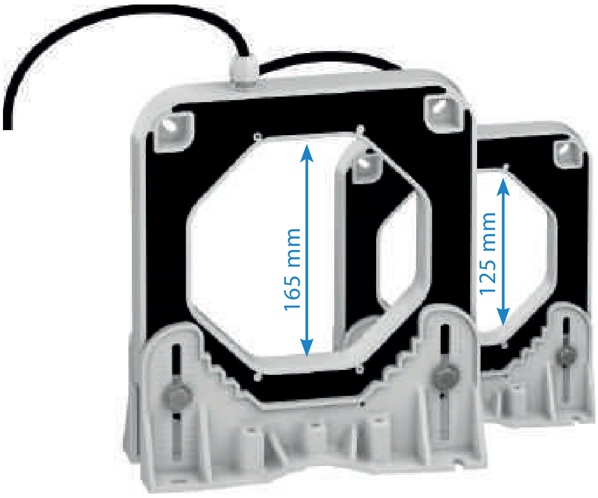
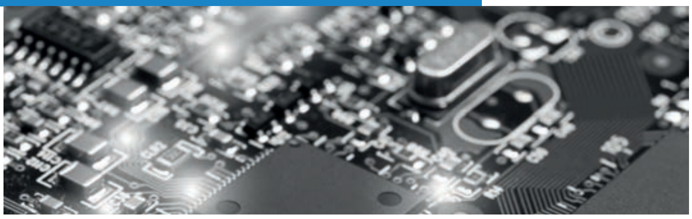
Railway current sensors NCS-T range electronic technology

Electronic technology



100% electronic

The main advantage of the NCS range of sensors is that they are designed using a brand-new solution: 100% electronic technology. Unlike other currently available solutions such as shunts and CTs, this approach means that these sensors are very compact. Several patents were necessary to achieve this improvement.



Quality that goes beyond standards

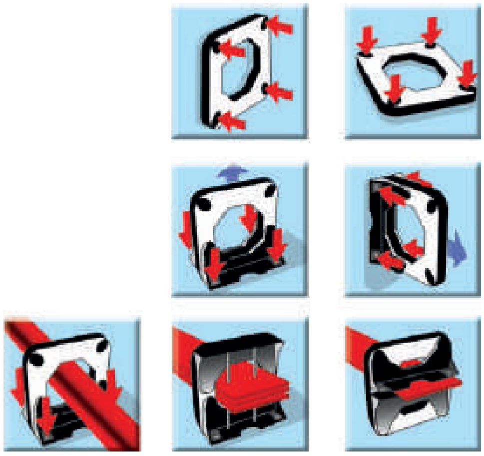
Our product line has been ISO 9001 certified since 1993 and our standard NCS sensors bear the CE label in Europe.
This ongoing striving after quality has always been the hallmark of a company where excellence and safety are part of the culture, from design right through to production.
This culture is the result of continuous research to make technical progress and meet our customers' demands.

The chief selling-point of NCS sensors is their quality. Compliance of their high-tech electronic design with standard EN 50155 is proof of their ability to comply with the most detailed constraint as well as major demands. The fact that each individual sensor is subjected to rigorous testing is proof of the importance PETERCEM attribute to quality.

Designed to be integrated into every situation

The NCS sensor is entirely symmetrical. Its square shape and strategically positioned oblong holes make it easy to fasten in a choice of 2 positions. As an accessory it comes with a side plate that can be fastened on either side of the sensor giving complete fitting flexibility. It meets the standard design of PETERCEM current sensors. It can be fitted both horizontally and vertically. This flexibility means that NCS sensors can be fitted in any position and simplifies the work of integrators. Additionally the pair of right angle brackets allows the NCS sensor to be fitted to one or several bars at the same time.

3



Considerable energy savings

NCS sensors offer considerable savings in energy. Indeed only a few watts are required to power the NCS sensor in contrast to traditional sensors that require several hundred watts.
This reduction in wasted energy means there is no rise in temperature around the sensor.

