

# Sensor Accessories

## Connector adapters; Current adapters

### Connector adapters

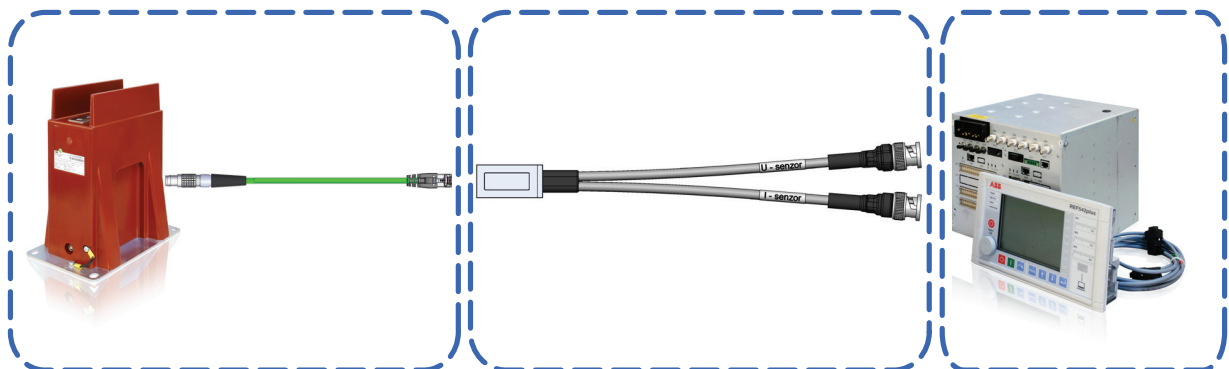
To provide connectivity between sensors and IEDs with different types of connectors a group of connector adapters was designed. The purpose of the connector adapters is to adapt the sensor connector type to the IED connector type (if they do not match directly). The use of a connector adapter has no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



Sensor with RJ-45 connector output

Connector adapter from RJ-45 to Twin-BNC

IED with Twin-BNC input connectors



### Sensor connectors

Some sensors are still produced with a Twin-BNC connector. Performance is very good and reliable. In order to standardize sensor connectors, new sensor designs use a RJ-45 connector instead. The following table summarizes connector types used in different sensors.

Sensor type	Sensor connector used	
	Twin-BNC	RJ-45
KEVCD_A		■
KEVCD_B	■	
KECA_A1	■	
KECA_B1		■
KEVA_	■	
KEVCY 24R_1		■
KEVCR 24_		■

### IED connectors

Some IEDs also have Twin-BNC connectors in the sensor input card of the relay, but new designs use a RJ-45 connector instead.

The following table summarizes connector types used in different IEDs.

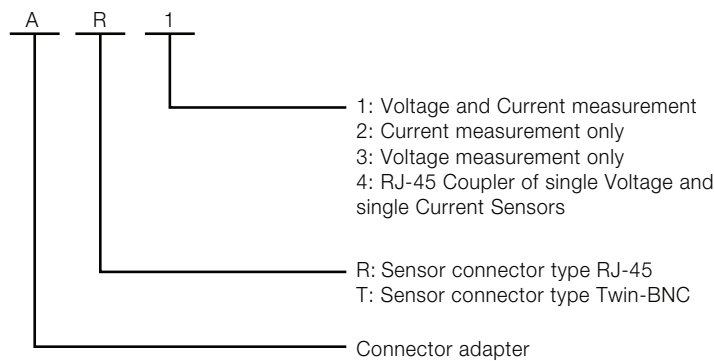
IED	IED connector used	
	Twin-BNC	RJ-45
REX 521	■	
REC 523	■	
REF 541/3/5	■	
REM 543/5	■	
REF 542plus	■	
REF 601		■
REF 615		■

### Connector adapters selection table

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
	Twin-BNC	RJ-45	Twin-BNC	RJ-45	Voltage	Current	
AR1		■	■		■	■	1VL5300685R0101
AR2		■	■			■	1VL5300685R0102
AR3		■	■		■		1VL5300685R0103
AR4		■		■	■	■	1VL5300752R0101
AT1	■			■	■	■	1VL5300693R0101
AT2	■			■		■	1VL5300693R0102
AT3	■			■	■		1VL5300693R0103

