MEDIUM VOLTAGE PRODUCT

AdvaSense™ Sensor Compatibility Guide

How to select intelligent electronic device correctly

The basic role of AdvaSense™ current and voltage sensors are to transform current and voltage from the high levels in electrical distribution systems to the standardized values that can be used by low voltage measuring and protection apparatus.

The range of electric values in the power supply systems is very extensive. In order to provide full performance and expected accuracy it is necessary to match the respective values appropriate to connected Intelligent Electronic Devices (IEDs) represented by Protection relays and Faulat Passage Indicators (FPIs).

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1. ABB Relays

ABB product families of IEDs and MV sensors offer the widest range of solutions for the protection, control, measurement and supervision of power systems supported by decades of experience from development and operation. ABB IEDs use advantage of ABB MV sensors and operate with secondary signal from Rogowski coil with output of 150mV/180mv for 50/60 Hz in current sensors and also by voltage divider with fixed ratio 10000:1, utilizing correction factors as smart way how to increase overall accuracy performance.

Note: For merging of current and voltage sensor output signals AR4 or AR5 ABB adapters to be used.

1.1 Protection Relays

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REF601, REJ601, REM601

RELION® 605 SERIES
REF601, REJ601 and REM601 are dedicated protection and control relays intended for the protection and control of utility and industrial power systems in secondary distribution networks same as protection and control of medium-voltage and low-voltage asynchronous motors in the manufacturing and process industry. The IEDs provide an optimized composition of protection, monitoring and control functionality (overcurrent, earth-fault, short circuit, phase-discontinuity, negative-phase sequence and thermal-overload protections, inrush current detection, loss of load, circuit-breaker control, reclosing and measurement) in one unit, with the best performance and usability in its class.

Compatibility:
ABB MV Current sensors

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REF615, REM615,
RED615, REC615

RELION® 615 SERIES
The 615 series of relays provides a number of standard configurations and is the ideal choice for a great variety of applications within distribution protection and control. The series include sensors compatible IEDs REF615, REM615, RED615, REC615 dedicated for protection, control, measurement and supervision of overhead lines, cable feeders in utility and industrial power distribution systems, distribution networks, motor protection and line differential protection. Together with sensor technology this IEDs represent extensive range of protection and control functionality like line differential protection with directional or non-directional overcurrent and earth-fault protection, voltage and frequency based protection and measurement functionality, motor protection and protection functionality to detect, isolate and restore power in medium-voltage networks.

Compatibility:
ABB MV Current and Voltage sensors

REF620, REM620

RELION® 620 SERIES
Series increases flexibility and extends the hardware possibilities further compared to the 615 series. REF620 and REM620 are dedicated as feeder management IEDs for protection, control, measurement and supervision in utility and industrial power distribution systems, same as for motor management and supervision of medium and large sized asynchronous and synchronous motors. Advanced and fast fault location of short circuits and earth faults, interconnection protection for distributed power generation, capacitor bank, basic motor and arc protection are common features of Relion® 620 series.

Compatibility:
ABB MV Current and Voltage sensors.

REX640

RELION® 640 SERIES
REX640 is a powerful, all-in-one protection and control IED, for advanced power generation and distribution applications. REX640 offers unmatched flexibility throughout its entire life cycle – from ordering through testing and commissioning, to upgrading the functionality of its modular software and hardware to meet new application requirements. Together with ABB sensors REX 640 represents freely configurable IED for flexible tailoring to application-specific requirements.

Compatibility:
ABB MV Current and Voltage sensors

1.2 Fault Passage Indicators

RIO600

RIO600
RIO600 offers Fault Passage Indication (FPI) functionality in modules SIM4F and SIM8F. RIO600 enables accurate current and voltage measurements from the medium-voltage network utilizing ABB's light weight sensor technology. Based on the measured values, RIO600 gives directional fault passage indication and reports it to the upper level system using Modbus TCP or IEC 61850 GOOSE. RIO600 also enables power flow and power quality monitoring. With state-of-the-art multi-frequency admittance (MFA) based earth fault indication also high-ohmic transient and intermittent type of earth faults can be reliably detected, even in case of compensated and isolated networks.

