



Fluxgate-Based Residual Current Sensors



Why to choose MAGNETEC's Fluxgate-Based Residual Current Sensors?

MAGNETEC offers customers design support to ensure they get the best and most cost-effective solutions for their specific application.

Various designs with the same electrical performance allow customers to use MAGNETEC's Fluxgate-Based Residual Current Sensors in different products without additional development costs.

Residual Current Sensors

Generally, AC/DC-sensitive residual current sensors can be used where direct current and alternating current circuits are connected and therefore AC/DC leakage currents can occur.

As the residual currents to be monitored only occur in the event of electrical faults and are extremely low (mA), maximum measurement precision is critical. In addition, a fast response time is required to maintain safety features and prevent humans from getting injured. Residual current sensors fulfill both of these essential requirements.

Benefits

- Protects against hazardous situations with fault currents, preserving residual current circuit-breakers (RCCBs) type A from saturation
- Small footprint allows integration into compact IC-CPD
- Suitable for harsh environmental conditions due to a robust mechanical and electrical design
- Electrical safety at lower cost (compared to RCCB type B)
- Test winding included for self-monitoring and test functions



Fluxgate-Based Residual Current Sensors

MagBlue series

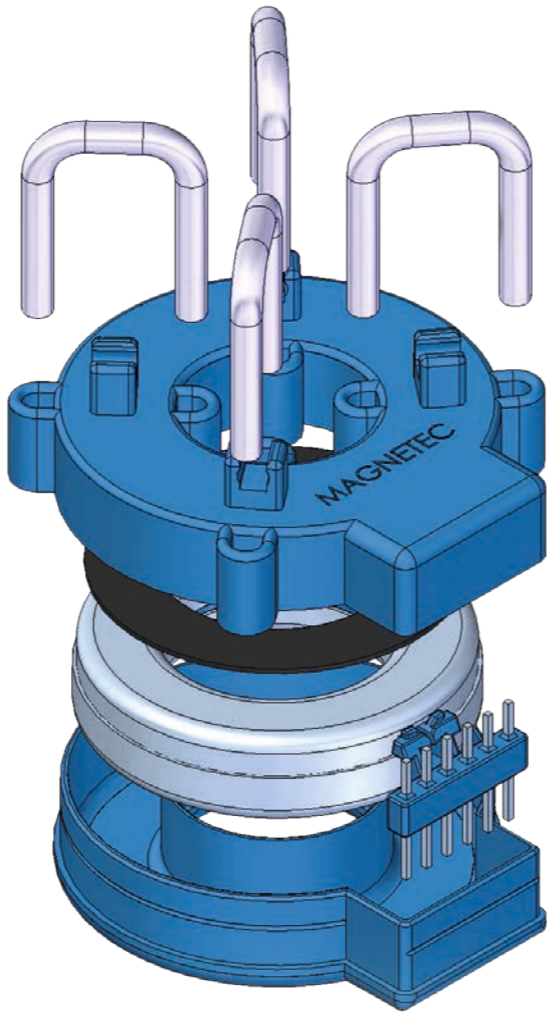
Residual Current Sensor element

The Fluxgate-Based Residual Current Sensors are made of an induction coil with particular characteristics. It has a high permeability Nanoperm® core, which makes the detection of very low (6mA) DC currents possible. The core material has very high permeability and low remanence (Hc), enabling very fast transition between linear and saturated state. Energizing the coil with an alternating voltage makes the core go through a complete hysteresis loop. With a residual current flowing through the coil, the hysteresis loop is shifted. The measurement of this shift represents the primary current.

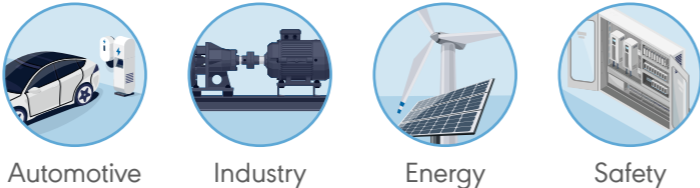
It enables the use of individual and customized evaluation circuits, allowing an ideal system integration in to your application in a cost-efficient way.

MAGNETEC sensors are already in use at numerous automotive OEMs. We would be happy to develop your individual product for you now.

