



**Prioritizing
safety in
protection
& control**

Protection components



Railway protection

In the international railway sector the main focus of performance, reliability & priority is given to the protection of rolling stock electrical equipment and infrastructure electrical installations ensuring no compromises for the safety of passengers.

Harsh environments such as extreme operating temperature, damp heat, vibration and shocks, fire and smoke standards, critical and safe operation of power equipment, braking and electrical distribution require high quality standard electrical protection devices.

Protection relays

Mors Smitt maintenance and supply free protection relays offer stand-alone current and voltage monitoring for traction equipment as well as infrastructure. They are used for applications like voltage catenary, short circuit, overload and ground fault detection in traction power electronics or railway substations.

Hall effect sensors

Mors Smitt hall effect closed loop sensors ensure high accuracy of voltage and current measuring in traction or substations power equipments for a full protection of the power equipment against power surges, overload, ground fault detection.

Our experience

Mors Smitt offers customizable protection solutions, enhancing the safety and the performance of rail transportation. Not just our products and services but also our production sites are focused on environmental performance improvements by certifications according to the IRIS, ISO 9001:2008 and ISO 14001 standards.

The company strategy for the future is based upon further responsible development and expansion of it's high quality components, responding to tomorrow's needs in the many current sectors it serves. It is based upon putting the skills and talents of it's staff to work for company, clients and mankind. Keeping that part of the world's operation for which it plays a role, working successfully, without question and without failure.

Serving Safety

We highly value our customers and put service first. We are committed to quality excellence to create reliable products and services, serving the stringest reliability, availability, maintain-ability, safety, health and environmental demands from our customers. This commitment will result in lower life-cycle-cost.

Mors Smitt is a trusted partner in your supply chain. World wide availability of products is assured by a network of professional, trained and dedicated subsidiaries, distributors and agents offering local service and support.

Mors Smitt is a total supplier for onboard and trackside safety-critical solutions. Combining electro-mechanical ultra-high dependable relays with safety-critical electronics

All is manufactured to the strictest standards.



Mors Smitt is part of Wabtec Corporation. A global provider of value-added, technology-based products and services for railway, transit, freight and other industrial markets, with facilities world wide.

Protection relays Voltage and current

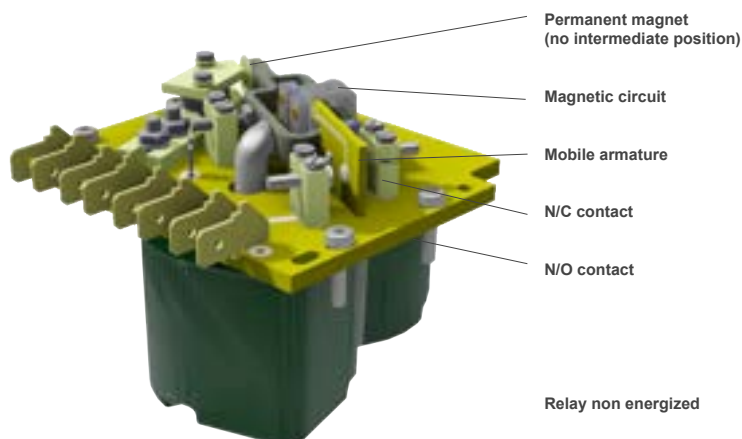


PRA - Current protection relay

Principle

With over 20 years experience in measurement for railway equipment, Mors Smitt has designed and manufactured detection and protection relays for railway onboard and trackside applications of currents, voltages and differential currents monitoring. PRA (current protection relays) and PRV (voltage protection relays) require no auxiliary power supply and provide commonly 1N/O +1N/C output relay contact.

Mors Smitt protection relays operate on an electromechanical magnetic circuit principle. Primary current or voltage create in the magnetic circuit a flux. A permanent magnet creates an opposite flux maintaining the contacts in rest position. As soon as the primary magnetic circuit flux is higher than the permanent magnet flux, the relay contacts trip. Adjustment of the position of the permanent magnet allows adjustment of the pick up value from 30% to 125 % of nominal value and adjustable drop out from 40% to 85% of pick-up value. Time delay can also be provided as an option. The mobile armature pivots without friction providing reliable operation and the permanent magnet ensures fast switching without intermediate position.



Advantages

- This technology allows all current or voltage waveforms: direct, alternating and impulse currents or voltages
- No auxiliary supply needed, stand alone unit required for safety application
- High galvanic isolation up to 12 kV
- High reliability and robustness, no friction of mobile armature, maintenance free device
- Extreme high speed response
- Strong ability to withstand high overloads due to its magnetic circuit materials
- Adaptable to specific customer applications
- Operating temperature -50 °C...+85°

Applications

- Voltage: minimum, maximum, interval monitoring, differential voltage
- Current: minimum, maximum, differential monitoring.

Traction main converters, auxiliary converters (lighting, air conditioning), battery chargers, power electronics, railway substations.

