Sample Specifications

Relion 670
General specifications

The IED shall support the following communication and time synchronization options:

- IEC 61850-8-1 including GOOSE and client-server MMS communication, with the option of changing from Edition 1 to Edition 2, or vice versa.
  - MMS communication shall be supported for up to 8 different clients
  - GOOSE, MMS and SV shall be available on every Ethernet port on the IED, with the option of enabling or disabling each of them by a parameter setting
- IEC 61850-9-2 LE process bus, with the option of mixing conventional analog channels with IEC 61850-9-2 LE in the same device. In the event a 9-2LE stream is lost, the IED shall block the functions that are dependent on the lost stream, while all other functions dependent on streams that are still available shall remain in operation.
- IEC 62439-3 parallel redundancy protocol (PRP) with zero seconds recovery time in case of communication failure. PRP shall be supported for the engineering tool, MMS, GOOSE, DNP3.0, FTP, SNTP, and PTP services.
- IEC 62439-3 high-availability seamless redundancy (HSR). HSR shall be supported for the engineering tool, MMS, GOOSE, DNP3.0, FTP, SNTP, and PTP services.
- IEC 60870-5-103 communication protocol
- DNP 3.0 communication protocol
- SPA communication protocol
- LON communication protocol
- Remote end communication for transfer of up to 9 analog signals and 192 binary signals in each direction simultaneously using one communication module in each IED, using the IEEE/ANSI C37.94 standard format.
- The IED shall support IEC 62351-8, and provide a full NERC-CIP level 5 cybersecurity compliance, including:
  - user authority and password management
  - centralized user authority and password management support
  - cybersecurity-related logged events (user log-in; log-in unsuccessful; password changes, etc.)
- The IED shall include the IEEE 1588-2008 / IEC 61850-9-3 precision time protocol (PTP), and the possibility of being synchronized by a master clock, or acting as a master clock. It also shall be able to serve as an IEEE 1588-2008/IEC 61850-9-3 boundary or transparent clock.
- Time-synchronization through GPS, SNTP, DNP 3.0, IEC 60870-5-103, IRIG-B, or PPS.
- The IED shall be capable of serving as an SNTP server.
- The IED shall have an Ethernet interface for communication with the engineering tool.
The IED shall support the following communication interfaces:

- An RJ-45 Ethernet interface on the front LHMI of the IED that can be used to connect the software engineering tool. This port shall also support DHCP, and the IEC 61850 standard.
- Up to six Ethernet interfaces according to IEEE 802.3u 100BASE-FX or IEEE 802.3u 100BASE-TX with 100 Mbit/s communication speed, freely configurable for single or redundant (HSR or PRP) communication for any protocol via Ethernet; it shall be possible to connect the software engineering tool to the IED via the mentioned Ethernet channels; the connector for each port shall be selectable between optical connector, or connector type RJ45.
- A serial communication interface used for SPA, IEC 60870-5-103 and DNP3.0; this module shall be optical, supporting glass fiber: 62.5/125 mm or 1 mm plastic fiber.
- An optical communication module used for LON; this module shall be optical, supporting glass fiber: 62.5/125 mm or 1 mm plastic fiber.
- A galvanic RS485 communication module with communication speed of 2400-19200 baud, which shall support a RS-485 6-pole connector or soft ground 2-pole connector.
- A galvanic 64 kbit/s X.21 line data communication module.
- A remote-end communication module using ANSI/IEEE C37.94 communication protocol for the following distances, with selectable speed of 64 kbit/s or 2 Mbit/s:
  - up to 3 km using multi-mode fiber
  - up to 110 km using single-mode fiber

The local HMI of the IED shall meet the following criteria:

- Graphical display capable of showing a user a defined single-line diagram and providing an interface for controlling switchgear; the display shall have up to 12 different pages, used for monitoring and controlling one or several bays, or for customized functionality like displaying measurements.
- Graphical display capable of showing virtual push-buttons and dynamic texts linked to the internal logic of the IED.
- A back lit HMI to ensure readability in dark conditions.
- Navigation buttons, virtual keyboard, and configurable command buttons that shall be freely configurable for shortcuts in the HMI tree, or for simple commands.
- User defined dynamical three-color LEDs for indications and alarms; the IED shall be capable of configuring up to 135 different LED indications.
- Ethernet communication port for commissioning and test purposes.
- Access to the various menus through the LMHI shall be protectable by password.
- Control of the primary apparatus using a two-step select operate command.