Environment-friendly

PETERCEM have long been concerned with the protection of the environment. This environmental approach is particularly noticeable in the production of the NCS range in the reduction of the number of components, in the use of a low-energy manufacturing procedure and the use of recyclable packing. The products in use are also characterized by their reduced energy consumption.
Our NCST range is RoHS compliant.

NCS Substation sensors have been designed to meet the substation standards EN 50123-1 and EN 50121-5. NCS range sensors also meet the security standard EN 50124-1.

The NCS meets all of your requirements

NCS125T ... NCS165T railway current sensors

For infrastructure only
4000 to 40000 A - Electronic technology

Frame mounting
These current sensors are specially designed and manufactured for Traction applications (NCS range for fixed railway applications and CS range for rolling stock).
The requirements for these sensors are generally higher than those for Industry applications (larger operating temperature range, higher level of shocks and vibrations...).
These sensors can be fixed mechanically, by the case or by the primary bar, depending on the version or option.

3

NCS125T-4AF to NCS125T-10AF
NCS125T-4VF to NCS125T-10VF

NCS165T-4AF to NCS165-20AF
NCS165T-4VF to NCS165-20VF

Ordering details

Nominal primary current	Secondary current I_{S1} at $\pm I_{PN}$	Secondary voltage V_{S1} at $\pm I_{PN}$	Supply voltage	Secondary connection	Type	Order code
A	mA	V	V DC			
4000	±20	–	±24	Shielded cable 6 wires (2 m)	NCS125T-4AF	1SBT209204R0001
4000	–	±10	±24	Shielded cable 6 wires (2 m)	NCS125T-4VF	1SBT209204R0101
4000	±20	–	±24	Shielded cable 6 wires (2 m)	NCS165T-4AF	1SBT209604R0001
4000	–	±10	±24	Shielded cable 6 wires (2 m)	NCS165T-4VF	1SBT209604R0101
6000	±20	–	±24	Shielded cable 6 wires (2 m)	NCS125T-6AF	1SBT209206R0001
6000	–	±10	±24	Shielded cable 6 wires (2 m)	NCS125T-6VF	1SBT209206R0101
6000	±20	–	±24	Shielded cable 6 wires (2 m)	NCS165T-6AF	1SBT209606R0001
6000	–	±10	±24	Shielded cable 6 wires (2 m)	NCS165T-6VF	1SBT209606R0101
10000	±20	–	±24	Shielded cable 6 wires (2 m)	NCS125T-10AF	1SBT209210R0001
10000	–	±10	±24	Shielded cable 6 wires (2 m)	NCS125T-10VF	1SBT209210R0101
10000	±20	–	±24	Shielded cable 6 wires (2 m)	NCS165T-10AF	1SBT209610R0001
10000	–	±10	±24	Shielded cable 6 wires (2 m)	NCS165T-10VF	1SBT209610R0101
20000	±20	–	±24	Shielded cable 6 wires (2 m)	NCS165T-20AF	1SBT209620R0001
20000	–	±10	±24	Shielded cable 6 wires (2 m)	NCS165T-20VF	1SBT209620R0101

NCS125T railway current sensors

For infrastructure only
Technical data

Application

Sensors to measure DC, AC or pulsating currents with a galvanic insulation between primary and secondary circuits.

