ABB Solutions for Railways

Components and systems

ABB can rightly be considered an ideal partner for builders and project engineers operating in the electric traction sector, not only because of its extensive range of products and systems, but also for the service it offers its customers and the comprehensive, professional and efficient assistance that the Group can provide all over the world, thanks to its presence in more than 100 countries.

To maintain this privileged relationship with professionals, ABB constantly updates the technological and functional characteristics of its equipment and widens its global offer, so that the users can always find the support necessary for achieving the respective objectives of quality, safety and reliability.

An expert partner that knows ...

... how to solve problems

In every case, there is a very wide choice, from dedicated equipment and systems, such as motors and transformers for traction or auxiliary converters, to individual electric components in specific versions for each application, such as, for example, contactors responding to the international Standards in the sector (IEC 60947-4-1, IEC 60077, UIC 616, NFF 62-000, …), moulded-case and air circuit breakers (IEC 60947-1, IEC 60947-2, EN50081, EN50082) in special versions for operating voltages up to 1000 V and modular circuit breakers which, certified by the railway companies, have peculiar characteristics:

connections suitable for eyelet terminal cables, the possibility of also functioning if their plastic coverings should be distorted, maximum selfextinguishing level (V0 with a thickness of 1.6 according to UL 94), the property of not emitting toxic gasses and tick smokes in the event of combustion, etc. We should not forget, either, that numerous product lines destined to the industrial sector also fully respond to the many requirements of electrified transport.

In general, and depending on the intended application of each type of device, ABB products comply with the main international Standards, in particular European and North American, and with the prescriptions of the Naval Registers.

The power to get things moving!

The safest solutions from the specialists

More than eighty years of activity in the development of specific solutions for electrified transport all over the world are more than a simple confirmation of skills and experience; they guarantee effective solutions for every technical, environmental and operational problem, however complex and structured it can be. This vast competence dates back, for example, to the electric locomotives that already in the Twenties had to face the severe conditions of the Scandinavian winter; or to the miniature circuit breakers which during the Thirties began to replace the old devices for protecting circuits. And it still allows ABB today to produce equipment and systems with the highest performances, as required by the particular conditions of use that are a characteristics of electric traction. And, still today, undergrounds, tramways and railways throughout the world use modern ABB technologies to guarantee their users a safe and high quality service.

On board operating and protecting systems

The need to be installed in small spaces, in spite of the electric powers at play, much higher temperatures than those present in traditional electric switchboards and the often considerable and constant presence of vibrations and other kinds of mechanical stress subject electric equipment to operational conditions usually absent in normal electric systems. In spite of this, the components fitted on board the vehicles must always guarantee perfect running, in particular when personal safety depends on them, as well as protection from damages that could be considerable.

ABB responds to this need with its wide range of miniature and residual current circuit breakers, contactors, control, monitoring and signaling devices equipped with all the technical contrivances that respond to the most stringent international Standards and which, in many cases, actually exceed the same prescriptions.

Propulsion systems

The numerous standard series of ABB motors and drives cover most of the applications in which electricity is used to generate movement; but for usages in special operational conditions, compared with those commonly considered as standard, specific, specially designed and scaled products are required. As far as electric traction is concerned, therefore, the experience of ABB plays a fundamental role in supplying motors and drives with the most appropriate technical characteristics to respond promptly to every new technological requirement of transport systems, giving due consideration to the critical factors that are always present in applications of this type, such as the extent of the powers involved, the usually limited amount of space in which the motors must be housed, the need to limit the weight of the vehicles as much as possible, constant exposure to often prohibitive weather conditions such as snow, ice, rain and dust and thermal excursions than can vary in a short amount of time from high temperatures to tens of degrees below zero.

Infrastructures and fixed plants

As well as products installed on board the vehicles, the whole range of ABB products responding to Standards is available for uses in normal plant contexts, such as, for example, stations, vehicle depots, electric cabins and substations, while specific technological solutions are available for applications that exceed the Standards.

A significant example of this can be seen in the current work going on to restore conditions of safety in railway tunnels, where ABB miniature and 1000 V moulded-case circuit breakers protect the various sections of emergency lighting inside tunnels and dialogue with ABB supervision systems that can reconfigure the whole management of the lighting system itself, if a breakdown should occur on the supply lines, to maintain maximum levels of afety if trains should stop inside the tunnel due to breakdowns or accidents.

