MEDIUM VOLTAGE PRODUCT

SENSOR ACCESSORIES

Connector Adapters

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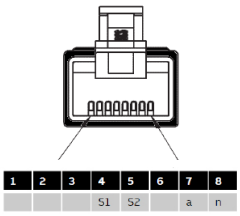
Introduction

The current trends in the MV grid, such as Smart Grids, PQ measurement, and renewables are related to the need for easily integrated voltage and current measuring in new applications as well as in already installed switchgear. Due to the fastgrowing installed base of MV sensors in the networks, the IEC committee decided to release series of standards related to MV sensors. The standard series IEC 61869 brings a higher level of standardization as well as higher technical requirements in comparison with the older series IEC 60044. Thanks to it, a higher level of compatibility with IEDs shall be achieved.

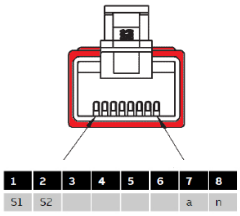
First important news is the definition of one burden value based on the resistance and capacitance (resistance 2 MΩ, capacitance 50 pF), in the older standard, there are several values of resistance. The next changes relate to the definition of correction factors and their limits as a way how to achieve declared accuracy classes. IEC 61869 standards define the RJ45 connector as a standardized type of connector for current and voltage sensors. The standard also describes how to make a pin assignment for a RJ45 connection. To ensure backward compatibility through the transient period ABB offers a product family of connector adapters. The same product family ABB covers also two generations backward compatibility with IEDs using TWIN-BNC connectors in the sensor input card. The difference between pinouts is visualized in Figure 01.

For better visual recognition ABB MV sensors are marked with the black booth on the RJ45 connector in case of pin assignment complying with IEC 60044 standards and red booth in case of pin assignment complying with IEC 61869 standards

BLACK



RED



01 Visualization of pin assignments used in ABB MV Sensors with RJ45 connector

ABB MV Sensor complying IEC 60044 standards with the black RJ45 connector

Adapter from the black RJ45 pinout to the red RJ45

IED supporting pinout according to IEC 61869 standards

02 Adapter ensuring the compatibility between the pinout used in ABB MV sensors complying IEC 60044 and pinout according to IEC 61869 standards

Connector adapters

To provide connectivity between sensors and IEDs with different types of connectors a group of connector adapters was designed. The purpose of the connector adapters is to adapt the sensor connector type to the IED connector type (if they do not match directly). The use of a connector adapter has no influence on the current or voltage signal or the accuracy of a sensor with cable.

Connector adapter name code

A R 1

1: Voltage and Current measurement
2: Current measurement only
3: Voltage measurement only
4: RJ45 Coupler of single Voltage and single Current Sensors
5: 3 phase RJ45 Coupler of single Voltage and single Current Sensors
6: RJ45 pinout used in ABB Sensors complying IEC 60044 standards/IEC 61869 pinout compatibility adaptation
7: 3 phase RJ45 current sensors coupling/ differential adapter (2 sensors per phase)

R: Sensor connector type RJ45
T: Sensor connector type Twin-BNC

Connector adapter

Connector adapters selection tables

In order to match required sensor types with the required IED type, connector adapters might be used if the connector types differ from each other. If the same type of connector is used, no connector adapter is required.

Adapter	Sensor connector		IED connector		Enabled measurement		Ordering Code
	Black RJ45	Red RJ45	Black RJ45	Red RJ45	Voltage	Current	
AR4 black	▪		▪		▪	▪	1VL5300752R0101
AR4 red		▪		▪	▪	▪	1VL5300752R1101
AR5	▪	▪	▪	▪	▪	▪	1VL5300817R0102
AR6	▪	▪	▪	▪	▪	▪	2RKA027446A0001
AR7	▪	▪	▪	▪		▪	2RKA031172A0101
AR8	▪	▪	▪	▪	▪	▪	3XAA069890A0001
AR10 1/3 A[1)]		▪		▪	▪	▪	3XAA088514A0001
AR10 1/3 B[2)]		▪		▪		▪	3XAA091854A0001

[1)]Version A of the AR10 1/3 adapter is compatible with the KEVCY RE combined sensor
[2)]Version B of the AR10 1/3 adapter is compatible with the KECA 80 C85 current sensor

To ensure full compatibility with the older IEDs or MV sensors using TWIN-BNC connector, we have a dedicated portfolio in the same product family.

Adapter	Sensor connector		IED connector			Enabled measurement		Ordering Code
	Twin-BNC	Black RJ45	Twin-BNC	Black RJ45	Red RJ45	Voltage	Current	
AR1		▪	▪			▪	▪	1VL5300685R0101
AR2		▪	▪				▪	1VL5300685R0102
AR3		▪	▪			▪		1VL5300685R0103
AT1 black	▪			▪		▪	▪	1VL5300693R0101
AT1 red	▪				▪	▪	▪	1VL5300693R1101
AT2 black	▪			▪			▪	1VL5300693R0102
AT3 black	▪			▪		▪		1VL5300693R0103