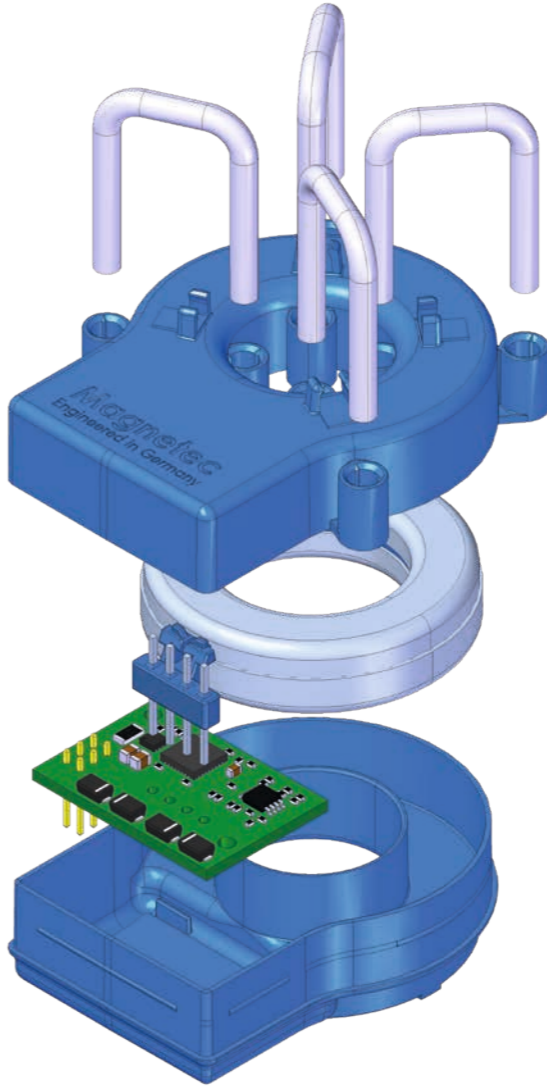
Contact us: info.germany@magnetec.de



Areas of application



Automotive Industry Energy Safety



SafeBlue® series

Residual Current Sensor for EV Charging

MAGNETEC offers AC/DC sensitive residual current sensors for charging cable (mode 2), AC wallbox (mode 3), DC charging station (mode 4) and optional in on-board charger applications.

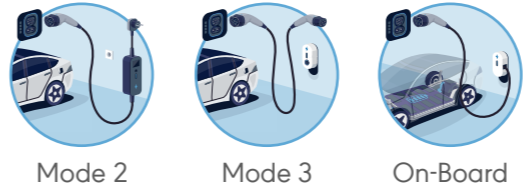
The SafeBlue® series Sensors features a high permeability Nanoperm® core, which makes the detection of very low (6mA) DC currents possible.

It has an integrated evaluation circuit, providing all features requested by the relevant standards.

MAGNETEC sensors are already in use at numerous automotive OEMs. We would be happy to develop your individual product for you now.

Contact us: info.germany@magnetec.de

EV-Charging Modes



Mode 2 Mode 3 On-Board

MagBlue series

Portfolio of 6mA DC / 30mA AC sensors

Compact design, test windings to verify functionality, complies with standards, available in industrial and automotive grade versions (compliant with standards IEC 62955, IEC 62752, IEC 61851, IEC 61008, IEC 61009, IEC 61543, UL 2231, UL 2594, GBT 18487).



Inside

- Shielded transformer core, with a high surge current capability

Benefits

- Perfectly aligned sensor
- Simplifies integration into your application
- Reliable detection of fault currents
- Proven technology with more than 3 million products on the market
- Designed in Germany, produced in Europe
- High availability and short leadtimes