Overview

LV motors

- *Standard motors*
- *Smoke venting motors*

MV motors

- *Asynchronous motors*

Transformers

- On-board transformers

Drives

- *On-board auxiliary converters*
- *LV converters*

Command and protection

- *Automatic circuit-breakers*
- *Contactors and thermal overload relays*
- *Command and signalling units*
- *Programmable logic controllers*
- *Limit switches and position sensors*
- *Surge arresters do so today.*

Enclosures and wiring components

- *Switchboards, distribution boards and cabinet*
- *Thermoplastic and halogen free wiring*
- *Terminal blocks assemblies*
- *Plastic enclosures*

Process instrumentation

- *Physical measuring instrumentation*

Products for general applications

Command, protection, power factor correction

Programmable logic controllers

Micro PLCs: *From 14 to 100 I/U*

PLCs: *Up to 1000 I/U in remote configuration*

Devices for auxiliary functions

Electronic timers

Electronic industrial relays
For current, voltage, phase controls etc.

Safety devices
For all risk categories provided by Machine Directive

Equipment mounted components

Limit switches
In plastic: width 30 to 40 mm
In metal: width 40 to 60 mm

Position sensors
Inductive, capacitive, photo-electric, ultrasound

Power factor corrections and filtering

Low voltage capacitors

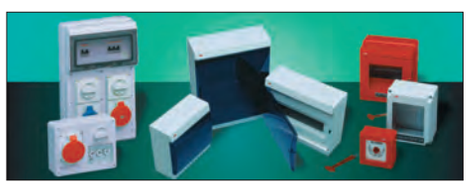
Power factor controllers

Capacitor banks

Active harmonic filters

Board and wiring

Plastic enclosures



Consumer units and special enclosures in various protection categories

Emergency enclosures

Modular enclosures for IEC 309-1 sockets

Trunking systems

Feeder and cable trunkings

Industrial trunkings and cable trays

Metal distribution boards

Switchboards, installation boards, distribution boards, monoblock and kit up to 3200 A

Process instrumentation

Chemical and physical measuring instrumentation

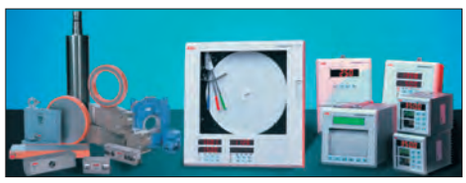
Pressure, differential pressure, level
- *Complete range of intelligent electronic transmitters and Fieldbus*
- *Pneumatic transmitters*

Temperature
- *Field and switchboard transmitters*
- *Thermo-couples, thermo-resistances and mantel cables*
- *Barriers and remote I/O*

Capacity
- *Electromagnetic transmitters*
- *Vortex, Swirlmeters*
- *Hot wire and variable area*
- *Coriolis effect for mass capacity*

Liquids analysis
- *Sensors and transmitters for pH/Redox, conductivity, dissolved oxygen, turbidity*
- *Selective ion, colour-metric and UV monitors*

Control instruments



Regulators and recorders
- *Microprocessor regulators*
- *Line and dot video-graphic recorders*
- *Analogue and digital gauges*

Process control
- *Scalable process control*
- *Fieldbus applications*

Force measurement products and systems
Solutions for measuring force in industrial processes aimed at improving quality and productivity

Regulation and actuation

Devices for valves ...
- *I/P field, switchboard and rack converters also for danger zones*
- *Traditional, pneumatic membrane actuators*
- *Electric regulation and On-Off servomotors*
- *Pneumatic and electro-pneumatic positioners*

Services

Low voltage on line

An Internet site that is a real working instrument, divided into various sections including indexes of all products, selection and coordination tools, news and documentation.

Product indexes

Full information on the range of control and automation products and installation and distribution equipment is available either by categories (eg. circuit-breakers) and in alphabetical order so that it can be found at each visitor's ease and needs.

Product selection and coordination

A range of tools to select the products that best fit in each specific application, to coordinate them for back-up and motor protection, to choose the most appropriate kits for retrofitting. All are easy and friendly to use.

Technical library

The multilingual collection of all manuals, catalogues, certificates, drawings, pictures and other documents available for our range of products in each country. Files are saved in PDF format and can be downloaded for free. The news section provides for the most updated information about products.

Contact lists

The addresses, e-mails and web sites of ABB local contacts all over the world to be as close as possible to our customers and always fulfil their expectations.