### Connector adapter name code



## Description

Preview	Description	From	To	Designation	Ordering code
	U + I	Female RJ-45	2x Female Twin-BNC	AR1	1VL5300685R0101
	I	Female RJ-45	Female Twin-BNC	AR2	1VL5300685R0102
	U	Female RJ-45	Female Twin-BNC	AR3	1VL5300685R0103
	U + I	2x Female RJ-45	Male RJ-45	AR4	1VL5300752R0101
	U + I	2x Male Twin-BNC	Male RJ-45	AT1	1VL5300693R0101
	I	Male Twin-BNC	Male RJ-45	AT2	1VL5300693R0102
	U	Male Twin-BNC	Male RJ-45	AT3	1VL5300693R0103

## Technical details

Test voltages	Unit	Value
Power frequency withstand voltage test	V	500
Impulse voltage withstand test	kV	1

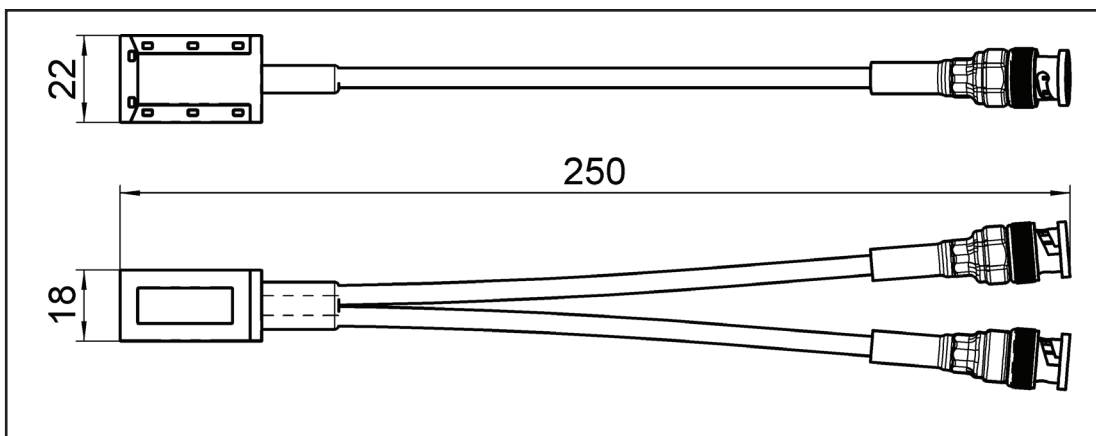
Temperature category	Unit	Value
Operation	°C	-25 / +80
Transport and storage	°C	-40 / +80

## Dimensions and weights

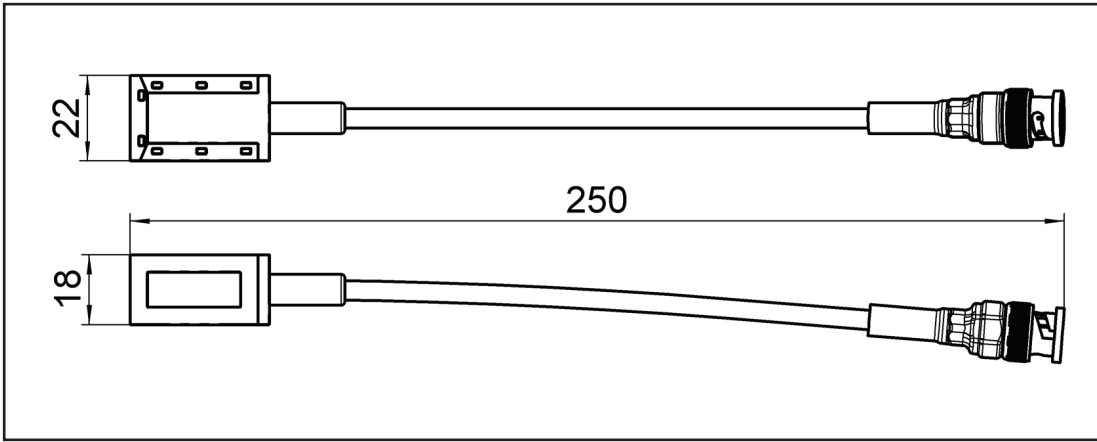
Connector Adapter	Dimension	Weight
AR1	250x22x18 mm	0.12 kg
AR2	250x22x18 mm	0.07 kg
AR3	250x22x18 mm	0.07 kg
AR4	200x49x20 mm	0.08 kg
AT1	250x53x15 mm	0.10 kg
AT2	250x40x15 mm	0.07 kg
AT3	250x40x15 mm	0.07 kg