	Output current shielded cable		NCS125T-4AF	–
	Output voltage shielded cable		–	NCS125T-4VF
Nominal primary current		A	4000	4000
Measuring range		A	20000	20000
Not measured overload	1 s/h	A peak	80000	80000
Secondary current I_{S1} at I_{PN}		mA	±20	–
Secondary current I_{S2} at I_{PMAX}		mA	±20	–
Residual current $I_{S1}0$	@ +25 °C	µA	≤±250	–
Residual current $I_{S2}0$	@ +25 °C	µA	≤±180	–
Thermal drift coefficient (outputs I_{S1}, I_{S2})		µA/°C	≤±4	–
Measuring resistance (outputs I_{S1}, I_{S2})		Ω	0 ... 350	–
Secondary voltage V_{S1} at I_{PN}		V	–	±10
Secondary voltage V_{S2} at I_{PMAX}		V	–	±10
Residual voltage $V_{S1}0$	@ +25 °C	mV	–	≤±100
Residual voltage $V_{S2}0$	@ +25 °C	mV	–	≤±50
Thermal drift coefficient (outputs V_{S1}, V_{S2})		mV/°C	–	≤±2
Measuring resistance (outputs V_{S1}, V_{S2})		Ω	–	10000 ... ∞
Rms accuracy 50 Hz (without offset) (1) at I_{PN}	@ +25 °C	%	≤±1	≤±1
Rms accuracy 50 Hz (without offset) (1) at I_{PMAX}	@ +25 °C	%	≤±3	≤±3
Gain thermal drift	-25 ... +85 °C	%/°C	≤0.03	≤0.03
Gain thermal drift	-40 ... -25 °C	%/°C	≤ 0.2	≤ 0.2
Linearity (typical)		%	±0.5	±0.5
Delay time (typical)		µs	≤3	≤3
di/dt correctly followed		A / µs	≤100	≤100
Bandwidth	@ -1 dB	kHz	0 ... 10	0 ... 10
No load consumption current (I_{A0+})	@ -40 °C	mA	≤ 245	≤ 245
No load consumption current (I_{A0-})		mA	≤35	≤35
Dielectric strength Primary/Secondary	50 Hz, 1 min	kV r.m.s.	20	20
Supply voltage	± 25%	V DC	±24	±24
Mass		kg	1.4	1.4
Operating temperature		°C	-40 ... +85	-40 ... +85
Storage/startup temperature		°C	-50 ... +90	-50 ... +90

(1) Maximum current I_{PN} generated: 5000 A r.m.s.

General data

– Plastic case and insulating resin are self-extinguishing.

– Two fixing modes:
  - Horizontal or vertical with fixing holes in the case moulding
  - By bar using the intermediate side plate kit (Refer to Accessories and options on the following page)

– Max tightening torque for M6 screws (side plate mounting): 2 N.m

– **Direction of the current:**
  - Output current (I_{S1} and I_{S2}): A primary current flowing in the direction of the arrow results in a positive secondary output current on terminals I_{S1} and I_{S2}.
  - Output voltage (V_{S1} and V_{S2}): A primary current flowing in the direction of the arrow results in a positive secondary output voltage on terminals V_{S1} and V_{S2}.

– Burn-in test in accordance with FPTC 404304 cycle

Primary connection

Hole for primary conductor.
The temperature of the primary conductor in contact with the case must not exceed 100 °C.

Secondary connection

Shielded cable 6 x 2000 mm (cross section 0.5 mm^2)

3

	Output current shielded cable		NCS125T-6AF	–	NCS125T-10AF	–
	Output voltage shielded cable		–	NCS125T-6VF	–	NCS125T-10VF
Nominal primary current		A	6000	6000	10000	10000
Measuring range		A	30000	30000	30000	30000
Not measured overload	1 s/h	A peak	120000	120000	200000	200000
Secondary current I_{S1} at I_{PN}		mA	±20	–	±20	–
Secondary current I_{S2} at I_{PMAX}		mA	±20	–	±20	–
Residual current $I_{S1}0$	@ +25 °C	µA	≤±250	–	≤±250	–
Residual current $I_{S2}0$	@ +25 °C	µA	≤±180	–	≤±180	–
Thermal drift coefficient (outputs I_{S1}, I_{S2})		µA/°C	≤±4	–	≤±4	–
Measuring resistance (outputs I_{S1}, I_{S2})		Ω	0 ... 350	–	0 ... 350	–
Secondary voltage V_{S1} at I_{PN}		V	–	±10	–	±10
Secondary voltage V_{S2} at I_{PMAX}		V	–	±10	–	±10
Residual voltage $V_{S1}0$	@ +25 °C	mV	–	≤±100	–	≤±100
Residual voltage $V_{S2}0$	@ +25 °C	mV	–	≤±50	–	≤±50
Thermal drift coefficient (outputs V_{S1}, V_{S2})		mV/°C	–	≤±2	–	≤±2
Measuring resistance (outputs V_{S1}, V_{S2})		Ω	–	10000 ... ∞	–	10000 ... ∞
Rms accuracy 50 Hz (without offset) (1) at I_{PN}	@ +25 °C	%	≤±2	≤± 2	≤± 2	≤± 2
Rms accuracy 50 Hz (without offset) (1) at I_{PMAX}	@ +25 °C	%	≤±3	≤±3	≤±3	≤±3
Gain thermal drift	-25 ... +85 °C	%/°C	≤0.03	≤0.03	≤0.03	≤0.03
Gain thermal drift	-40 ... -25 °C	%/°C	≤0.1	≤0.1	≤0.1	≤0.1
Linearity (typical)		%	±0.5	±0.5	±0.5	±0.5
Delay time (typical)		µs	≤3	≤3	≤3	≤3
di/dt correctly followed		A / µs	≤100	≤100	≤100	≤100
Bandwidth	@ -1 dB	kHz	0 … 10	0 … 10	0 … 10	0 … 10
No load consumption current (I_{A0+})	@ -40 °C	mA	≤ 245	≤ 245	≤ 245	≤ 245
No load consumption current (I_{A0-})		mA	≤35	≤35	≤35	≤35
Dielectric strength Primary/Secondary	50 Hz, 1 min	kV r.m.s.	20	20	20	20
Supply voltage	± 25%	V DC	±24	±24	±24	±24
Mass		kg	1.4	1.4	1.4	1.4
Operating temperature		°C	-40 … +85	-40 … +85	-40 … +85	-40 … +85
Storage/startup temperature		°C	-50 … +90	-50 … +90	-50 … +90	-50 … +90