Functions

The relays provide under, over, interval, differential voltage and current monitoring for the following applications:

- Catenary voltage detection
- Overload, second side transformer short-circuit detection
- Battery load shedding and charging current monitoring
- 3 Phase motor pump and fan protection against phase loss, unbalance
- Current monitoring in magnetic brake
- Ground fault detection in the traction power equipment



PRV - Voltage protection relay

High galvanic insulation

PRA and PRV relays withstand high overloads due to a very magnetic circuit materials and offer a high galvanic insulation up to 12 kV.

Stand-alone



Protection relays
Voltage and current

Protection relays are self powered from measuring circuit and do not require any auxiliary supply ensuring protection continuity required for safety application.

High reliability




Their technology is electromechanical, based on magnetic field tripping without friction of mobile armature. They offer extreme high speed response and withstand extreme temperatures -50 °C...+85 °C. 1 N/C + 1 N/O output contacts are weld no transfer with rating a mechanical life of 100 million of operations

Maintenance free

Current and voltage protection relays are chassis or copper busbar mounted, in any positions. They do not required any specific maintenance.



Characteristics

| |  PRV |  PRA |  PRA (differential) |
|-----------------------------|--|---|---|
| Voltage measuring | 100 V - 3000 VAC/DC | | |
| Current measuring | | 1 A - 6 kAAC/DC | 1 A - 6 kAAC/DC |
| Typical output ¹ | 1 N/O + 1 N/C | 1 N/O + 1 N/C | 1 N/O + 1 N/C |
| Accuracy | 5 % | 5 % | 5 % |
| Dielectric strength | up to 12 kV | up to 12 kV | up to 12 kV |
| Operating temperature | -50 °C...+85 °C | -50 °C...+85 °C | -50 °C...+85 °C |
| Terminals ² | Faston, M5 | Busbar, Faston, M6 | Busbar, Faston, M6 |
| Monitoring functions | Minimum voltage Maximum voltage Interval voltage Differential voltage | Minimum current Maximum current | Differential current |