The IED shall be able to display the following quantities on the LHMI and on the substation automation system:

- Measured voltages, currents, frequency, active, reactive and apparent power and power factor.
- Measured analog values from merging units.
- Primary phasors
- Positive, negative and zero sequence currents and voltages.
- mA, input currents
- Pulse counters
The IED shall have the following monitoring capabilities:

- Disturbance recorder with disturbance report:
  - non-volatile memory capable of storing up to 100 disturbance recordings
  - 40 analog channels (30 physical and 10 derived) with 1000 Hz sampling rate for 50 Hz systems and 1200 Hz sampling rate for 60 Hz systems
  - 352 binary channels
  - disturbance recorder shall have a post-fault retriggering option
  - recordings shall be stored in the device in COMTRADE format
- Event list for 1000 process events and 2048 security events.
- Event and trip value recorders.
- Self-supervision with internal event list function. The IED shall be capable of flagging error signals from time synchronization and individual error signals from I/O modules.
- Adjustable breaker monitoring with the capability to handle multiple breaker types. Breaker monitoring function shall comprise of the following:
  - travel time of the CB during opening operation
  - travel time of the CB during closing operation
  - number of CB operations
  - CB remaining life of respective phase
  - the number of days CB has been inactive
  - the CB charging time of the
  - the accumulated energy (I^2t) based on current samples
- Temperature and pressure insulation supervision for gas medium for circuit breakers.
- Fault locator
- Event counters
- Running hour meter
- Elapsed time integrator with limit transgression and overflow supervision.
- Supervision of AC and mA input quantities.
- Limit counter for 4 independent limits for binary signals with overflow indication.
- Ethernet access point diagnostics for all Ethernet ports on the IED, including diagnostics for redundant communication; Ethernet access point diagnostics shall be able to indicate denial of service.
- IEC 61850 quality monitor, detailing the quality of an IEC 61850-9-2LE analog channels.
- Supervision of remote end communication for transfer analog and/or binary signals based on IEEE/ANSI C37.94.

The IED shall support the following logic functions:

- A substantial number of logic functions that are freely configurable and can be combined with the protection, control and monitoring functions inside the IED. The logic functions shall be available in different execution cycles, to match those of protection, control and monitoring functions. These logic function shall be:
  - starting and tripping logic, with settable pulse time and tripping program (single-phase, double-phase or three-phase), and with testing and simulation capabilities as per IEC 61850
basic configuration function blocks, such as AND, OR, XOR, INVERTER, TIMER, flip-flop function blocks, Boolean to integer conversion, and integer to Boolean conversion

- comparator for integer inputs
- comparator for real inputs

The IED shall be able to support following hardware:

- Test switch in connection with the IED, including a solution for mounting the test switch in the same 19" rack as the IED to ensure a clear station layout.
- The hardware configuration of the IED shall be flexible and expandable to allow coverage of all customer applications in one single unit.
- 1/1 x 19", 3/4 x 19" or 1/2 x 19" 6U height case selected according to the required number of I/O modules, and according to the required number of analog inputs.
- Power supply modules shall have support for DC voltages in the range from 24 V DC to 60 V DC, or from 90 V DC to 250 V DC.
- All modules used in the IED shall be conformal coated.
- It shall be possible to choose between a compression or ring-lug connector type.
- One of the following mounting alternatives shall be available: flush, rack, and wall mounting.
- Water and dust protection level shall be according to IEC 60529, with at least:
  - front IP40 (IP54 with sealing strip)
  - sides, top and bottom IP40
  - rear side IP20
- All above-stated specifications shall be integrated in one single IED.
- The hardware shall comply to IEC 60255-1.
- The IED shall have a reliability factor, Mean Time Before Failures (MTBF), of at least 100 years.

General requirements

- Manufacturer shall offer 5 years of warranty.
- Manufacturer shall ensure that, in the case of failure of the IED while under warranty, a replacement product shall be shipped from the factory within 48 hours of receiving an order, and without the need to first return the failed IED.
- The IED shall be parametrized and configurable using a single software tool, which shall be used for IEC 61850 configuration, monitoring, disturbance recordings withdrawing, troubleshooting and migration of the project file and/or IED configuration to a newer version; the software tool shall be available free-of-charge.
- The product shall support seamless, periodic and easy product firmware updates.