DESCRIPTION

Preview	Description	From	To	Designation	Ordering code
	U + I	Female RJ45	2x Female Twin-BNC	AR1	1VL5300685R0101
	I	Female RJ45	Female Twin-BNC	AR2	1VL5300685R0102
	U	Female RJ45	Female Twin-BNC	AR3	1VL5300685R0103
	U + I	2x Female RJ45	Male RJ45	AR4 black-0.2m	1VL5300752R0101
	U + I	2x Female RJ45	Male RJ45	AR4 black-2.2m	1VL5300752R0102
	U + I	2x Female RJ45	Male RJ45	AR4 red-0.2m	1VL5300752R1101
	U + I	2x Female RJ45	Male RJ45	AR4 red-2.2m	1VL5300752R1102
	U + I	6x Female RJ45	3x Female RJ45	AR5	1VL5300817R0102
	U/I	Female RJ45	Male RJ45	AR6	2RKA027446A0001
	I	6x Female RJ45	3x Female RJ45	AR7	2RKA031172A0101
	U + I	9x Female RJ45	3x Female RJ45	AR8	3XAA069890A0001
	U + I	3x Female RJ45	3x Female RJ45	AR10 1/3 A[1)]	3XAA088514A0001
	I	3x Female RJ45	3x Female RJ45	AR10 1/3 B[2)]	3XAA091854A0001
	U + I	2x Male Twin-BNC	Male RJ45	AT1 black	1VL5300693R0101
	U + I	2x Male Twin-BNC	Male RJ45	AT1 red	1VL5300693R1101

Preview	Description	From	To	Designation	Ordering code
	I	Male Twin-BNC	Male RJ45	AT2 black	1VL5300693R0102
	U	Male Twin-BNC	Male RJ45	AT3 black	1VL5300693R0103

[1] Version A of the AR10 (1:3) adapter is compatible with the KEVCY RE combined sensor
[2] Version B of the AR10 (1:3) adapter is compatible with the KECA 80 C85 current sensor

Technical details

- Power frequency withstand voltage test 820 V
- Impulse voltage withstand test 1500 V

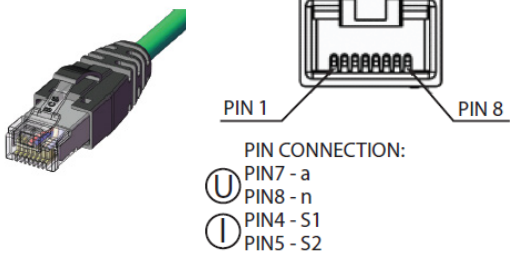
Temperature category

- Operation: -25°C/+80°C
- Transport and storage: -40°C/+80°C

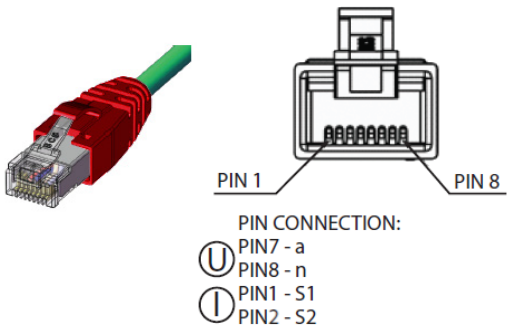
Types of adapter connectors

In order to achieve proper connection of male and female parts of connectors, it is necessary to use only high quality connectors. RJ45 connectors used in ABB connector adapters are Category 6 products that also ensure excellent performance under harsh conditions.

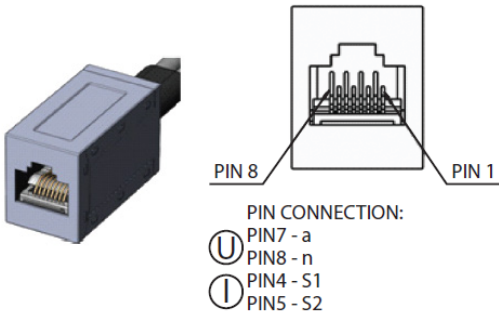
The black RJ45 Male connector (Jack) Cat. 6



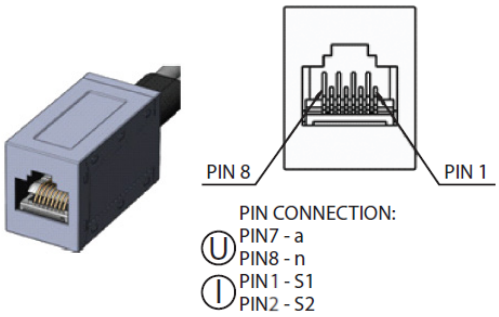
The red RJ45 Male connector (Jack) Cat. 6



The black RJ45 Female connector (Plug) Cat. 6



The red RJ45 Female connector (Plug) Cat. 6

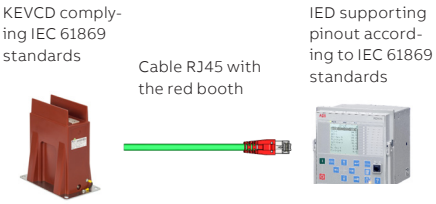


Connection of connectors between a sensor and IED with adapter

The following examples describe the location of connector adapters when they are needed to interface different connector inputs of the IED that is required. Adapters were designed for ensuring of 2 generations backward compatibility. With respect of pin assignment from Figure 01, adapters is possible to use with ABB Relion® family as well as selected 3rd party devices.