Products for electrified transport applications

Traction motors and transformers

LV motors suitable for frequency converters

Standard motors
Power from 0.055 to 700 kW

Smoke venting motors (according to EN 12101-3)
Power from 0.37 to 500 kW

MV motors

Asynchronous motors for traction
- *Power from 30 to 1800 kW; air cooling*
- *Power from 25 to 220 kW; water cooling*

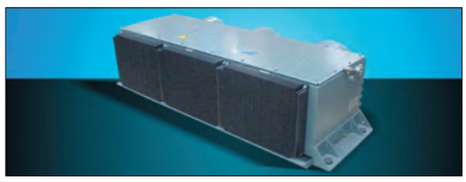
Direct current motors
Power up to 3200 kW

Transformers

On-board transformers
- *11 kV, 15 kV; 16 Hz*
- *25 kV; 50/60 Hz*

Drives

On-board auxiliary converters



BORDLINE series

Direct current drives

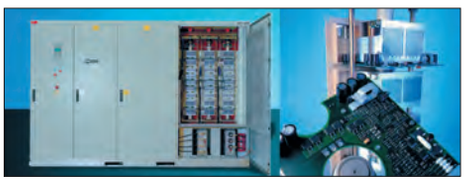
DCS series
- *Power from 10 to 20000 kW, voltages from 220 to 1000 V, IP00-IP31*
- *SingleDrive and MultiDrive*

LV soft starter

DTC technology *(ACS 600, ACS 800)*
- *Power from 1.1 to 3000 kW, voltages from 220 to 600 V, IP00-IP54*
- *SingleDrive and MultiDrive*

PWM technology *(ACS100, ACS140, ACS160 and ACS400)*
- *For all applications up to 37 kW*

MV converters



DTC technology
Power from 315 to 5000 kW, voltages from 2.3 – 3.3 to 4.16 kW

Semiconductors

Thyristors

Diodes

IGBT

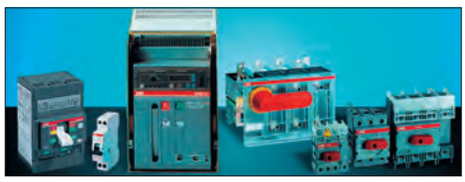
GTO

Gate drives

Products for electrified transport applications

Command, protection, measurement

Circuit-breakers and switches



Automatic
- *MCBs (depending on the series): In up to 125 A; Icu up to 50 kA*
- *On-board MCBs (depending on the series): In up to 63 A; Icu up to 25 kA; Ue up to 400 V*
- *MCCBs (depending on the series): In up to 3200 A; Icu (380/415 V AC) up to 200 kA*
- *ACBs: In up to 6300 A; Icu (380/415 V AC) up to 150 kA*

Isolators
- *Switch disconnectors: from 16 to 3150 A*
- *Switch fuses: from 25 to 800 A*
- *Moulded-case switch disconnectors: from 125 to 3200 A*
- *Air switch disconnectors: from 800 to 630 A*

Motor protection and command

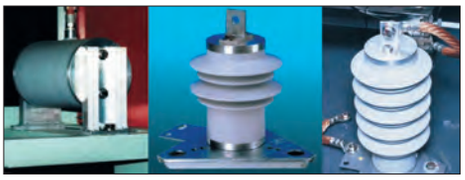
Circuit breakers for motor protection
- *MCCBs: In up to 1250 A; Icu (400 V AC) up to 200 kA*
- *Manual motor starters: regulation field from 0.1 to 100 A*

AC & DC contactors
- *For power up to 400 kW (depending on the series)*
- *Miniature sizes*

Thermal overload & protection relays (normal or heavy duty start-up)
- *Bi-metal*
- *Electronic*

Command and signalling units
Push-buttons, switches, warning lights, luminous floor boxes, pedals, cam switches

Surge arresters



AC and DC railway surge arresters
Currents from 5 to 6000 A; voltages from 50 to 5000 V

Current and voltage transducers

Current sensors
From 50 to 6000 A

Voltage sensors
From 50 to 5000 V

Enclosures and wiring components

Sheet-steel boards

Boxes, multipurpose enclosures
H: from 300 to 1200 mm, W: from 200 to 800 mm, D: from 150 to 300 mm

Switchboards and cabinets
H: from 1800 to 2200 mm, W: from 400 to 1200 mm, D: from 300 to 1000 mm

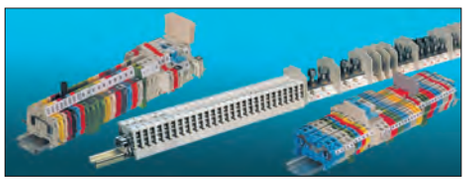
Control and command consoles
H: from 960 to 1350 mm, D: from 470 to 990 mm

Wiring components

Thermoplastic wiring ducts
- *With vertical slots*
- *Flexible wiring ducts*
- *With lateral knockouts*
- *Halogen free wiring ducts*