## Dimensional drawings

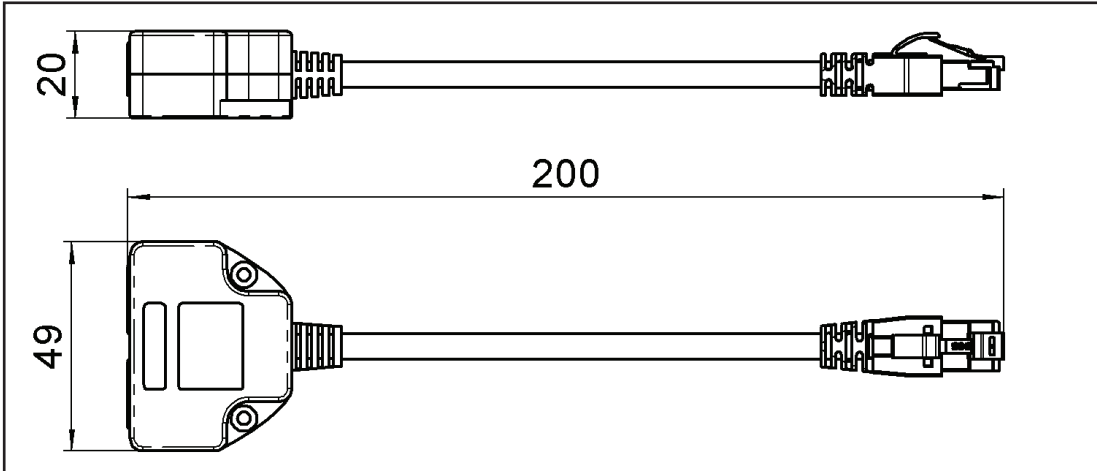
AR1:



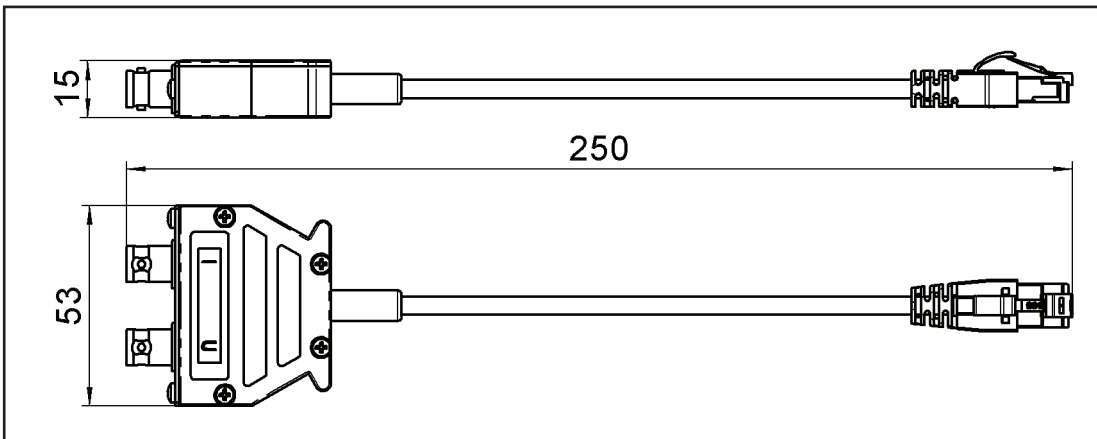
AR2 and AR3 :