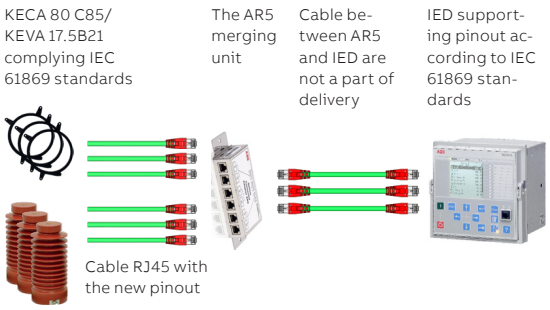
Example 1

KEVCD with cable RJ45 connector complying with IEC 61869 standards & IED supporting pinout according to IEC 61869 standards => direct connection



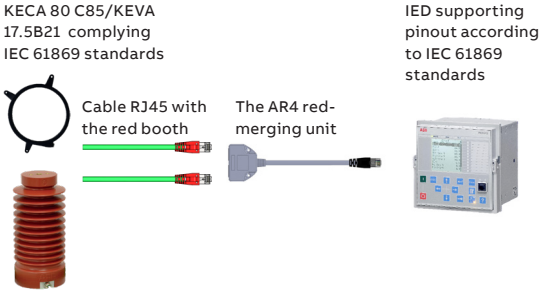
Example 2

KECA 80 C85 & KEVA 17.5 B21 with cable RJ45 connector complying with IEC 61869-10 & IEC 61869-11 standards/IED supporting pinout according to IEC 61869 standards => merging of current + voltage measurement provided by the three-phase merging unit AR5



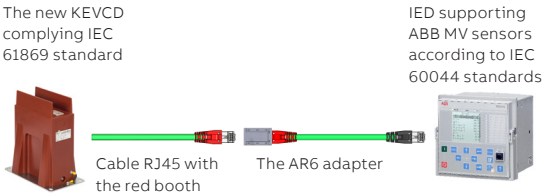
Example 3

KECA 80 C85 & KEVA 17.5 B21 with cable RJ45 connector complying with IEC 61869-10 & IEC 61869-11 standards/IED supporting pinout according to IEC 61869 standards => merging of current + voltage measurement provided by the new single phase merging unit AR4 red.



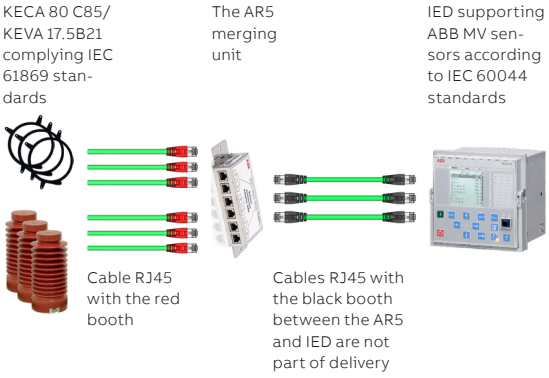
Example 4

KEVCD with cable RJ45 connector complying with IEC 61869 standards & IED supporting ABB MV sensors according to IEC 60044 standards => backward compatibility ensured with the AR6 adapter



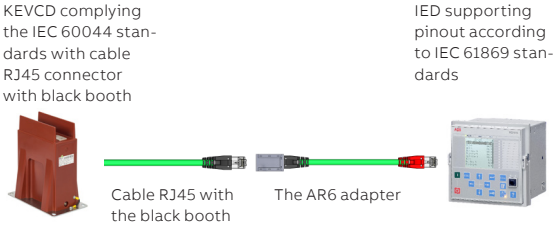
Example 5

KECA 80 C85 & KEVA 17.5 B21 with cable RJ45 connector complying with IEC 61869-10 & IEC 61869-11 standards/ IED supporting ABB MV sensors according to IEC 60044 standards => merging of current + voltage measurement & adaptation from the standards provided by three phase merging unit AR5

