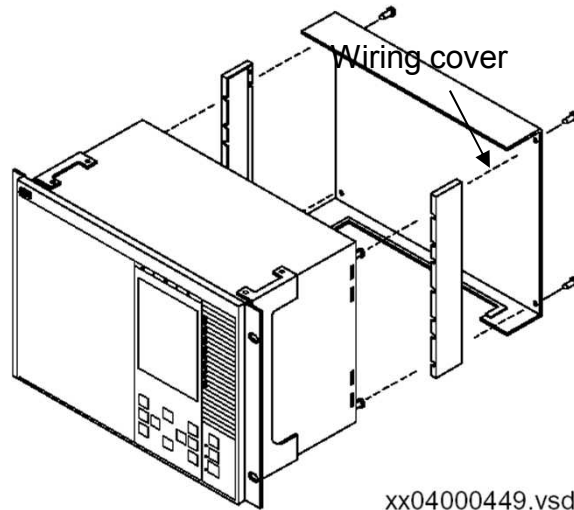
- 1/2, 3/4 or 1/1 of 19" wide

- 6U = 266 mm high

- 205 - 245 mm deep

Suitable for new and retrofit installations

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Serial communication module
670 series

- Communication protocols
  - LON
  - SPA
  - IEC 60870-5-103
  - DNP 3.0
- Alternative media
  - Glass fiber
  - Plastic fiber
  - Combination of glass & plastic fiber
- Max 1 module per IED

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EIA-485 for DNP-3
670 series
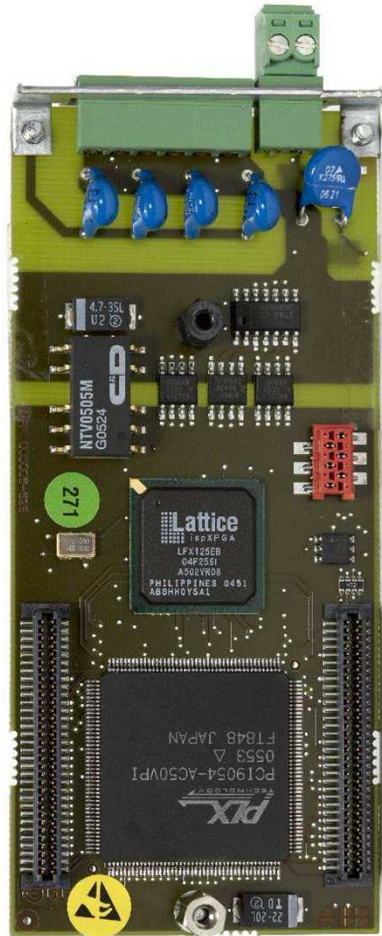
- Galvanic EIA-485 communication module for DNP 3.0

- Either two or four wire connection

  - Max 1 EIA-485 module per IED

  - Mounting position for the EIA-485 module is pos 312 on AD1

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Line data communication module
670 series

- Two versions for fiber optic communication:
  - Multi mode ST fiber 50/125 μm or 62,5/125 μm for short range
  - Single mode FC fiber 8/125 μm for medium and long range
- Transmission of 4 analog values and 8 binary signals
- Transmission of up to 192 binary signals when no analog
- 64 kbit communication channel in HDLC
- Optical budget:
  - Long range 26 dB or up to typically 120 km
  - Medium range 20 dB or up to typically 80 km
  - Short range 11 dB 62,5/125 μm and 7 dB 50/125 μm
  - Galvanic X21 short range for connection to multiplexers
- The IEEE/ANSI C37.94 standard format is used
- Up to 4 modules per IED with restrictions for case size
- Mounting position for the 64 kbit communication module is on NUM, AD1 or AD2

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Optical ethernet module
670 series