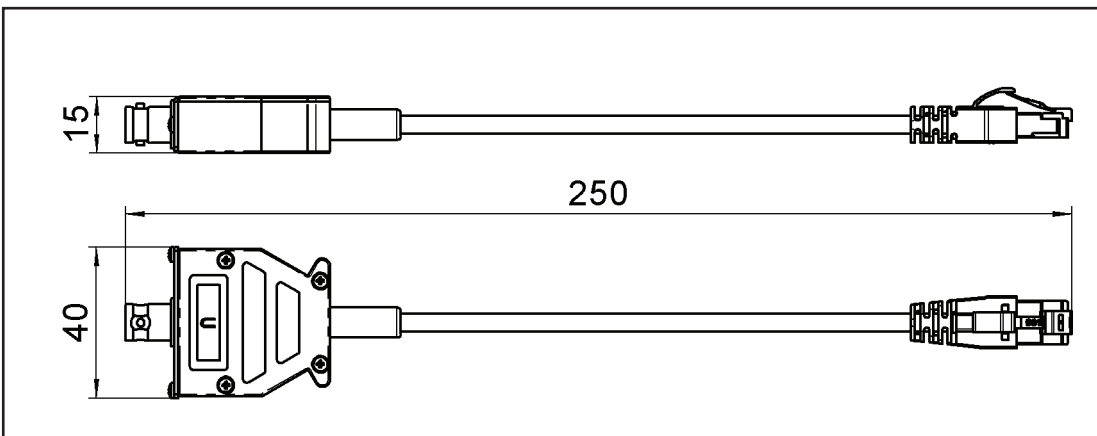
AR4:



AT1:



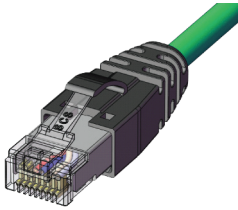
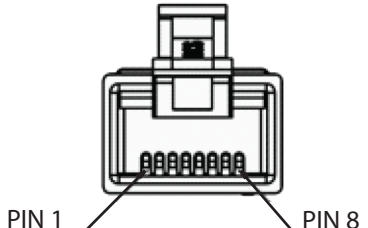
AT2 and AT3:



### 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. RJ-45 connectors used in ABB connector adapters are Category 6 products that also ensure excellent performance under harsh conditions.

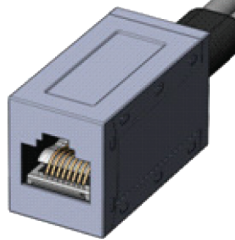
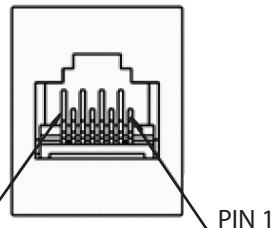
**RJ-45 Male connector (Jack) Cat. 6**

PIN CONNECTION:

- ⓪ PIN7 - a
- ⓪ PIN8 - n
- ⓪ PIN4 - S1
- ⓪ PIN5 - S2

**RJ-45 Female connector (Plug) Cat. 6**

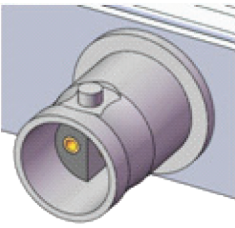
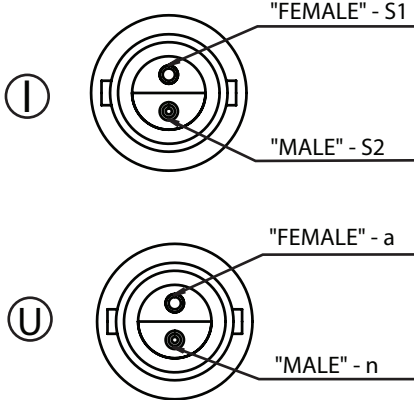



PIN CONNECTION:

- ⓪ PIN7 - a
- ⓪ PIN8 - n
- ⓪ PIN4 - S1
- ⓪ PIN5 - S2

Twin-BNC connectors are high quality shielded connectors. They provide only 2 signal outputs, which enables their use for single current or voltage sensors.


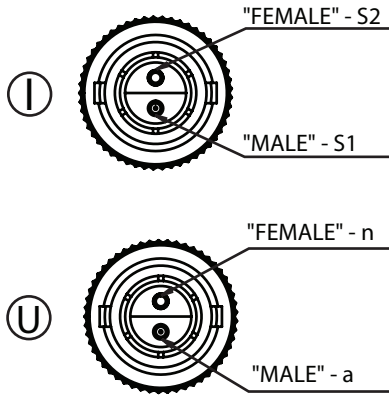
**Twin-BNC Male connector (Jack)**

"FEMALE" - S1  
"MALE" - S2

"FEMALE" - a  
"MALE" - n

**Twin-BNC Female connector (Plug)**

"FEMALE" - S2  
"MALE" - S1

"FEMALE" - n  
"MALE" - a

### Current adapters

If the transmitted signal from the current sensor is too high to be processed properly by the IED, a current adapter is to be inserted between the sensor cable and the IED adapter unit. Simply said, the current adapter operates as a highly accurate voltage divider giving a higher transformation ratio of the current sensor. The current adapters have to be matched to the actually used IED and must be ordered as accessories. For IEDs from the Relion® product family (REF615 etc.) no current adapter is needed. The current range could be changed in the IED using a higher transformation ratio parameter.