Compatibility:
ABB MV Current sensors (SIM4F) and ABB MV Current and Voltage sensors (SIM8F)

2. 3rd Party IEDs

The evolution of smart grids and the broad application of renewables has created a need for the extensive use of current and voltage measurements for the proper management of power networks. These trends therefore require the use of advanced, low-power sensing technologies instead of traditional solutions using iron-core instrument transformers, due to their physical limitations. In ABB is perceived the gradual expansion of the compatibility of our portfolio as a natural part of the development of sensors and their use in an increased range of applications in MV systems. Therefore, voltage sensors family KEVA C extends IEDs compatibility list far beyond ABB borders with a secondary output of 3.25 V. New version of KEVA C with 3.25 V output is designed for three primary voltage ratios of 20/√3 kV, 15/√3 kV, 10/√3 kV with option of 2 MΩ/50 pF or 200 kΩ/350 pF rated burden, completely type tested according to IEC 61869-11 standard which secure the compatibility with 3rd party IEDs.

2.1 Protection Relays

Schweitzer Engineering Laboratories SEL-751

SCHWEITZER ENGINEERING LABORATORIES SEL-751
The SEL-751 Feeder Protection Relay provides a comprehensive combination of protection, fault-locating features, monitoring, control, and communication in an industrial package.

Compatibility ensured with ABB sensors complying with IEC 61869-10 / IEC 61869-11 standards:
- Current sensors from KECA family with 150/180 mV @ 50/60 Hz
- Voltage sensors KEVA C, KEVA B (both with transformation ratio 1:10 000, 2MOhm/50pF)

Note: For splitting of current and voltage sensor output signals AR5 ABB adapters to be used.
- Combined sensors KEVCY/KEVCD/KEVCR with 150/180 mV @ 50/60 Hz for current measurement and ratio 1:10 000, 2MOhm/50pF for voltage measurement.

Schweitzer Engineering Laboratories SEL-787L

SCHWEITZER ENGINEERING LABORATORIES SEL-787L
The SEL-787L Line Current Differential Protection Relay provides a comprehensive combination of protection, fault-locating features, monitoring, control, and communication in an industrial package.

Compatibility ensured with ABB sensors complying with IEC 61869-10 / IEC 61869-11 standards:
- Current sensors from KECA family with 150/180 mV @ 50/60 Hz
- Voltage sensors KEVA C, KEVA B (both with transformation ratio 1:10 000, 2MOhm/50pF)

Note: For splitting of current and voltage sensor output signals AR5 ABB adapters to be used.
- Combined sensors KEVCY/KEVCD/KEVCR with 150/180 mV @ 50/60 Hz for current measurement and ratio 1:10 000, 2MOhm/50pF for voltage measurement.

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Siemens SIPROTEC 7SY82

SIEMENS SIPROTEC 7SY82
The universal protection device SIPROTEC 7SY82 is designed for the connection of LPITs (Low Power Instrument Transformers).
The SIPROTEC 7SY82 universal protection is designed for the following types of protection: protection and control of feeders, detection and selective 3-pole tripping of short circuits in medium-voltage networks, selective detection of all earth faults.
Protection applications and functions: directional and non-directional overcurrent protection of feeders with additional functions, detection of, ground faults of any type in isolated or arcsuppression-coil grounded power systems, overvoltage and undervoltage protection, frequency protection and frequency-rate-of-change protection, power protection and many others.

Compatibility ensured with ABB sensors complying with IEC 61869-10 / IEC 61869-11 standards:
- Current sensors from KECA family with 150/180 mV @ 50/60 Hz LPCT: KECA x00CL83 with 225 mV output
- Voltage sensors KEVA C, KEVA B (both with transformation ratios 1:10 000, 3.25 V, 2MOhm/50pF)
- Combined sensors KEVCY/KEVCD/KEVCR with 150/180 mV @ 50/60 Hz for current measurement and ratio 1:10 000, 2MOhm/50pF for voltage measurement.

SIEMENS SIPROTEC 7SJ81
The protection relay by Siemens provides standard functions of directional and non-directional over current protection with additional functions and detection of ground faults of any type in compensated or isolated electrical power systems. Numerous types of protections functions as arc protection, over voltage protection, frequency protection, power protection and under voltage protection are also included, same as detection of current and voltage signal up to 50th harmonics and many other functions.
Compatibility ensured with ABB LPCT and LPVT complying with IEC 61869-10/ IEC 61869-11 standards:
LPCT: KECA x00CL83 with 225 mV output
LPVT: KEVA C, KEVA B with 3.25 V output, rated burden 200 kΩ/ 350 pF. Type of connection: RJ45.