For more information, see our application note now

Primary conductors

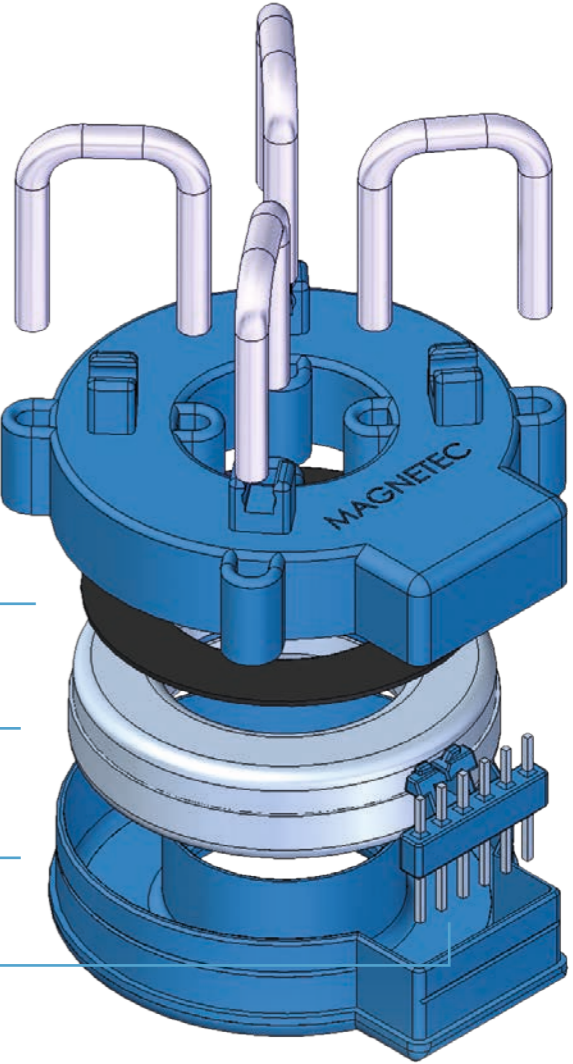
Housing

Foam

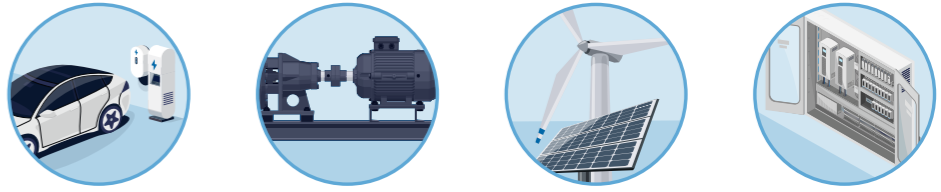
Shielded Nanoperm® core

Housing

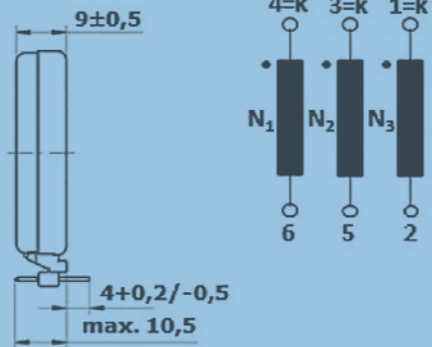
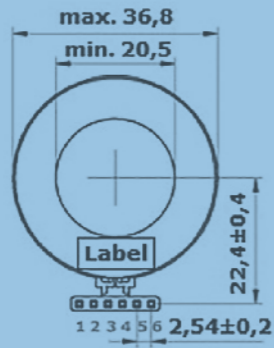
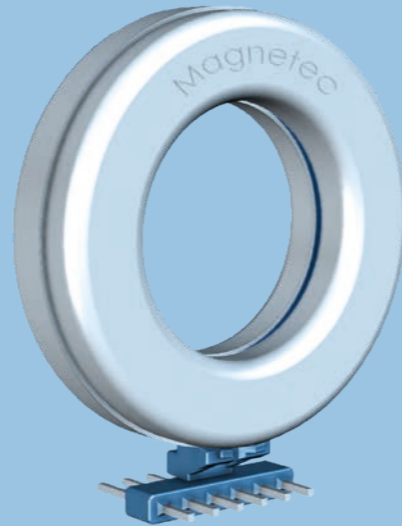
Secondary pins



Areas of application



Automotive Industry Energy Safety



Features

- Nanoperm® core
- Horizontal mounting
- Inner diameter 21mm
- Secondary Pins 0,64mm square, material CuNi18Zn20 alloy
- Low temperature drift / temperature resistant
- Shielded against electrical noise and false triggering caused by high inrush current peaks
- Compatible with all cable diameters up to 43kW charging power (3x63A)
- Mode 2 (IEC62752) drop test compatible
- One product family covers all mode 2 (IC-CPD) and mode 3 (wallbox) applications
- Bottom side is epoxy coated

Advantages

- Very low error at small currents
- High overload capability and high insulation capability
- Test winding
- Takes over the job of the expensive type B RCCBs

Applications

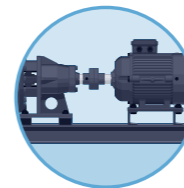
- Leakage current measurement in an IC-CPD (in-cable contact and protection device) (mode 2), wallboxes (mode 3) and for charging station (mode 4)

Complies with applications using these standards

- IEC 62955, IEC 62752, IEC 61851, IEC 61008, IEC 61009, IEC 61543, UL 2231, UL 2594, GBT 18487



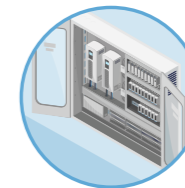
Automotive



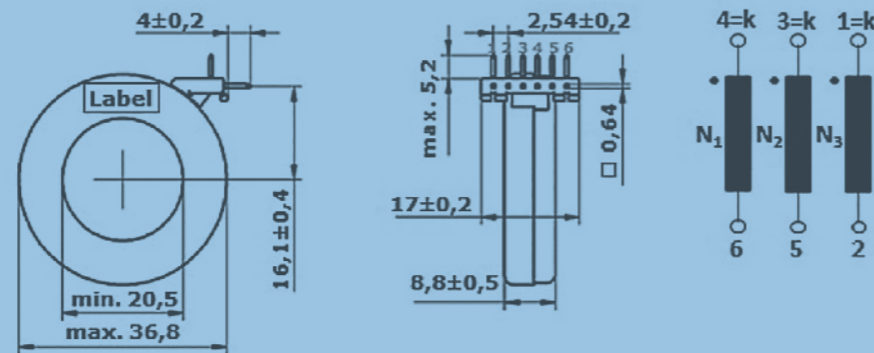
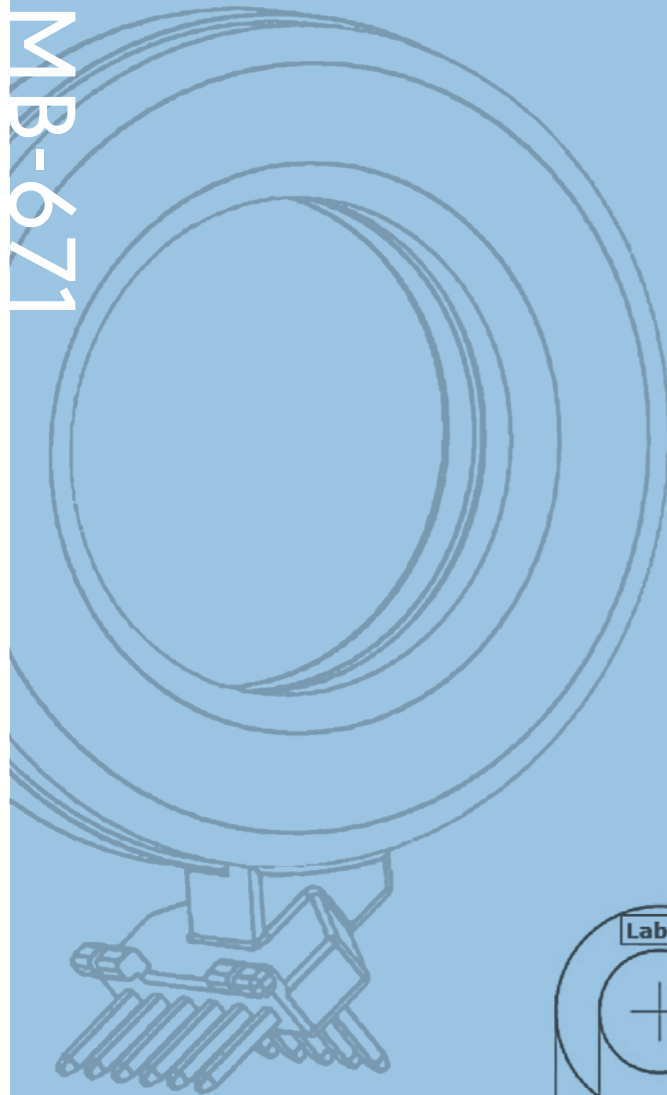
Industry