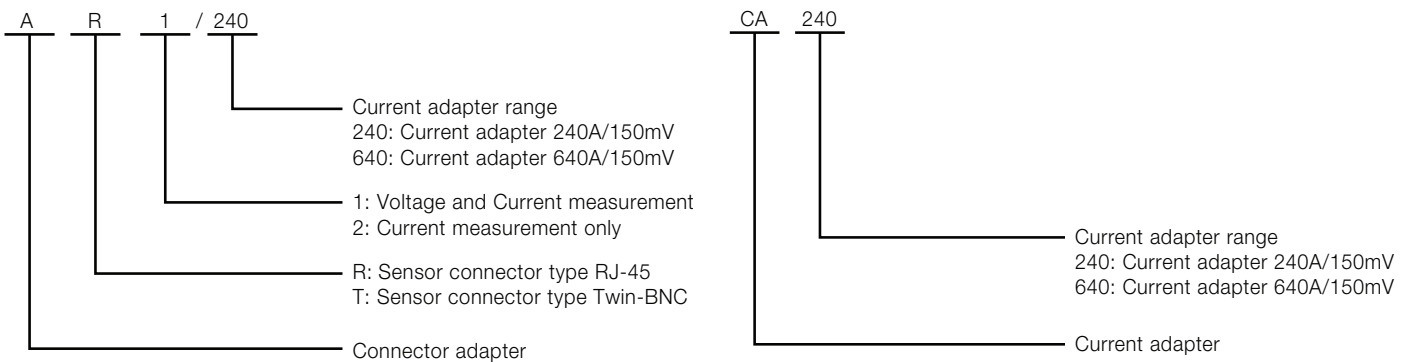
### Current adapters selection table

In order to adapt the transmitted signal level from the current sensor to the IED as well as to match the required sensor types with the required IED type, the current adapter with connector adapter function might be used if the connector types differ from each other (current adapters ARx/x40).

If both connectors are the Twin-BNC type, current adapters CAX40 might be selected.

Adapter	Sensor connector		IED connector		Enabled measurement		Current adapter	
	Twin-BNC	RJ-45	Twin-BNC	RJ-45	Voltage	Current	240A	640A
AR1/240		■	■		■	■	■	
AR1/640		■	■		■	■		■
AR2/240		■	■			■	■	
AR2/640		■	■			■		■
CA240	■		■			■	■	
CA640	■		■			■		■