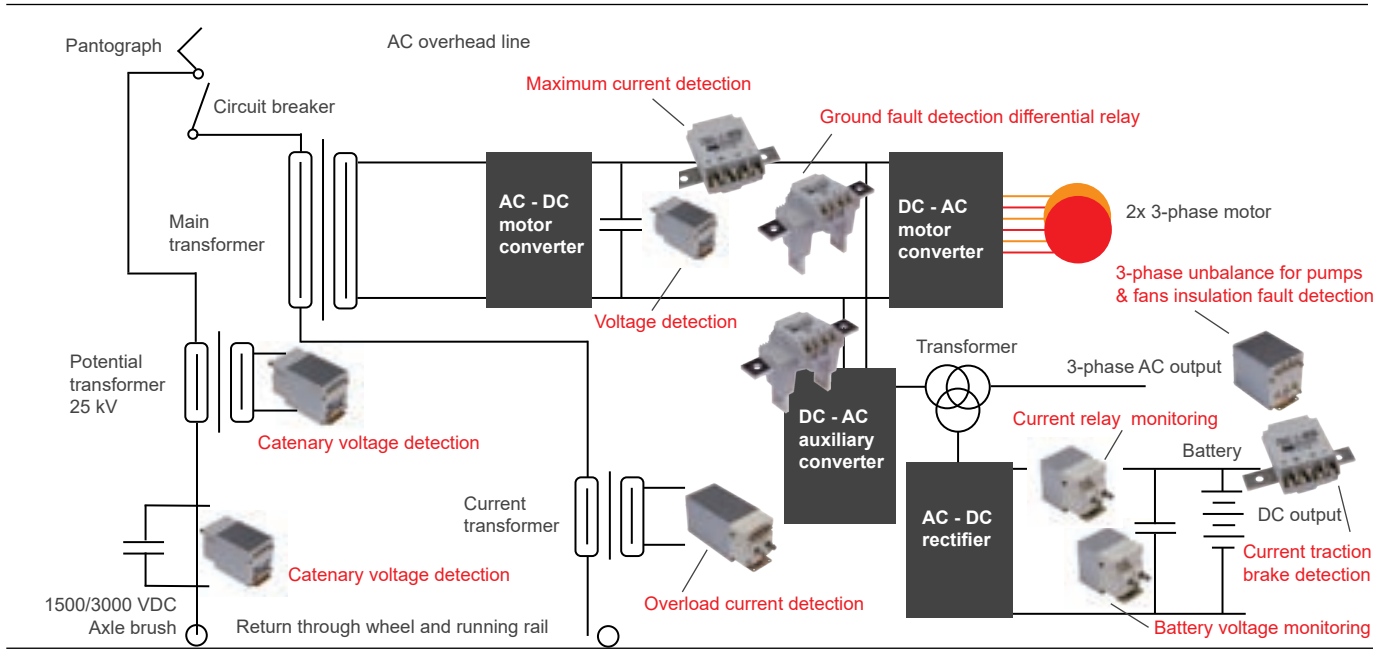
¹ other outputs on request

² other terminals on request



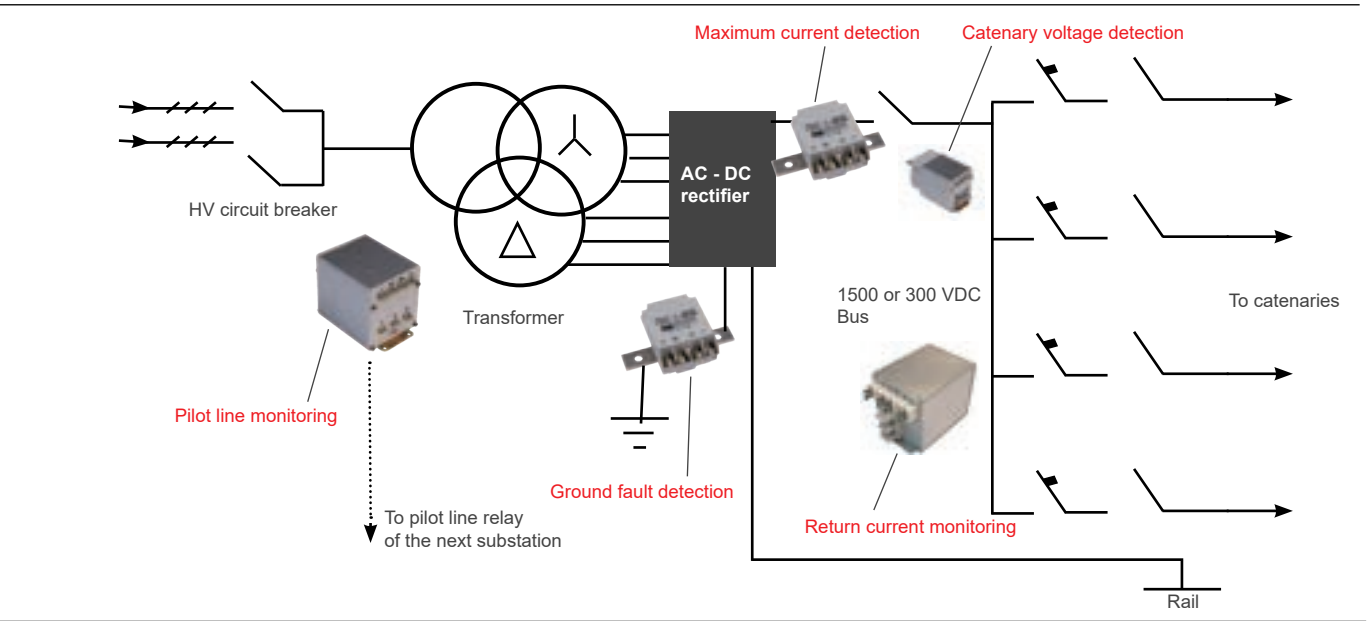
Application example

Onboard schematic of Mors Smitt protection relays in a self propelled car



Application example

Trackside schematic of Mors Smitt protection relays in a catenary distribution post





Hall effect sensors

Closed loop voltage and current sensors



MSV - Electronic voltage sensor

Principle

With over 20 years experience in measurement for railway equipment, Mors Smitt has developed a new range of sensors based on closed loop hall effect technology. They allow for the measurement of all current waveforms, with high galvanic insulation between the primary and secondary circuits.

The hall effect probe placed in the air gap of the magnetic circuit provide a voltage proportional to this flux. The electronic circuit amplify the signal from the primary current I_p or voltage U_p flowing across the sensor and generates a current into the secondary I_s .

The secondary output current I_s is exactly proportional to the primary current and can be passed through a measuring resistance R_m . The measuring voltage V_m at the terminals of this resistance is therefore proportional to the primary current I_p .

Advantages

- This technology allows all current or voltage waveforms: direct, alternating and impulse currents or voltages
- Accuracy from 1% of up to 0.5% over a large frequency range (from direct to more than 100 kHz)
- High galvanic isolation up to 10 kV
- Excellent linearity across a wide operating temperature of -50 °C...+85 °C
- High reliability and overload capacities

Applications

- Voltage measuring: catenary, secondary transformer and power electronics sufficient voltage monitoring for traction, track side voltage monitoring
- Current measuring: secondary transformer, DC link power electronics overload monitoring and short circuit detection for traction and railway substations
- Traction main converters, auxiliary converters (lighting, air conditioning), battery chargers, power electronics, railway substations

Product range

MSV Electronic voltage sensors

- MSV100 - up to 950 VAC/DC
- MSV200 - up to 5000 VAC/DC

Measuring of:

- Catenary voltage
- Secondary transformer for sufficient traction power
- DC link voltage to protect power electronics

Measuring and monitoring of:

- Phase loss or unbalanced to protect 3 phase motors

MSA Hall effect current sensors

- MSA100 - up to 100 A
- MSA200 - up to 200 A
- MSA300 - up to 300 A
- MSA500 - up to 500 A
- MSA1000 - up to 1000 A
- MSA2000 - up to 2000 A

Measuring and monitoring of:

- Secondary transformer overload of short-circuit detection
- DC link from ground fault and overload
- Motor overload
- Traction current

MSA2010 Elliptic current sensor

Up to 2000 A, accepts 10 x 1000 mm busbar direct for easy mounting and installation, cost saving.



MSA - Hall effect current sensor



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