Energy



Safety



Features

- Nanoperm® core
- Vertical mounting
- Inner diameter 21mm
- Secondary Pins 0,64mm square, material C5191 with Sn (3-8 μm) plating over Ni (1,25-3 μm)
- Low temperature drift / temperature resistant
- Shielded against electrical noise and false triggering caused by high inrush current peaks
- Compatible with all cable diameters up to 43kW charging power (3x63A)
- Mode 2 (IEC62752) drop test compatible
- One product family covers all mode 2 (IC-CPD) and mode 3 (wallbox) applications

Advantages

- Very low error at small currents
- High overload capability and high insulation capability
- Test winding
- Takes over the job of the expensive type B RCCBs

Applications

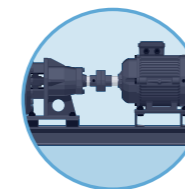
- Leakage current measurement in an IC-CPD (in-cable contact and protection device) (mode 2), wallboxes (mode 3) and for charging station (mode 4)

Complies with applications using these standards

- IEC 62955, IEC 62752, IEC 61851, IEC 61008, IEC 61009, IEC 61543, UL 2231, UL 2594, GBT 18487



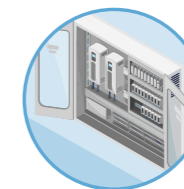
Automotive



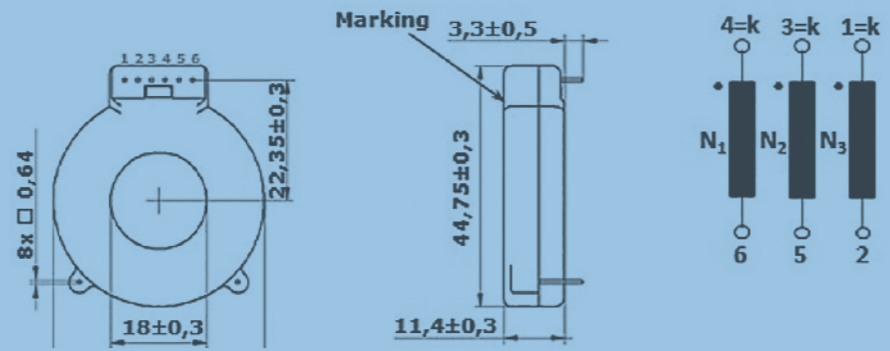
Industry



Energy



Safety



Features

- Nanoperm® core
- Horizontal mounting
- Inner diameter 18mm
- Pins 0,64mm square, material CuNi18Zn20 alloy
- Low temperature drift / temperature resistant
- Shielded against electrical noise and false triggering caused by high inrush current peaks
- Compatible with all cable diameters up to 43kW charging power (3x63A)
- Fulfills clearance and creepage distances from mode 3 (IEC 62955)
- Mode 2 (IEC62752) drop test compatible
- One product family covers all mode 2 (IC-CPD) and mode 3 (wallbox) applications

Advantages

- Very low error at small currents
- High overload capability and high insulation capability
- Test winding
- Takes over the job of the expensive type B RCCBs

Applications

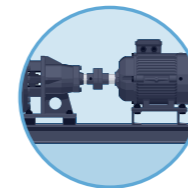
- Leakage current measurement in an IC-CPD (in-cable contact and protection device) (mode 2), wallboxes (mode 3) and for charging station (mode 4)

Complies with applications using these standards

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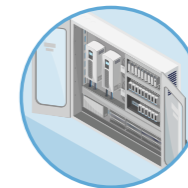
Automotive



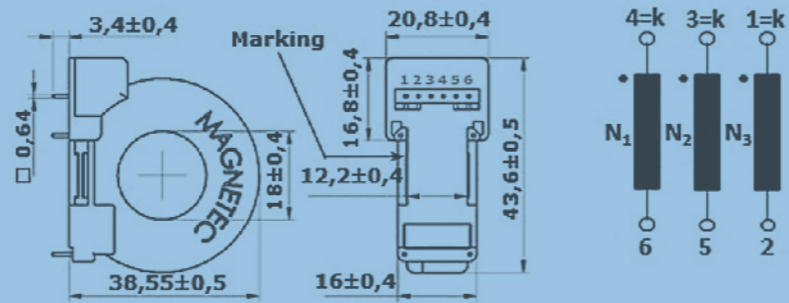
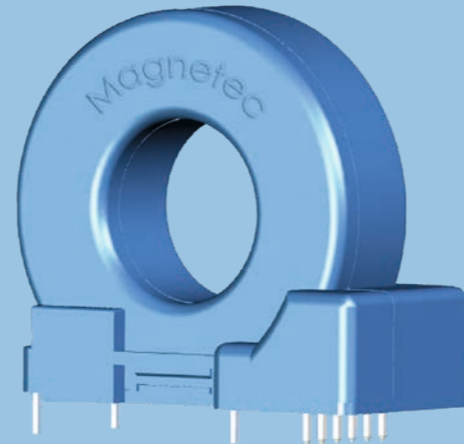
Industry