### Current adapter name code



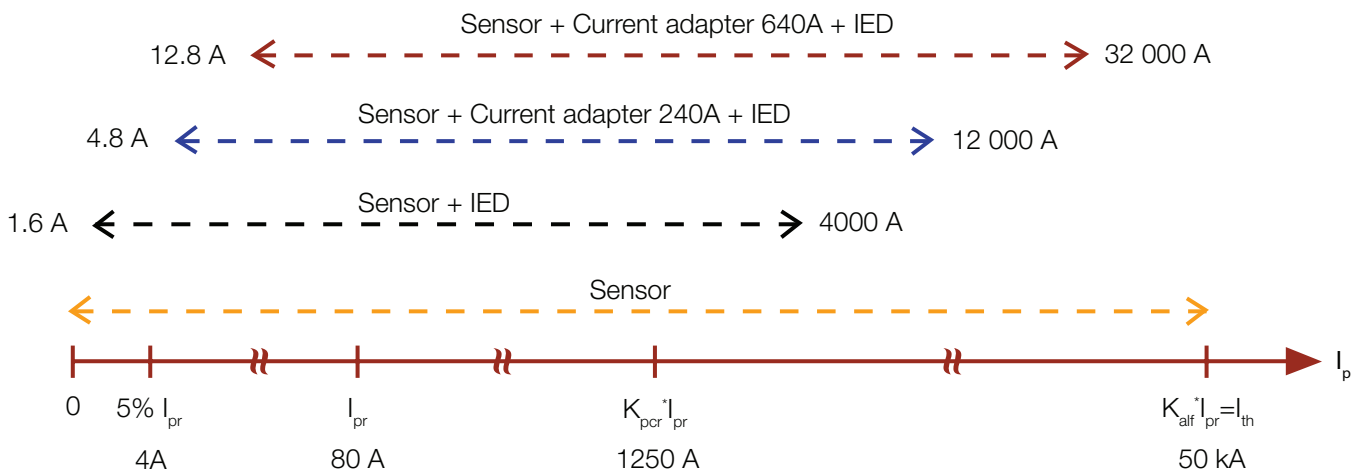
### Current adapters measurement ranges

Current adapters are selected according to the rated primary current of application and/or required current measurement range. Use of a current adapter determines the measurement range of the system (sensor plus IED), which is required for application.

Example of current adapters measurement ranges:

Sensor: KEVCD A

IED: REF542plus









## Rated primary current of application and current adapters measurement ranges

Rated primary current of application	Current adapter to be used	Resulting transformation ratio at 50Hz (60Hz)	Maximal linearity limit
(80 – 160) A	Not needed	80 A/150 mV (180 mV)	4 000 A
(160 – 480) A	AR1/240; AR2/240	240 A/150 mV (180 mV)	12 000 A
(480 – 1250) A	AR1/640; AR2/640	640 A/150 mV (180 mV)	32 000 A

Once a current adapter is used, the transformation ratio is changed accordingly and the parameter of rated primary current set in IED should be changed to 240 A or 640 A.

**Note:** Sensor current adapters are only used with KEVCD A sensors (rated primary current 80 A). The Relion® product family IEDs (REF615 etc.) enable changing of the current measurement range by using a higher transformation ratio parameter and therefore no current adapter is needed.

## Description

Preview	Description	From	To	Designation	Ordering code
	U + I with current adapter 240 A	Female RJ-45	2x Female Twin-BNC	AR1/240	1VL5300766R0104
	U + I with current adapter 640 A	Female RJ-45	2x Female Twin-BNC	AR1/640	1VL5300767R0105
	I with current adapter 240A	Female RJ-45	Female Twin-BNC	AR2/240	1VL5300768R0106
	I with current adapter 640A	Female RJ-45	Female Twin-BNC	AR2/640	1VL5300769R0107
	I Current adapter 240A	Male Twin-BNC	Female Twin-BNC	CA240	1VL5300397R0103
	I Current adapter 640A	Male Twin-BNC	Female Twin-BNC	CA640	1VL5300397R0104

## Technical details

Test voltages	Unit	Value
Power frequency withstand voltage test	V	500
Impulse voltage withstand test	kV	1

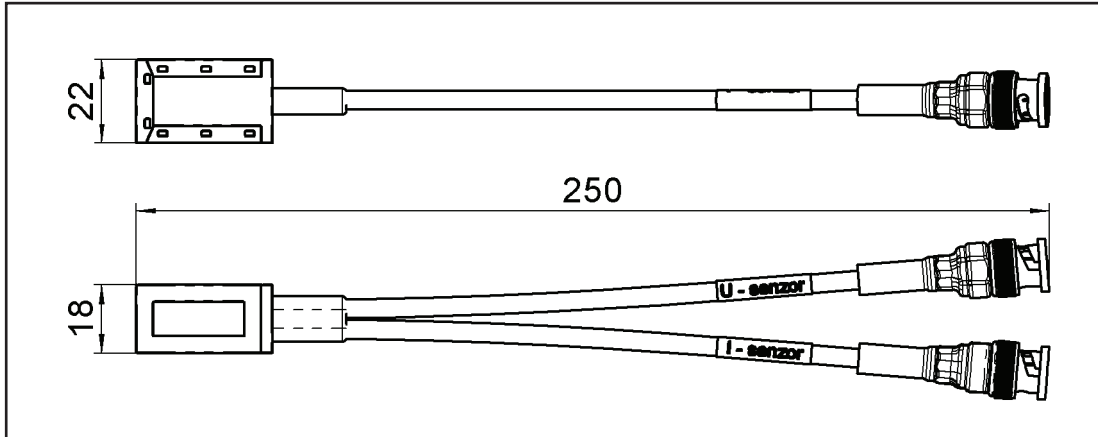
Temperature category	Unit	Value
Operation	°C	-25 / +80
Transport and storage	°C	-40 / + 80