(1) Maximum current I_{PN} generated: 5000 A r.m.s.

Accessories and options

Side plates (or right angle brackets)

For installation of the side plates, please refer to the mounting instructions ref. **1SBC146000M1703**

Side plate kit NCS125T:
PETERCEM order code: **1SBT200000R2002**

Conformity

EN 50155
EN 50121-5, EN50123-1, EN50124-1

CE

RoHS

NCS165T railway current sensors

For infrastructure only
Technical data

Application

Sensors to measure DC, AC or pulsating currents with a galvanic insulation between primary and secondary circuits.

	Output current shielded cable		NCS165T-4AF	–	NCS165T-6AF	–
	Output voltage shielded cable		–	NCS165T-4VF	–	NCS165T-6VF
Nominal primary current		A	4000	4000	6000	6000
Measuring range		A	20000	20000	30000	30000
Not measured overload	1 s/h	A peak	80000	80000	120000	120000
Secondary current I_{S1} at I_{PN}		mA	±20	–	±20	–
Secondary current I_{S2} at I_{PMAX}		mA	±20	–	±20	–
Residual current $I_{S1}0$	@ +25 °C	µA	≤±250	–	≤±250	–
Residual current $I_{S2}0$	@ +25 °C	µA	≤±180	–	≤±180	–
Thermal drift coefficient (outputs I_{S1}, I_{S2})		µA/°C	≤±4	–	≤±4	–
Measuring resistance (outputs I_{S1}, I_{S2})		Ω	0 ... 350	–	0 ... 350	–
Secondary voltage V_{S1} at I_{PN}		V	–	±10	–	±10
Secondary voltage V_{S2} at I_{PMAX}		V	–	±10	–	±10
Residual voltage $V_{S1}0$	@ +25 °C	mV	–	≤±100	–	≤±100
Residual voltage $V_{S2}0$	@ +25 °C	mV	–	≤±50	–	≤±50
Thermal drift coefficient (outputs V_{S1}, V_{S2})		mV/°C	–	≤±2	–	≤±2
Measuring resistance (outputs V_{S1}, V_{S2})		Ω	–	10000 ... ∞	–	10000 ... ∞
Rms accuracy 50 Hz (without offset) (1) at I_{PN}	@ +25 °C	%	≤±1	≤±1	≤±1	≤±1
Rms accuracy 50 Hz (without offset) (1) at I_{PMAX}	@ +25 °C	%	≤±3	≤±3	≤±3	≤±3
Gain thermal drift	-25 ... +85 °C	%/°C	≤0.03	≤0.03	≤0.03	≤0.03
Gain thermal drift	-40 ... -25 °C	%/°C	≤0.1	≤0.1	≤0.1	≤0.1
Linearity (typical)		%	±0.5	±0.5	±0.5	±0.5
Delay time (typical)		µs	≤3	≤3	≤3	≤3
di/dt correctly followed		A / µs	≤100	≤100	≤100	≤100
Bandwidth	@ -1 dB	kHz	0 ... 10	0 ... 10	0 ... 10	0 ... 10
No load consumption current (I_{A0+})	@ -40 °C	mA	≤210	≤210	≤210	≤210
No load consumption current (I_{A0-})		mA	≤35	≤35	≤35	≤35
Dielectric strength Primary/Secondary	50 Hz, 1 min	kV r.m.s.	20	20	20	20
Supply voltage	± 25%	V DC	±24	±24	±24	±24
Mass		kg	1.7	1.7	1.7	1.7
Operating temperature		°C	-40 ... +85	-40 ... +85	-40 ... +85	-40 ... +85
Storage/startup temperature		°C	-50 ... +90	-50 ... +90	-50 ... +90	-50 ... +90