Energy



Safety



Features

- Nanoperm® core
- Vertical mounting
- Inner diameter 18mm
- Pins 0,64mm square, material CuNi18Zn20 alloy or tinned Cu
- Low temperature drift / temperature resistant
- Shielded against electrical noise and false triggering caused by high inrush current peaks
- Compatible with all cable diameters up to 43kW charging power (3x63A)
- Fulfills clearance and creepage distances from mode 3 (IEC 62955)
- Mode 2 (IEC62752) drop test compatible
- One product family covers all mode 2 (IC-CPD) and mode 3 (wallbox) applications

Advantages

- Very low error at small currents
- High overload capability and high insulation capability
- Test winding
- Takes over the job of the expensive type B RCCBs

Applications

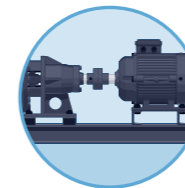
- Leakage current measurement in an IC-CPD (in-cable contact and protection device) (mode 2), wallboxes (mode 3) and for charging station (mode 4)

Complies with applications using these standards

- IEC 62955, IEC 62752, IEC 61851, IEC 61008, IEC 61009, IEC 61543, UL 2231, UL 2594, GBT 18487



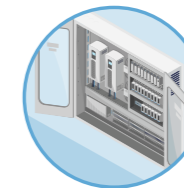
Automotive



Industry

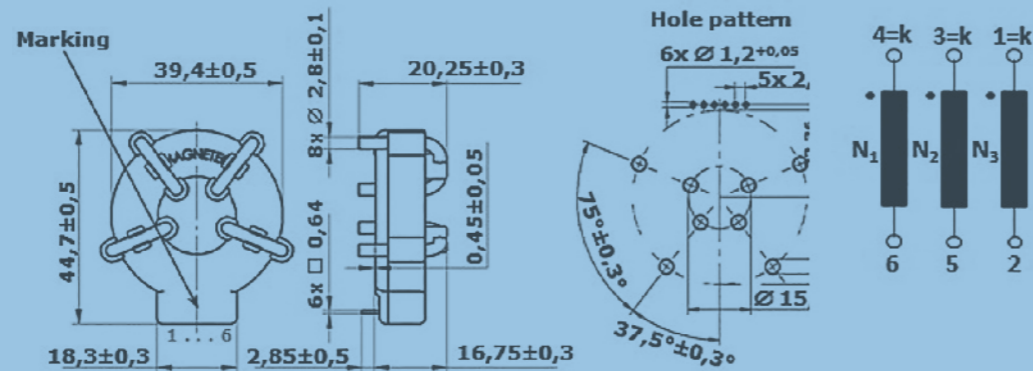
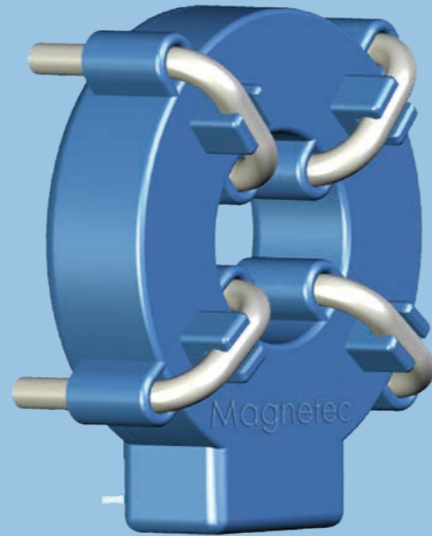


Energy



Safety

MB-676



Features

- Nanoperm® core
- Horizontal mounting
- Secondary Pins 0,64mm square, material CuNi18Zn20 alloy
- Low temperature drift / temperature resistant
- Shielded against electrical noise and false triggering caused by high inrush current peaks
- With integrated primary conductors up to 22kW charging power (3x48A)
- Fulfills clearance and creepage distances from mode 3 (IEC 62955)
- Mode 2 (IEC62752) drop test compatible
- One product family covers all mode 2 (IC-CPD) and mode 3 (wallbox) applications

Advantages

- Very low error at small currents
- High overload capability and high insulation capability
- Test winding
- Takes over the job of the expensive type B RCCBs

Applications

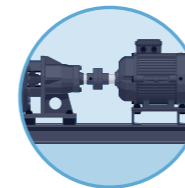
- Leakage current measurement in an IC-CPD (in-cable contact and protection device) (mode 2), wallboxes (mode 3) and for charging station (mode 4)

Complies with applications using these standards

- IEC 62955, IEC 62752, IEC 61851, IEC 61008, IEC 61009, IEC 61543, UL 2231, UL 2594, GBT 18487



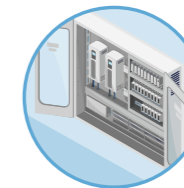
Automotive



Industry



Energy



Safety

SafeBlue® series

Residual current sensor for EV charging applications

MAGNETEC offers AC/DC sensitive residual current sensors for charging cable (mode 2), AC wallbox (mode 3), DC charging station (mode 4) and optional in on-board charger applications.

The SafeBlue® series Sensors features a high permeability Nanoperm® core, which makes the detection of very low (6mA) DC currents possible.

It has an integrated evaluation circuit, providing all features requested by the relevant standards.