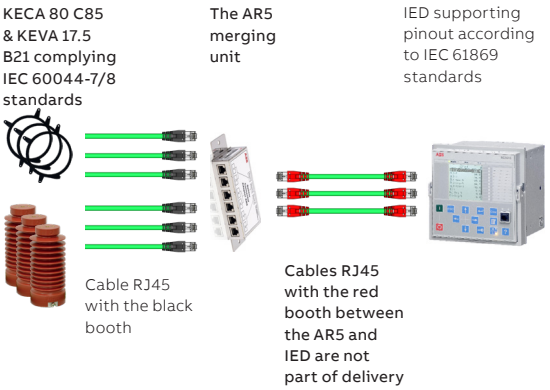


Example 6

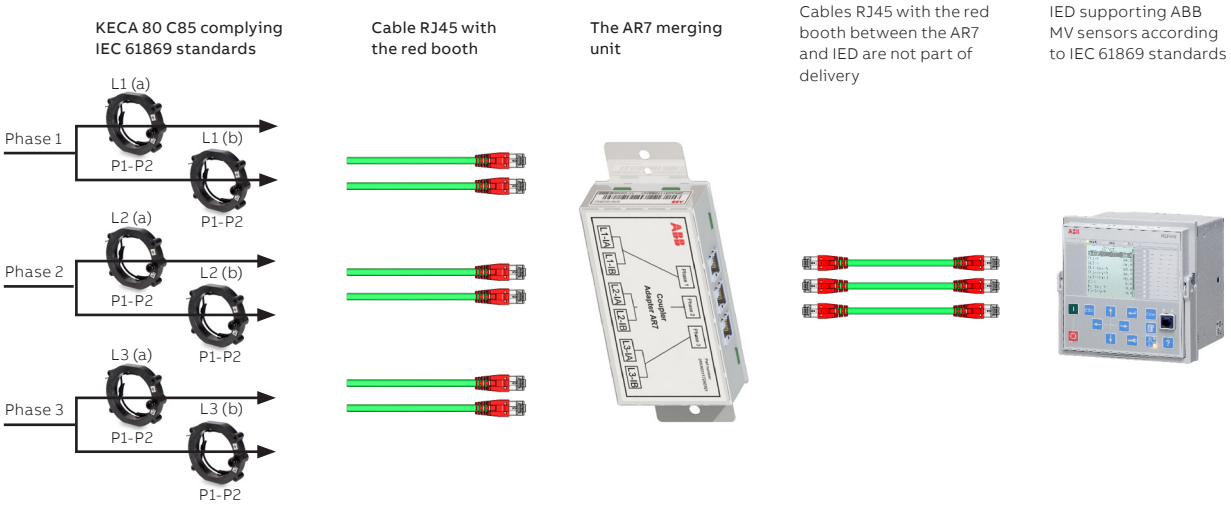
KEVCD complying the IEC 60044 standards with cable RJ45 connector with black booth & IED supporting pinout according to IEC 61869 standards => between generations ensured with the AR6 adapter.



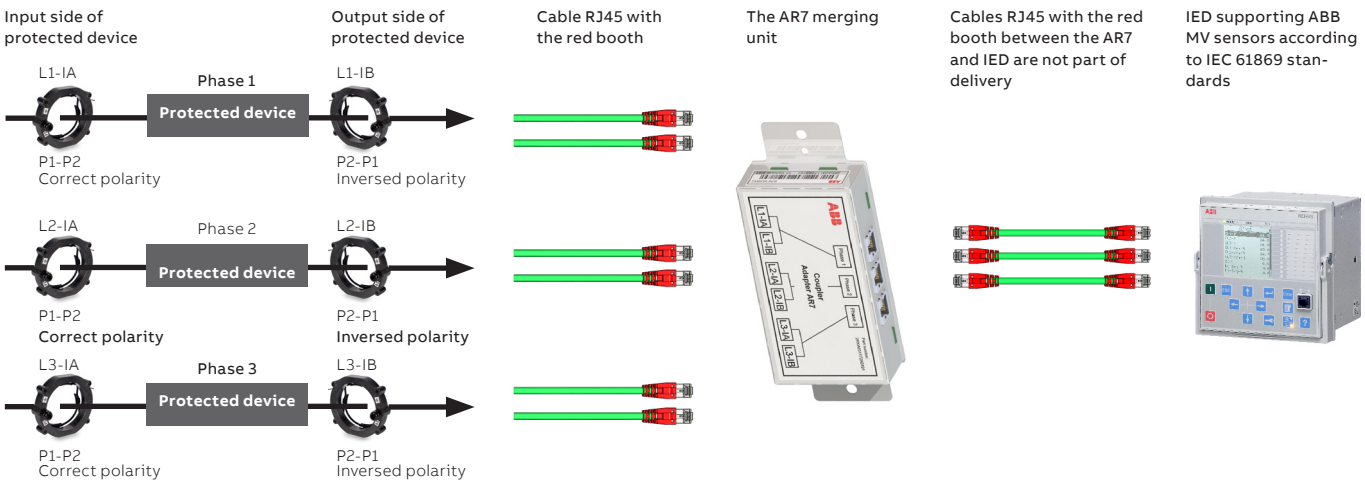
Example 7
KECA 80 C85 & KEVA 17.5 B21 complying IEC 60044-7/8 standards with cable the black RJ45 connector / IED supporting pinout according
to IEC 61869 standards => merging of current + voltage measurement & adaptation from the old to the new pinout provided by three phase merging unit AR5



Example 8
Coupling connection
- 2 current sensors per phase mounted on 2 parallel cables. Signal is summed together and signal provided to IED is equal to overall primary current.
- Correction factors of these 2 sensors on one phase shall be averaged