(1) Maximum current I_{PN} generated: 5000 A r.m.s.

General data

– Plastic case and insulating resin are self-extinguishing.

– Two fixing modes:

- Horizontal or vertical with fixing holes in the case moulding.
- By bar using the intermediate side plate kit (Refer to accessories and options on the following page)

– Max tightening torque for M6 screws (side plate mounting): 2 N.m

– **Direction of the current:**

- Output current (I_{S1} and I_{S2}): A primary current flowing in the direction of the arrow results in a positive secondary output current on terminals I_{S1} and I_{S2}.
- Output voltage (V_{S1} and V_{S2}): A primary current flowing in the direction of the arrow results in a positive secondary output voltage on terminals V_{S1} and V_{S2}.

– Burn-in test in accordance with FPTC 404304 cycle

Primary connection

Hole for primary conductor.

The temperature of the primary conductor in contact with the case must not exceed 100 °C.

Secondary connection

Shielded cable 6 x 2000 mm (cross section 0.5 mm^2)

3

	Output current shielded cable		NCS165T-10AF	–	NCS165T-20AF	–
	Output voltage shielded cable		–	NCS165T-10VF	–	NCS165T-20VF
Nominal primary current		A	10000	10000	20000	20000
Measuring range		A	30000	30000	40000	40000
Not measured overload	1 s/h	A peak	200000	200000	200000	200000
Secondary current I_{S1} at I_{PN}		mA	±20	–	±20	–
Secondary current I_{S2} at I_{PMAX}		mA	±20	–	±20	–
Residual current I_{S1} 0	@ +25 °C	µA	≤±250	–	≤±250	–
Residual current I_{S2} 0	@ +25 °C	µA	≤±180	–	≤±180	–
Thermal drift coefficient (outputs I_{S1}, I_{S2})		µA/°C	≤±4	–	≤±4	–
Measuring resistance (outputs I_{S1}, I_{S2})		Ω	0 ... 350	–	0 ... 350	–
Secondary voltage V_{S1} at I_{PN}		V	–	±10	–	±10
Secondary voltage V_{S2} at I_{PMAX}		V	–	±10	–	±10
Residual voltage V_{S1} 0	@ +25 °C	mV	–	≤±100	–	≤±100
Residual voltage V_{S2} 0	@ +25 °C	mV	–	≤±50	–	≤±50
Thermal drift coefficient (outputs V_{S1}, V_{S2})		mV/°C	–	≤±2	–	≤±2
Measuring resistance (outputs V_{S1}, V_{S2})		Ω	–	10000 ... ∞	–	10000 ... ∞
Rms accuracy 50 Hz (without offset)[1] at I_{PN}	@ +25 °C	%	≤±1	≤±1	≤±1	≤±1
Rms accuracy 50 Hz (without offset)[1] at I_{PMAX}	@ +25 °C	%	≤±3	≤±3	≤±3	≤±3
Gain thermal drift	-25 ... +85 °C	%/°C	≤0.03	≤0.03	≤0.03	≤0.03
Gain thermal drift	-40 ... -25 °C	%/°C	≤0.1	≤0.1	≤0.1	≤0.1
Linearity (typical)		%	±0.5	±0.5	±0.5	±0.5
Delay time (typical)		µs	≤3	≤3	≤3	≤3
di/dt correctly followed		A / µs	≤100	≤100	≤100	≤100
Bandwidth	@ -1 dB	kHz	0 ... 10	0 ... 10	0 ... 10	0 ... 10
No load consumption current (I_{A0+})	@ -40 °C	mA	≤210	≤210	≤210	≤210
No load consumption current (I_{A0-})		mA	≤35	≤35	≤35	≤35
Dielectric strength Primary/Secondary	50 Hz, 1 min	kV r.m.s.	20	20	20	20
Supply voltage	± 25%	V DC	±24	±24	±24	±24
Mass		kg	1.7	1.7	1.7	1.7
Operating temperature		°C	-40 ... +85	-40 ... +85	-40 ... +85	-40 ... +85
Storage/startup temperature		°C	-50 ... +90	-50 ... +90	-50 ... +90	-50 ... +90