Inside

- Shielded transformer core, with a high surge current capability
- Integrated evaluation unit
- Usable in systems according to IEC 62955, IEC 62752, IEC 61851, IEC 61008, IEC 61009, IEC 61543, UL 2231, UL 2594, GBT 18487
- Additional features planned, including functional safety according to IEC 61508 and UL 1998

Benefits

- Perfectly aligned sensor and evaluation system
- Simplifies integration into your application
- Reliable detection of fault currents
- Proven technology with more than 3 million products on the market
- Designed in Germany, produced in Europe
- High availability and short leadtimes

Shielded Nanoperm® core

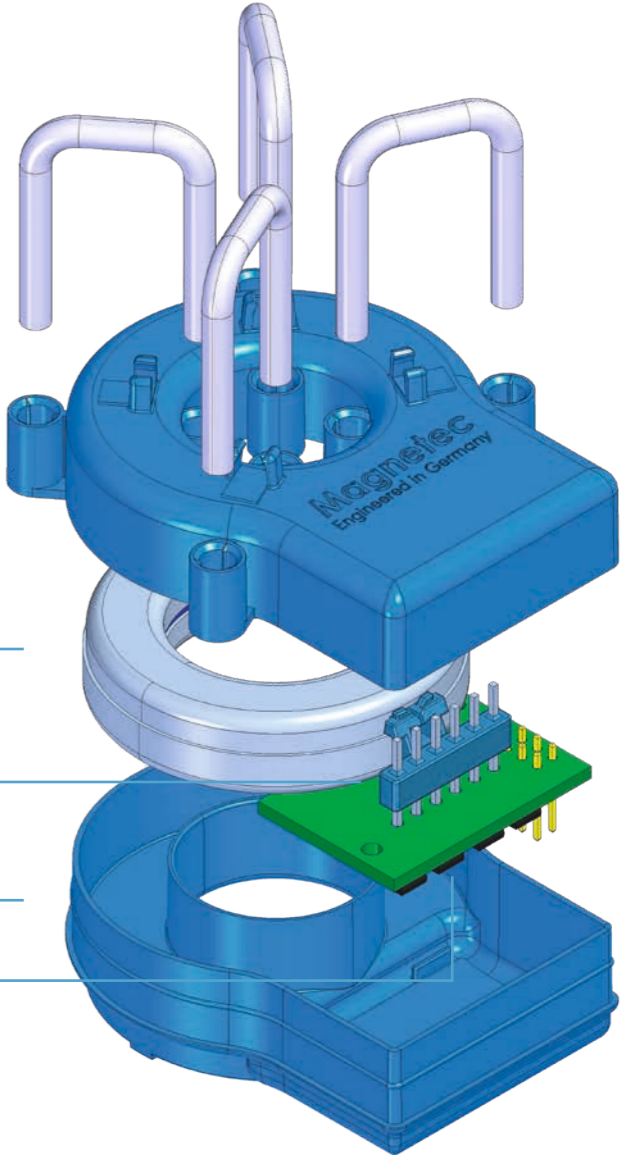
Primary conductors

Housing

Secondary pins

Housing

Evaluation unit



EV-Charging Modes



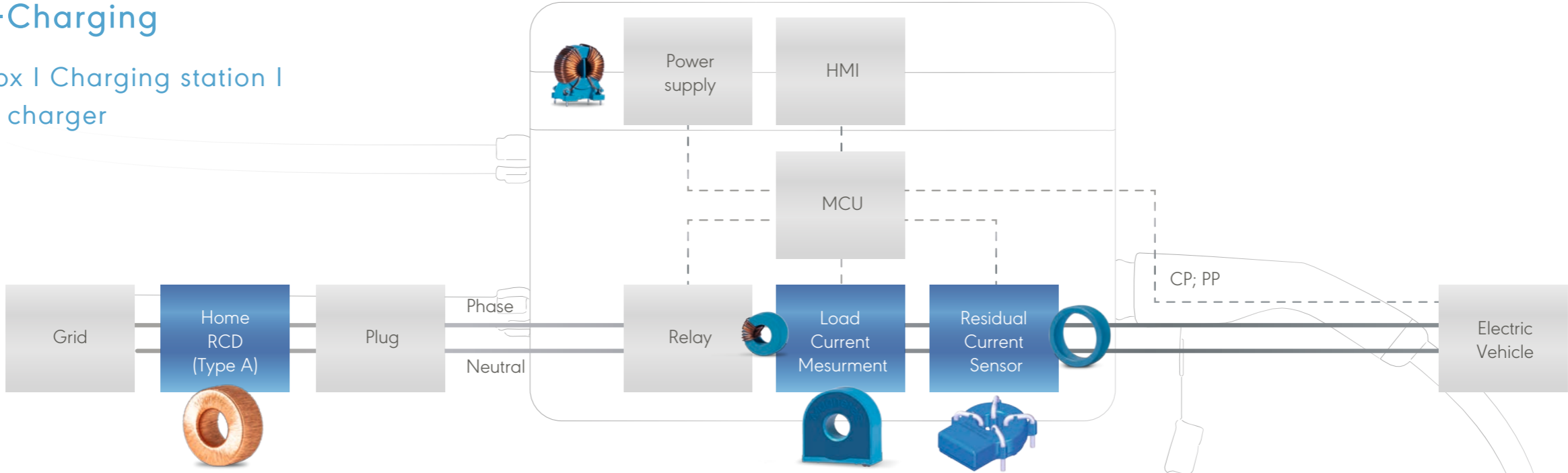
Mode 2

Mode 3

On-Board

Automotive EV-Charging

IC-CPD | AC wallbox | Charging station | optional On-Board charger



AC

Mode 2

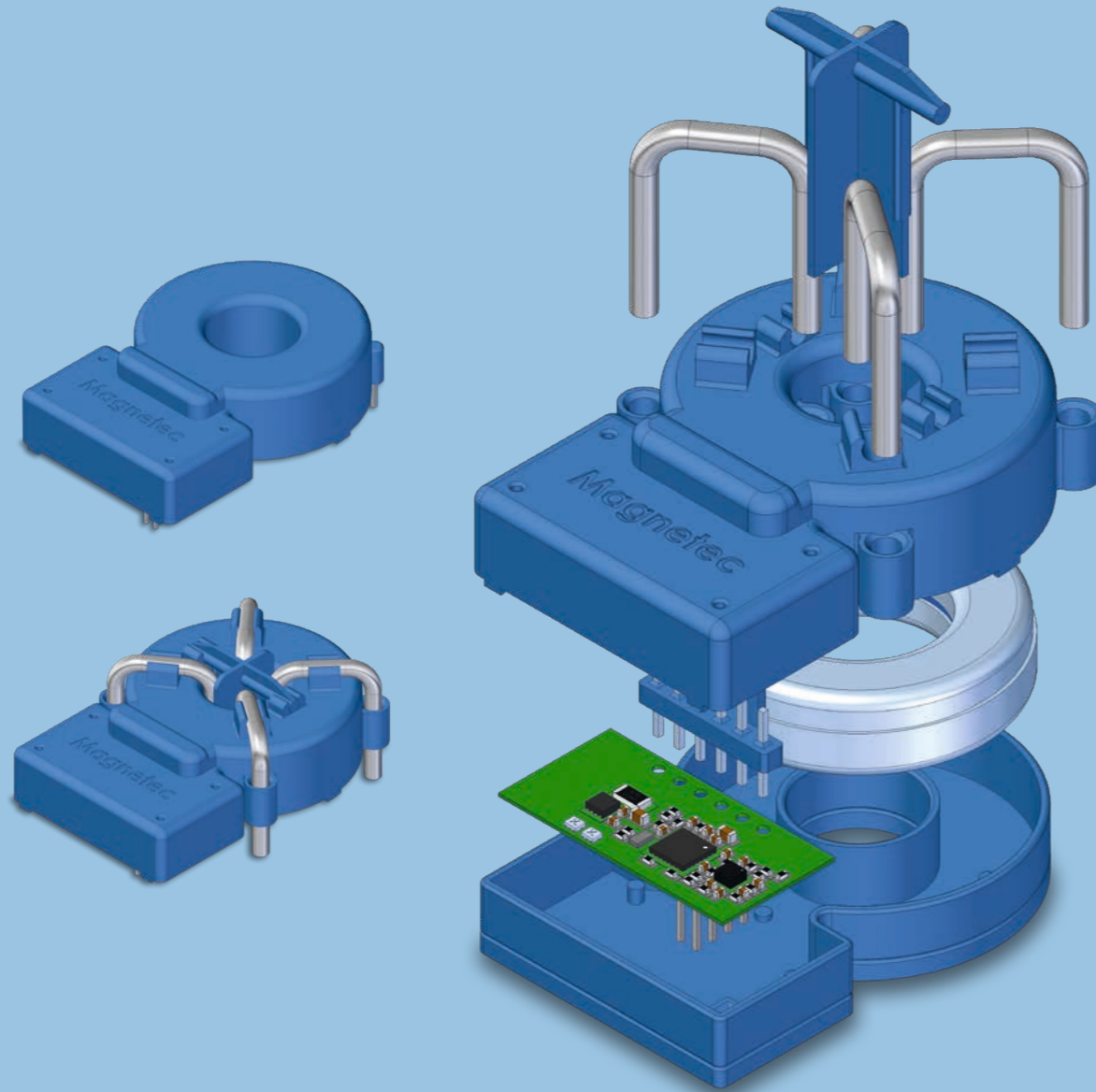
Mode 3

On-Board

Wireless

DC

Mode 4



Features

- Nanoperm® core
- Horizontal mounting
- Secondary Pins 0,64mm square, material CuNi18Zn20 alloy
- Rated nominal current: up to 40 / 80A
- Operating Current:
6 mA DC / 30 mA rms, 20 mA rms
- Temperature range: -40°C ... +85°C
- 3000A surge current withstand
- With integrated primary conductors up to 22kW charging power (3x32A)
- Fulfills clearance and creepage distances from mode 3 (IEC 62955)
- Mode 2 (IEC 62752) drop test compatible
- One product family covers all mode 2 (IC-CPD) and mode 3 (wallbox) applications

Advantages

- Very low error at small currents
- High overload capability and high insulation capability
- Test winding
- Takes over the job of the expensive type B RCCBs
- Flexible supply voltage: 3.3V or 5V
- Clearance and creepage distance >8mm (according to IEC 62955)

Applications

- Leakage current measurement in an IC-CPD (in-cable contact and protection device) (mode 2) and wallboxes (mode 3)