2.2 Fault Passage Indicators

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A-eberle EOR-3DS

A. EBERLE EOR-3DS
Earth fault and short circuit indicator for substations, compact stations up to local grid stations
with special requirements. EOR-3DS provides directional and non-directional short circuit indication, short circuit to earth indication and six different earth fault detection algorithms. With a wide range of SCADA protocols, MQTT and PLC functionality the device is especially designed for digital substations.

Compatibility ensured with ABB sensors according to IEC 61869:
EOR-3DS (product code U29 + C29):
- Voltage Sensors KEVA C, KEVA B (both with transformation ratio 10 000:1 and rated burden 2 MΩ; 50 pF)
- Current Sensor KECA sensors based on Rogowski coil technology

Note: For merging of current and voltage sensor output signals AR4 or AR5 ABB adapters to be used.
- Combined sensors KEVCY/KEVCD with 150/180 mV @ 50/60 Hz for current measurement and ratio 10000:1, 2 MΩ; 50 pF for voltage measurement

Type of connection: RJ45

EOR-3DS (product code U07 + C10):
- Voltage Sensor KEVA C, KEVA B (3.25 V output, rated burden 2 MΩ/ 50 pF)
- Current Sensor KECA 100 CL83 (with secondary output 225mV)

Type of connection: Screw type connection - ferrules

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A-eberle EOR-1DS

A. EBERLE EOR-1DS
Earth fault and short circuit indicator for substations, compact stations up to local grid stations with special requirements. EOR-1DS provides, beside Modbus RTU, directional and non-directional short circuit indication, short circuit to earth indication, transient earth fault detection and pulse location. Active power and reactive power location method will be available in future as well by firmware update.

Compatibility ensured with ABB sensors according to IEC 61869:
EOR-1DS (product code U07 + C10):
- Voltage Sensor KEVA C, KEVA B (3.25 V output, rated burden 2 MΩ/ 50 pF)
- Current Sensor KECA 100 CL83 (with secondary output 225mV)

Type of connection: Screw type connection - ferrules

HORSTMANN COMPASS B 2.0
Device provides directional short-circuit and directional earth fault detection same as monitoring of phase currents, phase-phase and phase-ground voltage, power factor and many others in all types of network . Earth fault detection is secured with six different detection methods.

Compatibility ensured with:
KEVA B/KEVA C with 3.25 V output, rated burden 200 kΩ/ 350 pF
Type of connection: RJ45

Note: For merging of current and voltage sensor output signals AR4 or AR5 ABB adapters to be used.

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Hortsmann ComPass Bs 2.0

HORSTMANN COMPASS BS 2.0
Device provides directional short-circuit and directional earth fault detection same as monitoring of phase currents, phase-phase and phase-ground voltage, power factor and many others in all types of network . Earth fault detection is secured with six different detection methods.

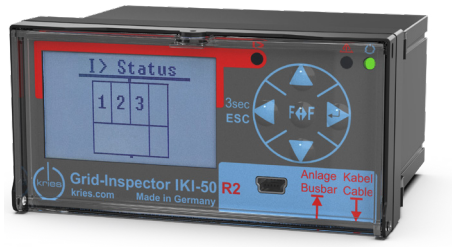
Compatibility ensured with ABB sensors complying with IEC 60044-7 / IEC 60044-8 standards:

- Current sensors from KECA family with rated primary current 80 A & rated secondary output 150/180 mV @ 50/60 Hz
- Voltage sensors KEVA C, KEVA B (both with transformation ratio 1:10 000, 10 MOhm)

Note: For merging of current and voltage sensor output signals AR4 or AR5 ABB adapters to be used.

- Combined sensors KEVCY/KEVCD/KEVCR with 150/180 mV @ 50/60 Hz for current measurement and ratio 1:10 000, 10 MOhm for voltage measurement.

Type of connection: RJ45



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Kries Inspector IKI-50

KRIES IKI-50 GRID INSPECTOR
Power flow monitoring, fault detection and prediction, as well as feeder controlling with Kries' IKI-50_1F R2
With its patented algorithm, IKI-50 can utilize the output signal from KEVA voltage sensor to perform cross-calibration on multiple devices within switchgear. This ensures precise voltage measurement in all the feeders of ring main unit.

Grid-Inspector monitors all electrical measurement values like currents, voltages, power and others. Kries device provides directional and non-directional short circuit detection together with earth fault detection with included failure forecast for all kind of neutral earthing systems.