(1) Maximum current I_{PN} generated: 5000 A r.m.s.

Accessories and options

Side plates (or right angle brackets)

For installation of the side plates, please refer to the mounting instructions ref. **1SBC146000M1703**

Side plate kit NCS165T:
PETERCEM order code: **1SBT200000R2001**

Conformity

EN 50155
EN 50121-5, EN 50123-1, EN 50124-1

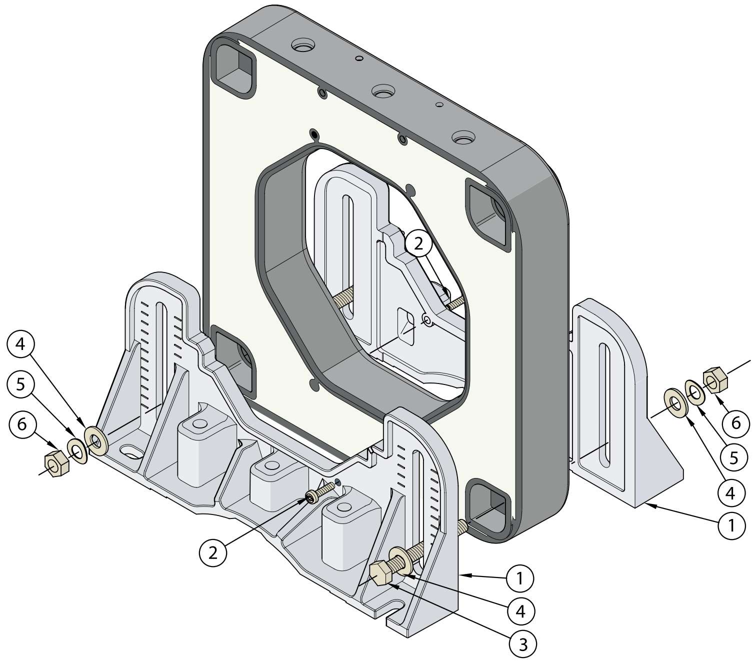
CE

RoHS

NCS125T railway current sensors

For infrastructure only

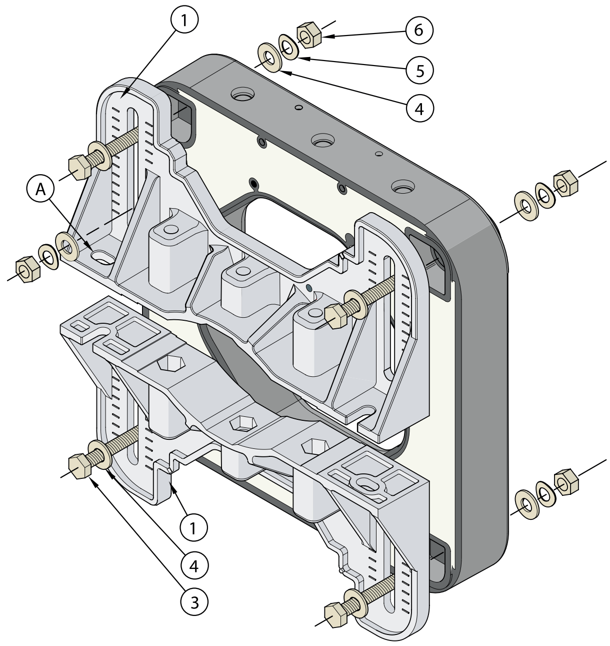
Right angle brackets mounting on NCS125T sensors