## Dimensions and weights

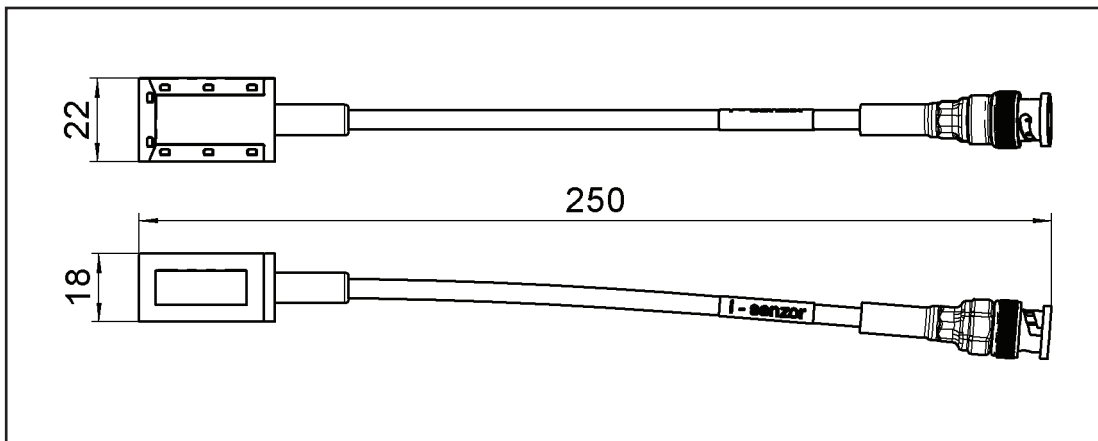
Current Adapter	Dimension	Weight
AR1/240	250x22x18 mm	0.12 kg
AR1/640	250x22x18 mm	0.12 kg
AR2/240	250x22x18 mm	0.07 kg
AR2/640	250x22x18 mm	0.07 kg
CA240	250x19x19 mm	0.07 kg
CA640	250x19x19 mm	0.07 kg

## Dimensional drawings

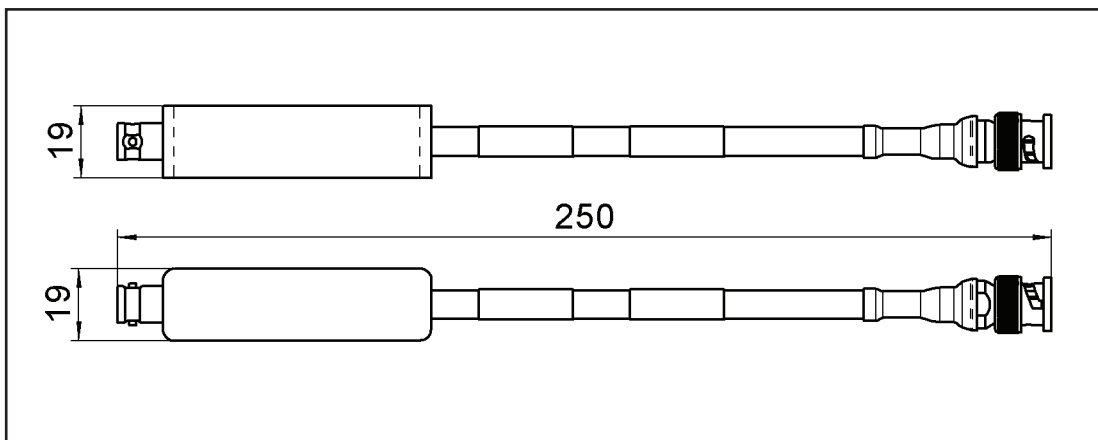
AR1/240 and AR1/640:



AR2/240 and AR2/640:



CA240 and CA640:

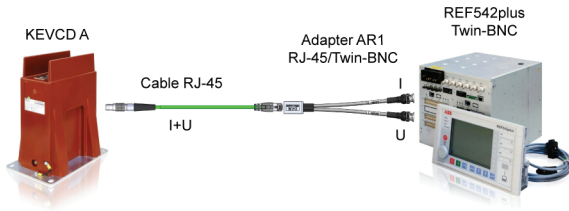




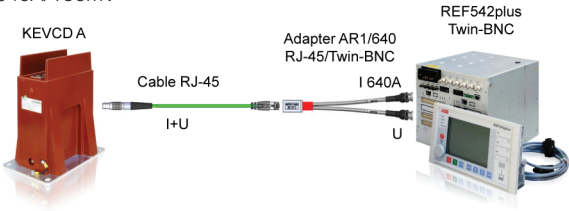
## Connection of connectors between a sensor and IED with adapter

The following examples describe the location of **connector adapters when they are needed** to interface different connector inputs of the IED that is required.

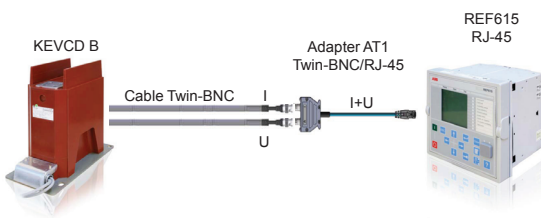
Example 1:  
KEVCD A with cable RJ-45 connector & REF542plus with Twin-BNC connectors => adapter AR1 (I+U)



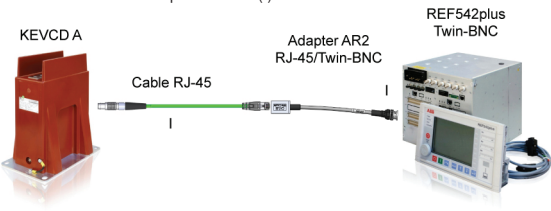
Example 2:  
KEVCD A with cable RJ-45 connector & REF542plus with Twin-BNC connectors => adapter AR1/640 (I+U) with implemented current adapter 640A/150mV



Example 3:  
KEVCD B with cable Twin-BNC connectors & REF615 with RJ-45 connector => adapter AT1 (I+U)



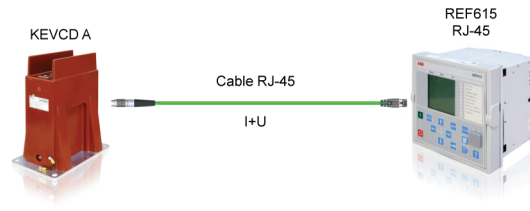
Example 4:  
KEVCD A with cable RJ-45 connector & REF542plus with Twin-BNC connectors => adapter AR2 (I)



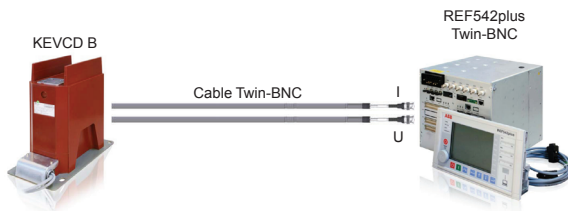
## Direct connection of connectors between a sensor and IED without adapter

The following examples describe solutions that **do not require any kind of connector adapter** to interface the IED that is required.

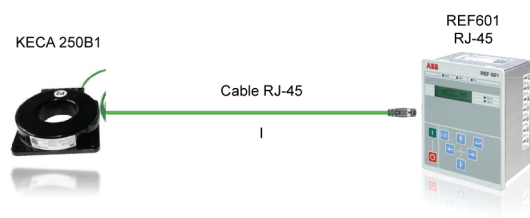
Example 1:  
KEVCD A with cable RJ-45 connector & REF615 with RJ-45 connector



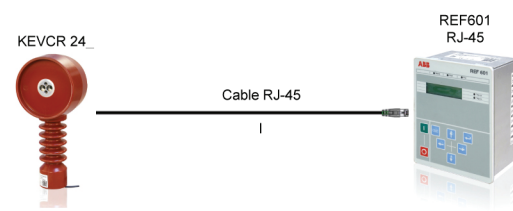
Example 2:  
KEVCD B with cable Twin-BNC connectors & REF542plus with Twin-BNC connectors



Example 3:  
KECA 250B1 with cable RJ-45 connector & REF601 with RJ-45 connector



Example 4:  
KEVCR 24\_ with cable RJ-45 connector & REF601 with RJ-45 connector



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