Compatibility ensured with:
KEVA C with 3.25 V output, rated burden 200 kΩ/ 350 pF
Type of connection: easy pluggable push-in clamps

3. Statistical Energy and Power Quality Meters

Energy and power quality meters represent an important role in very accurate measurement of electrical energy in the electricity distribution systems. ABB extended compatibility of Medium-voltage sensor portfolio for applications where the solution based on combination of ABB MV Current and Voltage sensors with dedicated Energy and power quality meters provide the most accurate data from the grid.

3.1 Power Quality

SATEC PM174/175
PM174/175 multifunctional measuring device acts as a statistical energy meter and power quality analyzer. The devices in chain with ABB Sensors operate in accuracy class 0.5 and provide a power quality profile of the network in the range of below mentioned limits*.

Compatibility ensured with following ABB sensors complying with IEC 60044-7 / IEC 60044-8 standards:

- Current sensors KECA 80 C104, C184, C260 & KECA 80 D85 up to 650A and KECA 80 C85, KECA 80 C216 & KECA 80 C165 up to 4000A with rated primary current 80 A & rated secondary output 150/180 mV @ 50/60 Hz, KECA 250 B1 from 47A up to 2000A with rated primary current 250 A & with rated secondary output 150/180 mV @ 50/60 Hz
- Voltage sensors KEVA 24 C, KEVA B (both with transformation ratio 1:10 000, 10 MOhm)
- Combined sensors KEVCY/KEVCD with 150/180 mV @ 50/60 Hz for current measurement and ratio 1:10 000, 10 MOhm for voltage measurement.

Type of connection: RJ45

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Satec PM 174

* Limitation on the measurement of individual harmonics in current. Maximum measurable harmonic is 21st for 50Hz and 18 for 60Hz (1050Hz)

4. Controlled Switching Device

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Vizimax SynchroTeq® MV

VIZIMAX SYNCHROTEQ® MV
A compact Control Switching Device (CSD) for 1, 2 or 3 phase medium voltage switchgears, the SynchroTeq® MV is specifically designed for load switching projects up to 69 kV. It is proposed in two versions: **SynchroTeq® MVR** and **SynchroTeq® MVX** respectively.
The SynchroTeq® MV features a comprehensive set of Controlled Switching modes, and performs significantly well in a variety of MV applications:

- Energizing MV transformers: SynchroTeq® MVX features a dedicated control mode for 3-p operated (or gang operated) switchgear or C/Bs or VCBs that aim at reducing inrush currents and voltage dips/RVCs.
- Capacitor banks, shunt reactors: SynchroTeq® MVR or SynchroTeq® MVX must be matched to 1-p operated (or independent pole operated) switchgear, as well as to 3-p operated switchgear with pole-staggering, or to a relevant combination of unipolar switches or circuit breakers. SynchroTeq® MVX also handles partially-charged capacitor switching.

Both SynchroTeq® MVR and SynchroTeq® MVX are suitable for unipolar switchgear and load in MV switching projects. Among other applications, SynchroTeq® MV is a powerful, communication-enabled IED suitable for: Renewable Power Generation, Industry, Datacenters, Power Grids, Off-grid power systems, FACTS, where MV Switchgear, MV transformers and MV reactive loads are involved.

Compatibility ensured with ABB sensors complying with IEC 60044-7 / IEC 60044-8 standards with limitation 630A* for current measurement:

- Current sensors from KECA family with rated-primary current 80 A & rated secondary output 150/180 mV @ 50/60 Hz
- Voltage sensors KEVA C, KEVA B (both with-transformation ratio 1:10 000, 10 MOhm)
- Combined sensors KEVCY/KEVCD/KEVCR with 150/180 mV @ 50/60 Hz for current measurement and ratio 1:10 000, 10 MOhm for voltage measurement

Type of connection: RJ45 in combination with VIZIMAX adapters.

Note: The phase shift error is not within the metering classes' limits according to IEC 60044-7, as the device is not set up for phase correction. This limitation does not impact the device's performance, as proper functions are considered with protection classes.

*For higher currents, please contact the ABB representative.

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5. More Information and Useful Links

It is easy to access more detailed information online. On our webpage you will find additional information regarding sensor compatibilities and other ABB releated products.

ABB AdvaSense™ product page

ABB Relion® product page

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