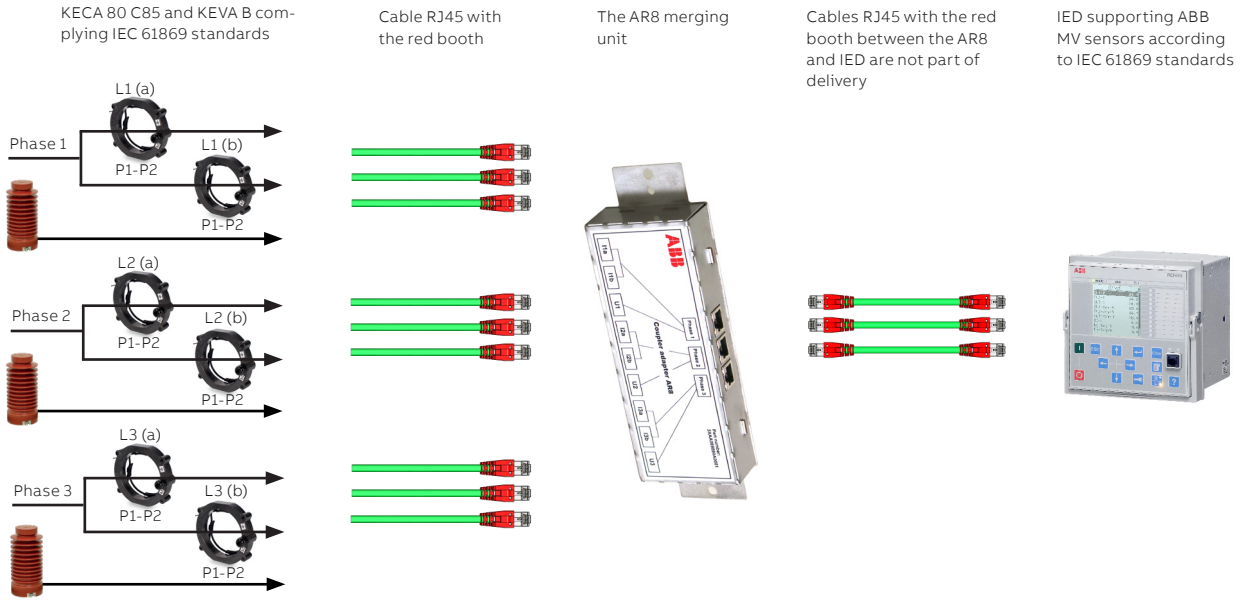


Example 9
Differential protection connection
2 current sensors per phase are mounted in the way:
- L1-IA – protected device input
- L1-IB – protected device output
- Signal provided to IED is proportional to power loses of protected device



Example 10
Coupling connection + voltage measurement

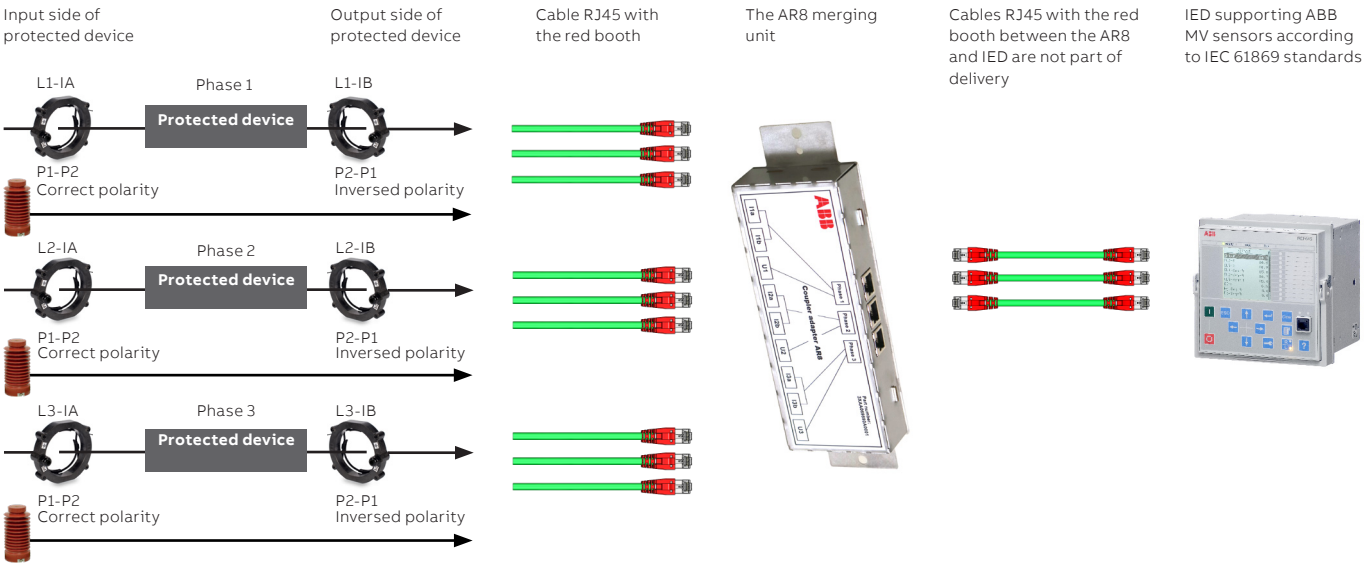
- 2 current sensors per phase mounted on 2 parallel cables. Signal is summed together and signal provided to IED is equal to overall primary current.
- Correction factors of these 2 sensors on one phase shall be averaged
- 1 voltage sensor per phase for voltage measurement



Example 11
Differential protection connection
2 current sensors per phase are mounted in the way:

- L1-IA – protected device input
- L1-IB – protected device output
- Signal provided to IED is proportional to power loses of protected device