1 -	Side plate: x2
2 -	Standard positioning screw: x2 (3x12)
3 -	Side plate screw M6: x2 (6x50)
4 -	Flat washer: x4
5 -	Spring washer: x2
6 -	Locknut: x2
7 -	Not used:
	• Side plate screw M6: x4 (6x30)
	• Flat washer: x4
	• Spring washer: x2
	• Locknut: x2

3

Right angle brackets mounting on NCS125T sensors



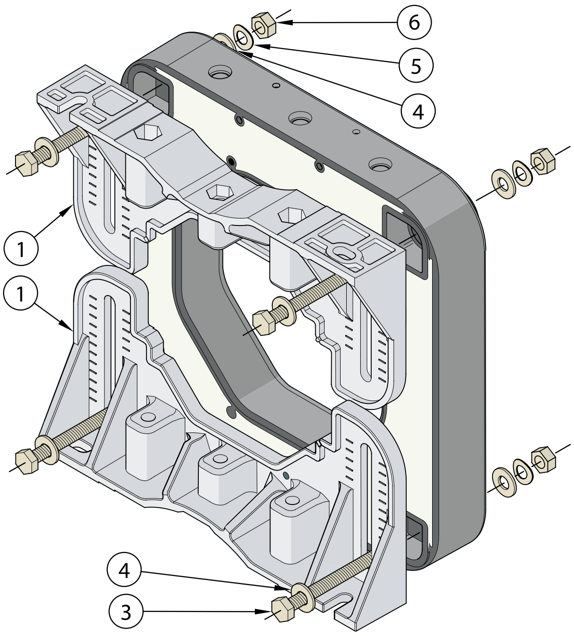
1 -	Side plate: x2
3 -	Side plate screw M6: x4 (6x30)
4 -	Flat washer: x8
5 -	Spring washer: x4
6 -	Locknut: x4
7 -	Not used:
	• Side plate screw M6: x4 (6x50)
	• Standard positioning screw: x2 (3x12)

A - The screws for clamping the side plates to the bar (or cable) are not supplied

NCS125T railway current sensors

For infrastructure only

Right angle brackets mounting on NCS125T sensors



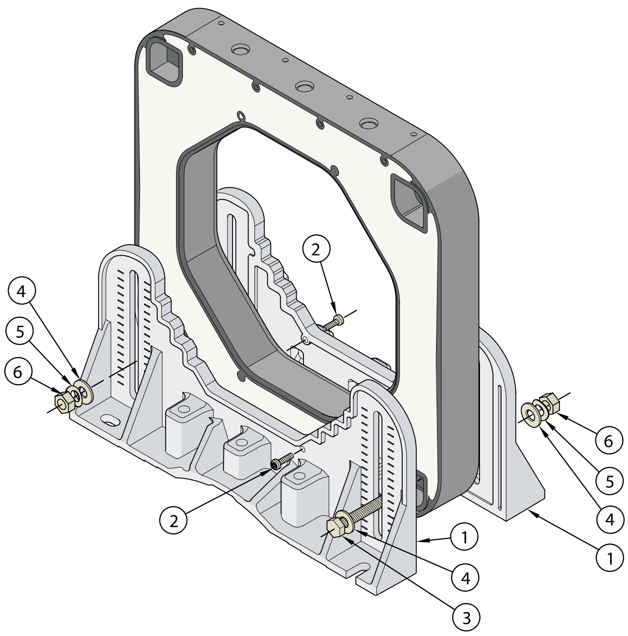
1 - Side plate: x2
3 - Side plate screw M6: x4 (6x30)
4 - Flat washer: x8
5 - Spring washer: x4
6 - Locknut: x4
7 - Not used:
  - Side plate screw M6: x2 (6x50)
  - Standard positioning screw: x2 (3x12)