Complies with applications using these standards

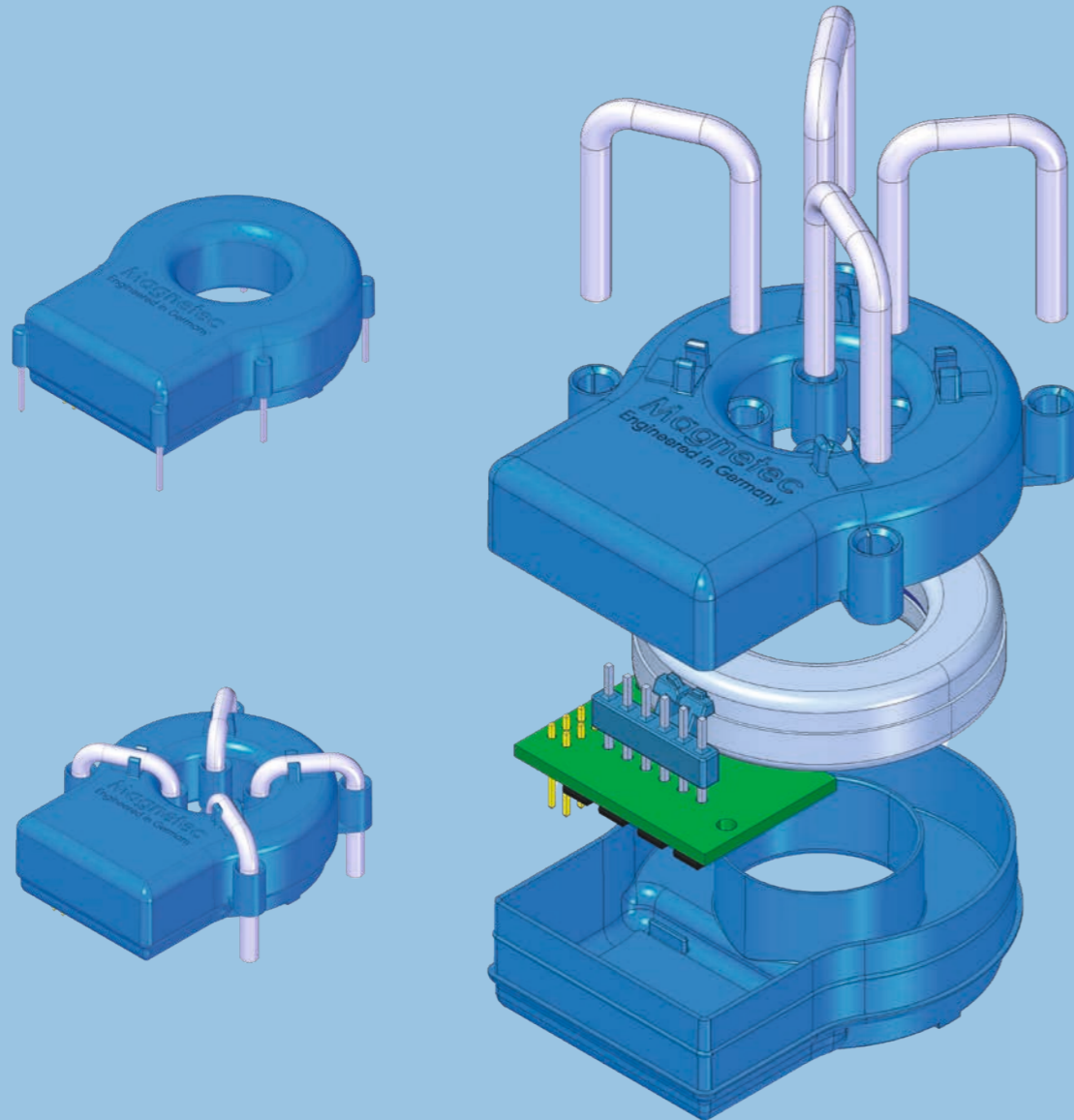
- Europe: IEC 62752, IEC 61851, IEC 62955
- NAFTA: UL2231



Mode 2



Mode 3



Features

- Nanoperm® core
- Horizontal mounting
- Secondary Pins 0,64mm square, material CuNi18Zn20 alloy
- Rated nominal current: up to 40/80A
- Operating Current: 6 mA DC / 30mA rms, 20mA rms
- Temperature range: -40°C ...+ 105°C
- 3000A surge current withstand
- With integrated primary conductors up to 22kW charging power (3x32A)
- Fulfills clearance and creepage distances from mode 3 (IEC 62955)
- Mode 2 (IEC62752) drop test compatible
- One product family covers all mode 2 (IC-CPD) and mode 3 (wallbox) applications

Advantages

- Very low error at small currents
- High overload capability and high insulation capability
- Test winding
- Takes over the job of the expensive type B RCCBs
- Clearance and creepage distance >8mm (according to IEC 62955)
- Bigger inner diameter / conductor cross section for higher charging power

Applications

- Leakage current measurement in an IC-CPD (in-cable contact and protection device) (mode 2), wallboxes (mode 3) and optional for On-Board Charging applications

Complies with applications using these standards

- Europe: IEC 62752, IEC 61851, IEC 62955
- NAFTA: UL 2231
- OBC: ISO 5474 (EU, NAFTA, Asia, SEA)



Mode 2



Mode 3



On-Board

Customer design options

MAGNETEC sensors are compatible with all common evaluation systems and can be adapted to customer specific evaluation units.

A sensor in combination with a separate evaluation unit is a more cost-effective solution than a system where the logic is integrated in the system and provides more flexibility for customization.

MAGNETEC offers customers the single sensor or a full solution package (sensor and evaluation system – standard or customer specific). In cooperation with well-known partner MAGNETEC offers the complete solution.

The Fluxgate-Based Residual Current Sensors are available as an off-the-shelf solution in various formfactors and performance levels and can be customized to meet individual requirements.



We look forward to your inquiry!

We will be happy to answer any questions you have about MAGNETEC's comprehensive product and service offering.

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