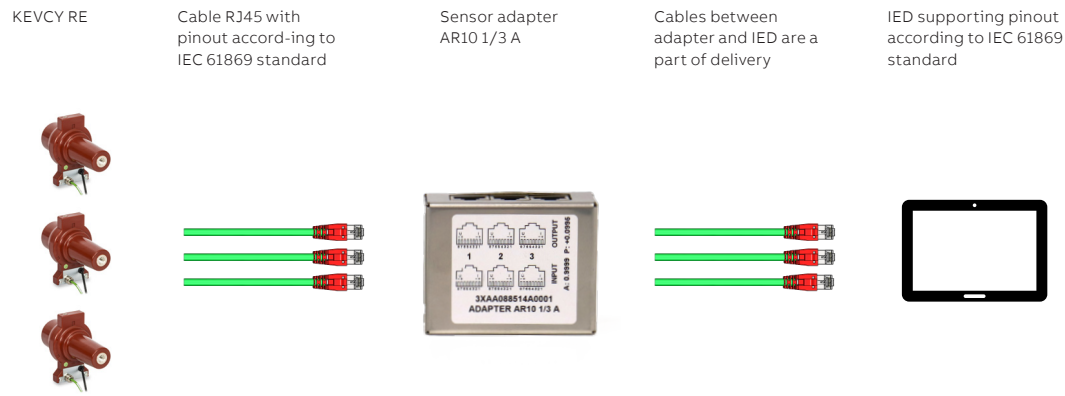
1 voltage sensor per phase for voltage measurement



Example 12
KEVCY RE with cable RJ45 connector
complying with IEC 61869-10 & IEC 61869-11/IED
supporting pinout according to IEC 61869 standards.

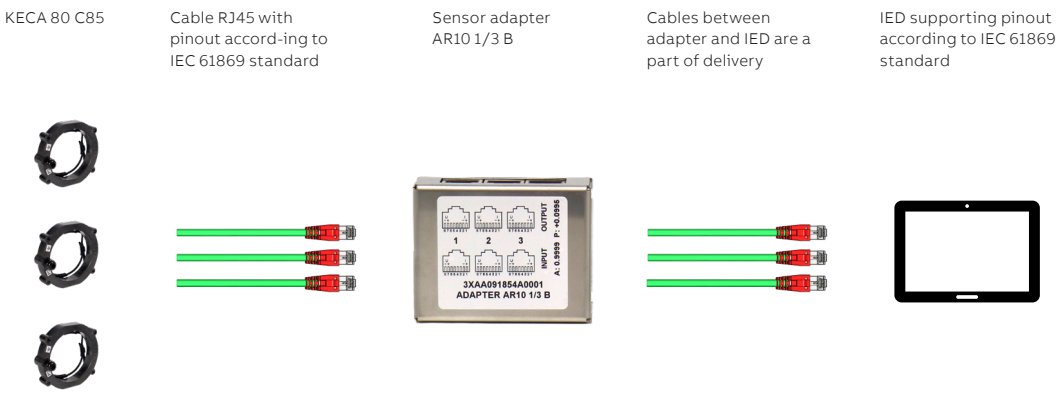
Current Measurement Output
- Output signal is divided by 3 – e.g. ratio 80 A/150 mV of attached sensor is changed to 240 A/150 mV
- The sensor adapter includes its own correction factors to ensure an accurate output current signal. These correction factors must be considered and properly configured in the IEDs.
- This output signal change may be used to match the input requirements of connected IEDs

Voltage Measurement Output:
- **Unchanged**, ensuring accurate transmission of the original voltage signal.



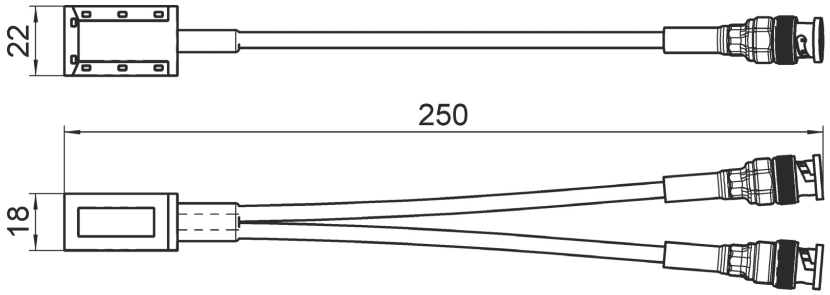
Example 13
KECA 80 C85 with cable RJ45 connector
complying with IEC 61869-10/IED
supporting pinout according to IEC 61869 standard

Current Measurement Output
- Output signal is divided by 3 – e.g. ratio 80 A/150 mV of attached sensor is changed to 240 A/150 mV
- The sensor adapter includes its own correction factors to ensure an accurate output current signal. These correction factors must be considered and properly configured in the IEDs.
- This output signal change may be used to match the input requirements of connected IEDs