See page 36 to 40 for detailed dimensions

NCS165T railway current sensors

For infrastructure only

Right angle brackets mounting on NCS165T sensors



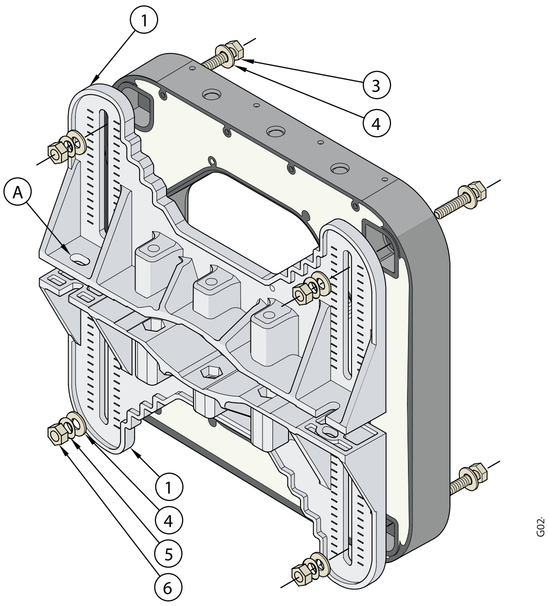
1 - Side plate: x2
2 - Standard positioning screw: x2 (3x12)
3 - Side plate screw M6: x2 (6x50)
4 - Flat washer: x4
5 - Spring washer: x2
6 - Locknut: x2
7 - Not used:
  - Side plate screw M6: x4 (6x30)
  - Flat washer: x4
  - Spring washer: x2
  - Locknut: x2

See page 36 to 40 for detailed dimensions

NCS165T railway current sensors

For infrastructure only

Right angle brackets mounting on NCS165T sensors

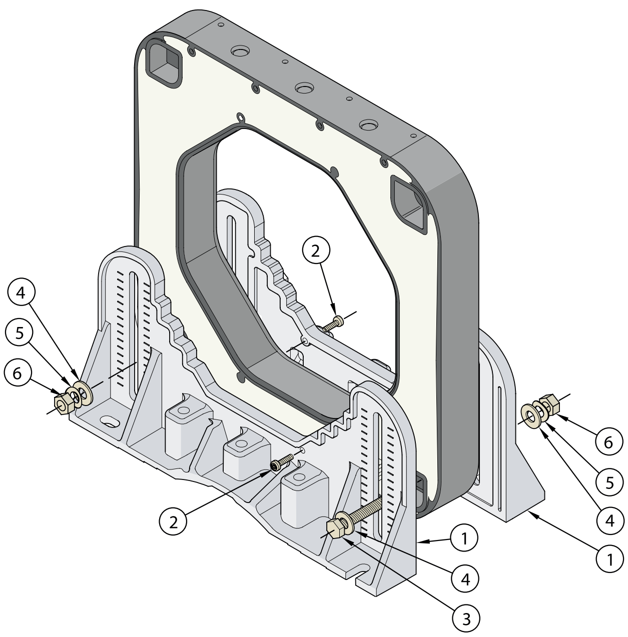


1 -	Side plate: x2
3 -	Side plate screw M6: x4 (6x30)
4 -	Flat washer: x8
5 -	Spring washer: x4
6 -	Locknut: x4
7 -	Not used: • Side plate screw M6: x4 (6x50) • Standard positioning screw: x2 (3x12)

A - The screws for clamping the side plates to the bar (or cable) are not supplied

See page 36 to 40 for detailed dimensions

Right angle brackets mounting on NCS165T sensors



1 -	Side plate: x2
2 -	Standard positioning screw: x2 (3x12)
3 -	Side plate screw M6: x2 (6x50)
4 -	Flat washer: x4
5 -	Spring washer: x2
6 -	Locknut: x2
7 -	Not used: • Side plate screw M6: x4 (6x30) • Flat washer: x4 • Spring washer: x2 • Locknut: x2

See page 36 to 40 for detailed dimensions