

# Questionnaire

## Current and voltage sensor selection guide

### General

The following questionnaires are used to select sensors according to the client's requirements.

The characteristics shown in the catalogue are given with respect to a defined environment (worst case conditions).

The technical requirements will not always reach these extreme limits, and it is possible, following confirmation by us, to propose higher maximum electrical or thermal values to those published, thanks to a knowledge and detailed analysis of the sensor operating environment.

A technical relationship between the client and ABB will allow the proposal of the best selection of sensors, equally from the viewpoint of performance and economy.

Two principal areas are considered in the selection of a sensor:

- the electrical aspect
- the thermal aspect

The sensor performance is based on a combination of electrical and thermal conditions; any values other than those indicated in this catalogue cannot be guaranteed unless validated by us. The information below is only valid for sensors using closed loop Hall effect technology.

Contact your local supplier for other technologies.

### Profile mission

Due to the design of converters with integrate more power with less volume, sensors are very constraint; leading to reduce their life time. As a matter of fact, even though the application main conditions are well within the sensors characteristics, these conditions have an impact on the sensor life time.

The main general characteristics that involves the sensors life time are the following:

- the ambient temperature above 40 °C. It is usually said that every additional 10 °C, the life time is reduced by a factor of 2. Of course, this value is a theoretical value and has to be defined in line with the concerned project.
- the ambient temperature variations also impact the sensor life time. Even small variations (like 10 °C) can change the life time of the sensor especially on the electronic part.
- the way the sensors are used also impact its duration (numbers of ON/OFF per day, average current or voltage value, power supply value, load resistor value, vibrations levels...)

The above general impacting conditions are well defined in standards like IEC 62380, UTE C 80-810 and must be consider during any new converter design.

ABB can provide theoretical reliability calculation based on specific profile mission of your projects.

### Electrical characteristics

The electrical characteristics values mentioned in this catalogue are given for a particular sensor operating point. These values may vary, according to the specific technical requirement, in the following way:

- The primary thermal current (voltage) ( $I_{PN}$  or  $U_{PN}$ ) may be increased if:
  - the maximum operating temperature is lower than the value shown in the technical data sheet
  - the sensor supply voltage ( $V_A$ ) is reduced
  - the load resistance value ( $R_M$ ) is increased
- The maximum current (voltage) measurable by the sensor may be increased if:
  - the maximum operating temperature is lower than the value shown in the technical data sheet
  - the sensor supply voltage ( $V_A$ ) is increased
  - the secondary winding resistance value ( $R_S$ ) is reduced (e.g. by using a lower transformation ratio)
  - the load resistance value ( $R_M$ ) is reduced

### Thermal characteristics

The operating temperature values mentioned in this catalogue are given for a particular sensor operating point. These values may vary, according to the specific technical requirement, in the following way:

- The maximum operating temperature may be increased if:
  - the primary thermal current (voltage) ( $I_{PN}$  or  $U_{PN}$ ) is reduced
  - the sensor supply voltage ( $V_A$ ) is reduced
  - the load resistance value ( $R_M$ ) is increased

PS: The minimum operating temperature cannot be lower than that shown in the technical data sheet as this is fixed by the lower temperature limit of the components used in the sensor.

# Questionnaire

## Industry current sensor selection

<b>Company:</b> .....	<b>Name:</b> .....
<b>Address:</b> .....	
<b>Tel:</b> .....	<b>Fax:</b> .....
<b>Email:</b> .....	

### Application

- Application :
  - Variable speed drive .....
  - UPS .....
  - Wind generator .....
  - Active harmonic filter .....
  - Welding machines .....
  - Solar .....
  - Other (description) .....
- Quantity per year: .....

### Mechanical characteristics

- Sensor fixing:
  - By soldering to the PCB .....
  - By the enclosure .....
  - By the primary conductor .....
- Primary conductor:
  - Cable diameter ..... (mm)
  - Cable connection size ..... (mm)
  - Bar size ..... (mm)
- Secondary connection:
  - By connector .....
  - By cable without connector .....
  - Other .....

### Sensor environmental conditions

- Minimum operating temperature ..... (°C)
- Maximum operating temperature ..... (°C)
- Presence of strong electromagnetic fields .....
- Max. continuous primary conductor voltage ..... (V)
- Main reference standards .....

### Other requirements (description)

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### Electrical characteristics

- Nominal current ( $I_{PN}$ ) ..... (A r.m.s.)
- Current type (if possible, show current profile on graph):
  - Direct .....
  - Alternating .....
- Bandwidth to be measured ..... (Hz)
- Current measuring range:
  - Minimum current ..... (A)
  - Maximum current ..... (A)
  - Duration (of max. current) ..... (sec)
  - Repetition (of max. current) .....
  - Measuring voltage (on  $R_M$ ) at max current ..... (V)
- Overload current (not measurable):
  - Not measurable overload current ..... (A)
  - Duration ..... (sec)
  - Repetition .....
- Sensor supply voltage:
  - Bipolar supply voltage ..... ( $\pm V$ )
  - Unipolar supply voltage ..... (0 +V or 0 -V)
- Output current
  - Secondary current at nominal current  $I_{PN}$  ..... (mA)
- Current output (NCS range only)
  - Secondary current at maximum current  $I_{PMAX}$  ..... (mA)
- Voltage output
  - Secondary voltage at nominal current  $I_{PN}$  ..... (V)
- Voltage output (NCS range only)
  - Secondary voltage at maximum current  $I_{PMAX}$  ..... (V)

*This document is used for selecting sensors according to the application and the clients requirements.*

# Questionnaire

## Railway current sensor selection

<b>Company:</b> .....	<b>Name:</b> .....
<b>Address:</b> .....	
<b>Tel:</b> .....	<b>Fax:</b> .....
<b>Email:</b> .....	