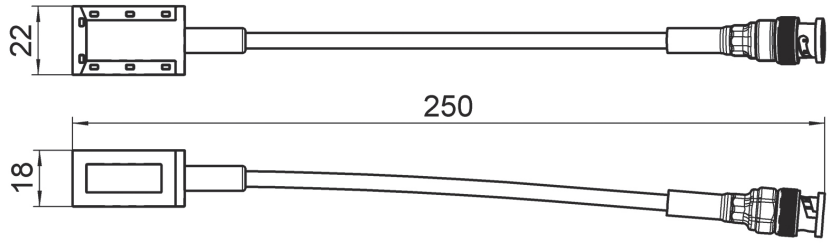


Dimensional drawings

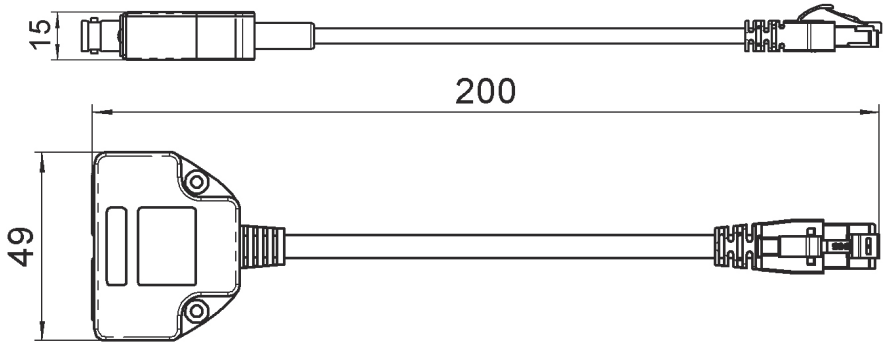
AR1



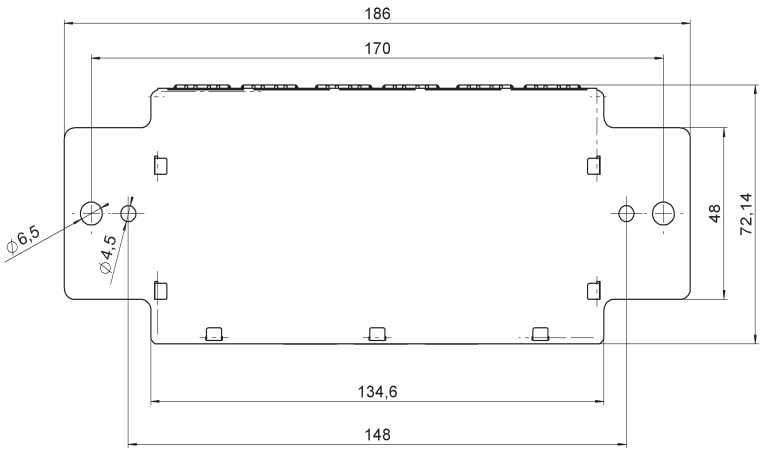
AR2 and AR3

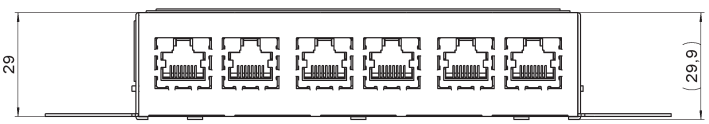


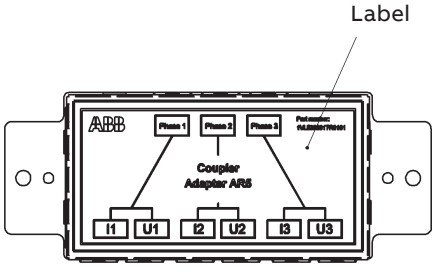
AR4



AR5







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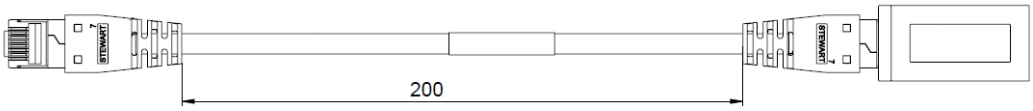
AR6


200

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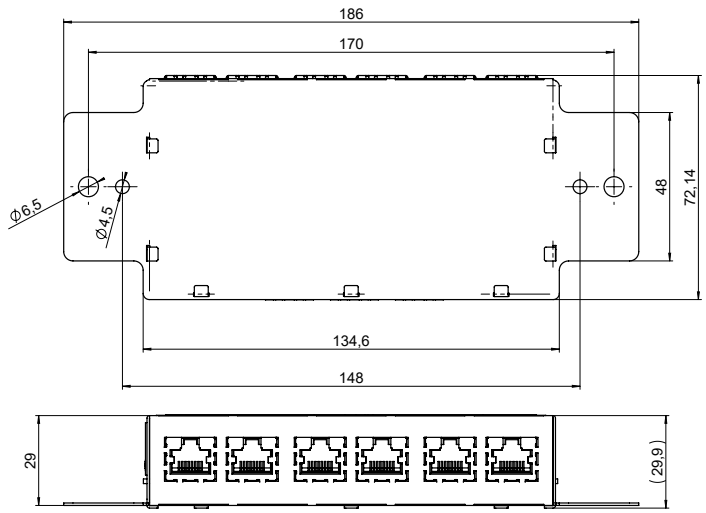
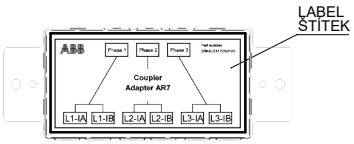
AR7


186
170
Ø6,5
Ø4,5
48
72,14
134,6
148
29
(29,9)