Module with two ports
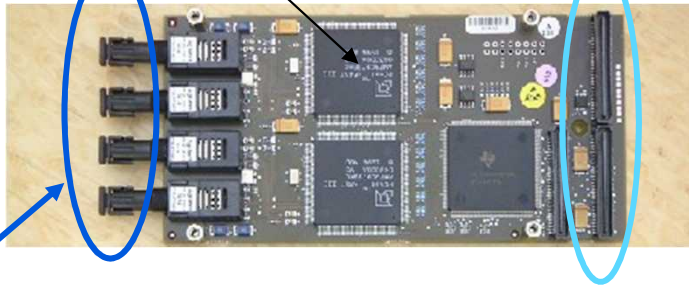
Glass
fiber

or

Glass
fiber
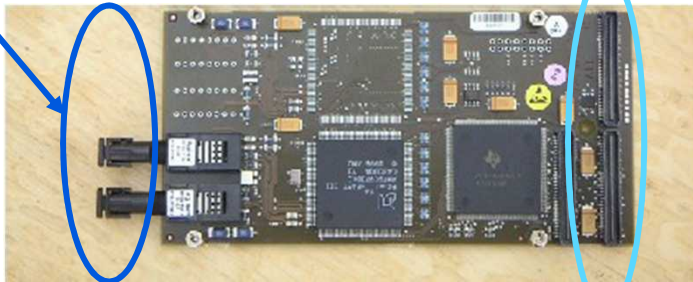
Module with one port

Internal communication bus

- IEC 61850-8-1 protocol
  - Ethernet 100 Mbit/s link
  - One or two optical ports
  - Multimode fiber 62,5/125 μm
  - ST fiberoptic connector
- Optical budget 13 dB
  - Typical maximum distance between nodes, 1 km
- Max one module located on A/D converter one

Versatile selection of communication protocols

Optimized local control and monitoring
670 series
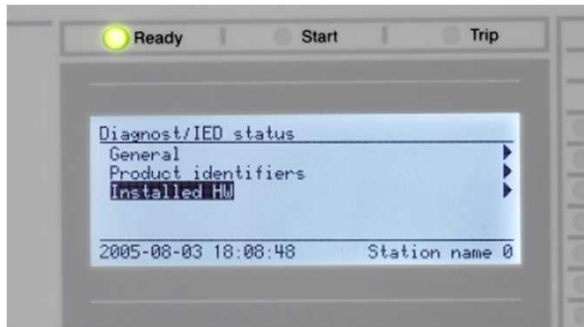
IEC

- Direct interaction with IEDs without any tools

- Control of up to 30 apparatuses

- The exact presentation of your switchgear arrangement on LCD

- Easy to adapt the graphical display to the changes in the process

- The arrow keys provide easy access to settings

  - All parameters can be read and set via the local HMI

- ANSI symbols in the HMI available

Quick access to important information
670 series
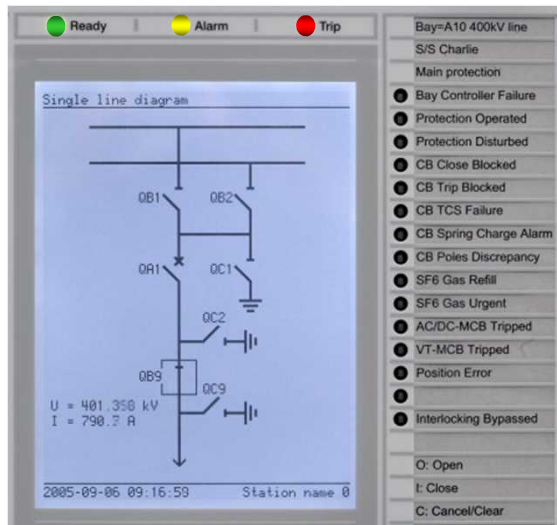
- IED status indication LEDs

  - Green
    - Steady: In service
    - Flashing: Internal failure
    - Dark: No power supply

  - Yellow
    - Steady: Disturbance
      - recorder triggered
    - Flashing: IED in test mode

  - Red
    - Steady: Trip command issued
    - Flashing: IED blocked

- Measurements

- Binary signals via indication LEDs

Relion® 650 series Ver. 1.3
Hardware

Relion® 650 series

- Platform based

  - Few spare parts needed on module level

  - Common module firmware

  - Easy to add hardware if needed

  - Minimized cost for maintenance and training

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Relion® 650 series

- **Time synchronization**
  - Time synchronization – SNTP and DNP 3.0
  - IRIG-B serial interface

- **Communication**
  - IEC 61850-8-1
  - Parallel Redundancy Protocol (PRP) according to IEC 62439-3 Ed. 2
  - DNP 3.0
  - IEC 60870-5-103

Dimension
  - 1/1 x 19", 3U (Ver. 1.2 and 1.3)