### Application

1. Project name .....
2. Application:
  - Rolling stock:
    - Power converter .....
    - Auxiliary converter .....
    - Other .....
  - Short or long distance train:
    - Power converter .....
    - Auxiliary converter .....
  - Metro or tramway:
    - Power converter .....
    - Auxiliary converter .....
  - Fixed installation (e.g. substation) .....
3. Quantity per year: .....
4. Total quantity for the project .....

### Mechanical characteristics

1. Sensor fixing:
  - By the enclosure .....
  - By the primary conductor .....
2. Primary conductor:
  - Cable diameter ..... (mm)
  - Bar size ..... (mm)
3. Secondary connection:
  - Screw or Faston .....
  - By connector .....
  - By shielded cable .....
  - Other .....

### Other requirements (description)

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### Electrical characteristics

1. Nominal current ( $I_{PN}$ ) ..... (A r.m.s.)
2. Current type (if possible, show current profile on graph):
  - Direct .....
  - Alternating .....
3. Bandwidth to be measured ..... (Hz)
4. Current measuring range:
  - Minimum current ..... (A)
  - Maximum current ..... (A)
  - Duration (of max. current) ..... (sec)
  - Repetition (of max. current) .....
  - Measuring voltage (on  $R_M$ ) at max current ..... (V)
5. Overload current (not measurable):
  - Not measurable overload current ..... (A)
  - Duration ..... (sec)
  - Repetition .....
6. Sensor supply voltage:
  - Bipolar supply voltage ..... ( $\pm V$ )
  - Unipolar supply voltage ..... (0 +V or 0 -V)
7. Output current
  - Secondary current at nominal current  $I_{PN}$  ..... (mA)
8. Current output (NCS125 & NCS165 only for fixed installations)
  - Secondary current at maximum current  $I_{PMAX}$  ..... (mA)
9. Voltage output (NCS125 & NCS165 only for fixed installations)
  - Secondary voltage at nominal current  $I_{PN}$  ..... (V)
10. Voltage output (NCS125 & NCS165 only for fixed installations)
  - Secondary voltage at maximum current  $I_{PMAX}$  ..... (V)

### Sensor environmental conditions

1. Minimum operating temperature ..... ( $^{\circ}C$ )
2. Maximum operating temperature ..... ( $^{\circ}C$ )
3. Average nominal operating temperature ..... ( $^{\circ}C$ )
4. Maximum continuous primary conductor voltage ..... (V)
5. Main reference standards .....

# Questionnaire

## Railway voltage sensor selection

<b>Company:</b> .....	<b>Name:</b> .....	
<b>Address:</b> .....		
<b>Tel:</b> .....	<b>Fax:</b> .....	<b>Email:</b> .....

### Application

1. Project name.....
2. Application:
  - Short or long distance train:
    - Power converter .....
    - Auxiliary converter.....
  - Metro or tramway:
    - Power converter .....
    - Auxiliary converter.....
  - Fixed installation (e.g. substation).....
3. Quantity per year:.....
4. Total quantity for the project.....

### Mechanical characteristics

1. Primary connection:
  - By screw .....
  - Other.....
2. Secondary connection:
  - Screw or Faston.....
  - By connector .....
  - Other.....

### Sensor environmental conditions

1. Minimum operating temperature..... (°C)
2. Maximum operating temperature..... (°C)
3. Average nominal operating temperature .....(°C)
4. Main reference standards.....

### Other requirements (description)

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### Electrical characteristics

1. Nominal voltage ( $U_{PN}$ ) ..... (V r.m.s.)
2. Voltage type (if possible, show voltage profile on graph):
  - Direct .....
  - Alternating .....
3. Bandwidth to be measured ..... (Hz)
4. Voltage measuring range:
  - Minimum voltage..... (V)
  - Maximum voltage..... (V)
  - Duration (at max. voltage)..... (sec)
  - Repetition (at max. voltage) .....
  - Measuring voltage (on  $R_M$ ) at max voltage..... (V)
5. Overload voltage (not measurable):
  - Not measurable overload voltage..... (V)
  - Duration..... (sec)
  - Repetition .....
  - Category (from OV1 to OV3).....
6. Sensor supply voltage:
  - Bipolar supply voltage..... ( $\pm V$ )
  - Unipolar supply voltage ..... (0 +V or 0 -V)
7. Output current
  - Secondary current at nominal voltage  $U_{PN}$ ..... (mA)

# Questionnaire

## Voltage detector selection

<b>Company:</b> .....	<b>Name:</b> .....
<b>Address:</b> .....	
<b>Tel:</b> .....	<b>Fax:</b> .....
<b>Email:</b> .....	

### Application

1. Project name.....
2. Application:
  - Short or long distance train:
    - Power converter .....
    - Auxiliary converter.....
  - Metro or tramway:
    - Power converter .....
    - Auxiliary converter.....
  - Fixed equipment (e.g. substation).....
3. Quantity per year: .....
4. Total quantity for the project.....

### Sensor environmental conditions

1. Minimum operating temperature ..... (°C)
2. Maximum operating temperature ..... (°C)
3. Average nominal operating temperature ..... (°C)
4. Pollution degree .....
5. Over voltage category (from OV1 to OV3).....
6. Maximum ambient light level..... (lux)
7. Main reference standards .....

### Electrical characteristics

1. Nominal voltage ( $U_{PN}$ ) ..... (V DC)
2. Maximum voltage long duration: 5 min ( $U_{MAX2}$ ) ..... (V DC)
3. Maximum voltage overload: 20 ms ( $U_{MAX3}$ ) ..... (V DC)
4. Minimum voltage to be detected..... (V)

### Other requirements (description)

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