LABEL
ŠTÍTEK
ABB
Coupler
Adapter AR7
L1-IA
L1-IB
L2-IA
L2-IB
L3-IA
L3-IB

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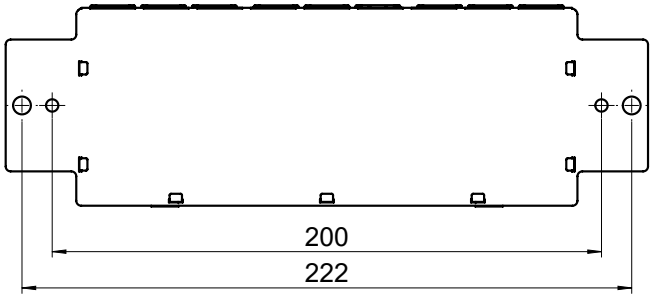
AR8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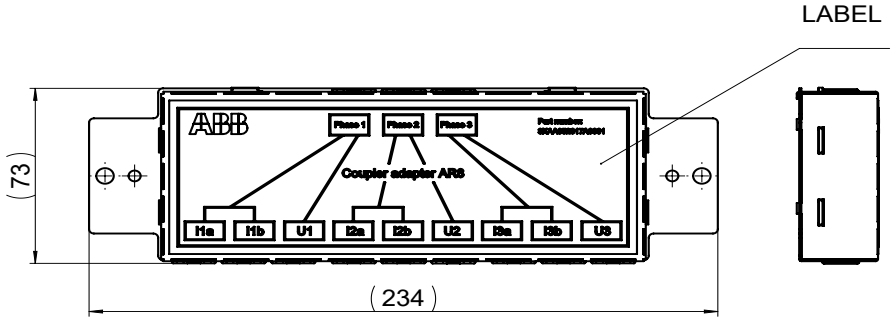
(31)


LABEL
(73)
ABB
Phase 1
Phase 2
Phase 3
Coupler adapter AR8
I1a
I1b
U1
I2a
I2b
U2
I3a
I3b
U3
(234)

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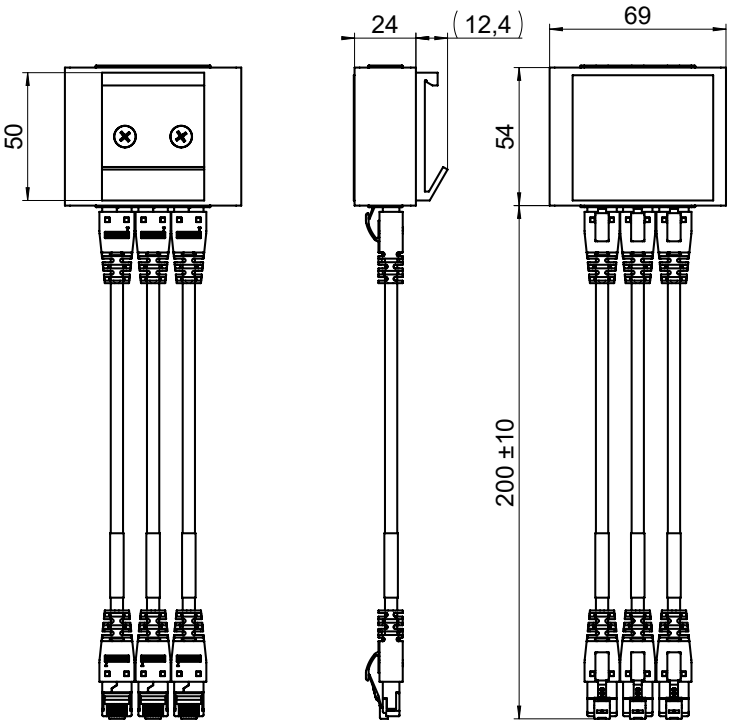
AR10 1/3



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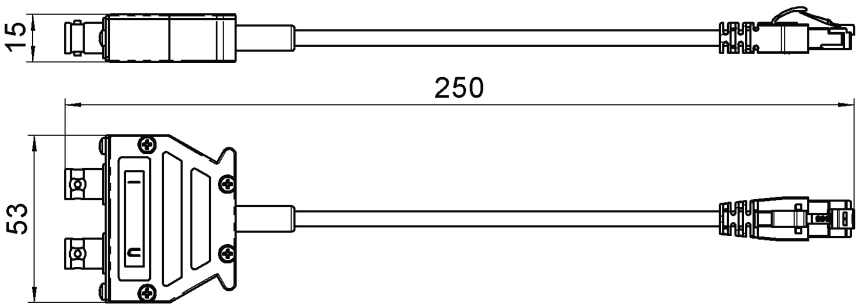
AT1



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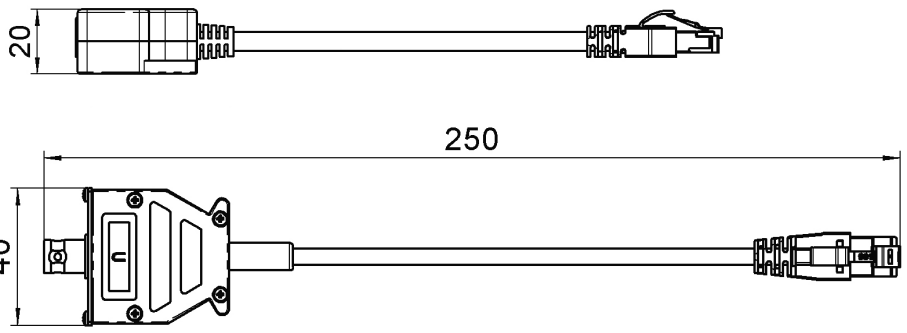
AT2 and AT3



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