Mounting flexibility
  - Flush-, semi-flush, wall- and rack mounting
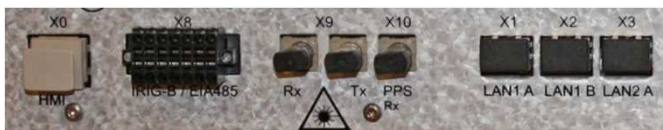 - Side by side

Relion® 650 series

IEC

ANSI

- Communication & Processor Module, COM
- Power supply module, PSM
- Transformer module, TRM
- Transformer module (2nd), AIM
- Binary input/output module, BIO

  Binary input/output module, BIO, option

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Communication and processor module
650 series

- Ethernet communication, LC optical IEC61850-8-1, DNP3.0

- Optical serial port, ST connection, IEC 60870-5-103 glass fiber

- Local HMI connection. RJ45

- IRIG-B, screw terminals

- Choice of communication and processor module with:

  - COM05: 12 binary inputs, TCP/IP optical, IRIG-B, galvanic RS485 and optical serial communication ports

  - COM03: TCP/IP optical with PRP redundancy, IRIG-B, galvanic RS485 and optical serial communication ports

Power supply module
650 series

- PSM01/02/03

  - Power supply modules from 24 to 30 V DC, 48 to 250 V DC or 100 to 240 V AC with 9 outputs, 3 of which with trip circuit supervision

  - Internal fail (IRF) self-supervision contact

  - Two LEDs Battery and Ready

ABB
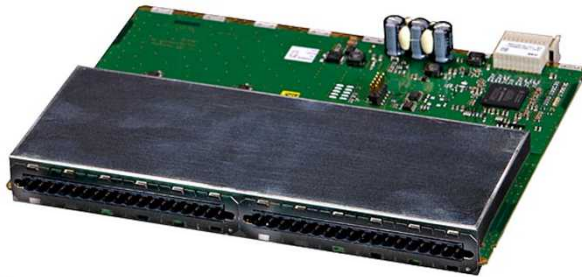
Transformer modules
650 series

TRM01/AIM01 module

- 10 analog inputs per module
  - 8I+2V, 6I+4V, 4I+1I+5V, 4I+6V (TRM)
  - Sensitive current channel 0.1 /   0.5 A
  - 6I+4V, 4I+1I+5V (AIM)

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Input and output modules
650 series

- I/O flexibility

- Analoge inputs

  - 10 or 20 analog inputs.

  - 1A and 5A on the same CT

- Binary inputs/outputs

  - 14 – 50 binary inputs, 9 – 45 binary outputs

  - Compression type or ring lug cable termination

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IED HMI
650 series

IEC

- **Efficient interaction with the IED**
  - Direct interaction with IEDs without any tools
  - Graphical display adapted to the application
  - Local language support
  - Forcing of binary output when in test mode

- **Monitoring**
  - IED status indication LEDs
  - Measurements
  - Binary signals via indication LEDs
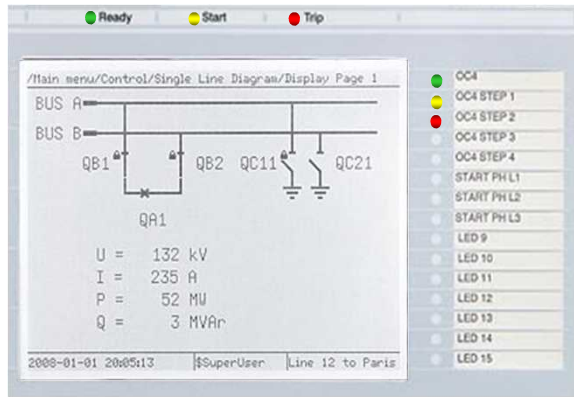 - Disturbances and events

IED HMI
650 series

IEC

- Control
  - Control of up to 8 apparatus
  - The exact presentation of the configured switchgear arrangement
  - Bypass operations
- Settings
  - All parameters can be read and set via the IED HMI
- Five configurable push button shortcuts with labels presented on the display for different actions

IED HMI
650 series

- Status indication LEDs indicate the status of the IED:
  - Green
    - Steady: In service
    - Flashing: Internal failure
  - Yellow:
    - Steady: Disturbance recorder triggered
    - Flashing: IED in test mode
  - Red:
    - Steady: Trip command issued
    - Flashing: IED blocked
- Indication of binary signals via 15 three-color-state indication LEDs on up to three pages

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