Metal trunkings

Terminal blocks assemblies



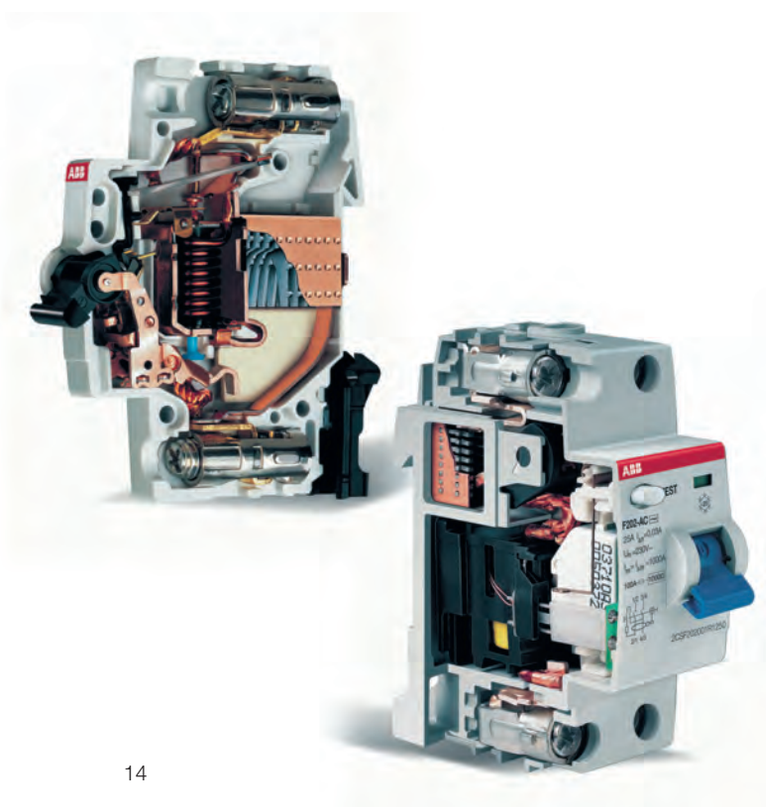
Terminals for remote controls
- *Self stripping connections in A.D.O. technology*
- *Screw and spring terminals*
- *Faston terminals*

Power connections
- *Studs*

System pro *M* compact®: Products complying to all the relevant Railway requirements

A wide product range suitable for all applications in residential, industrial and commercial installations. Thanks to the compatibility between the new System pro *M* compact® range and the System pro *M* range, ABB offers many additional functionalities like:

- **protection and switching**
- **checking and monitoring**
- **control and programming**



Shape and dimensions of the new series allow both precise adapting in already existing installations and continuity in terms of profile and appearance.

Time saving in cross-wiring within groups and combinations of devices is another advantage.

The technologically innovative bidirectional cylinder-lift terminal enables synchronous closing of the front and rear wiring input.

Highest safety standard for the installer thanks to protection against electric shock according to EN 41140.

Marking of devices is reliable and clear.

Both supply and connection with busbars from top or bottom is admitted.

- **Fire resistance, comply with hazard level HL 4 according to NFF 16-101/102, prEN 45545-1/-2**
- **Shock and vibration resistance pursuant to DIN IEC 60068, DIN EN 50155/EN 61373 (railway application)**
- **UC Breakers for DC-Applications**
- **MCBs complying to UL 489/ CSA 22.2 No.5**
- **Special characteristics K and Z**

The System pro *M* compact® range

MCBs:
– new circuit-breakers

RCDs:
– new residual current circuit-breakers (RCCBs)
– new RCD-blocks
– new residual current circuit-breakers with overcurrent protection (RCBOs)

Auxiliary elements:
– new universal signal contact switch/ auxiliary switch
– new auxiliary switch for circuit-breaker extensions
– new shunt release
– new undervoltage release

MDRCs-Surge protection devices

MDRCs-Protection devices
In addition to MCBs and RCDs, ABB supplies other modular devices for protection such as residual current relays and fuse holders.

MDRCs-Command devices
This category includes devices that are operated manually to command the electric system: contactors, latching relays, switchisolators, switches, pushbuttons etc. Typically they are installed to control lights from severeal points of the same circuit or to pilot user devices with a high number of operations.

MDRCs-Load management devices
Overload relays, load management switches, anti black-out lamps, time switches and the other modular devices in this category react automatically to variations of parameters and other events in the system to allow for plant optimisation.

MDRCs-Measurement devices
The range of devices in this category is very wide, including a great number of auxiliary components and accessories that make installation in switchboards and consumer units practical and economic.

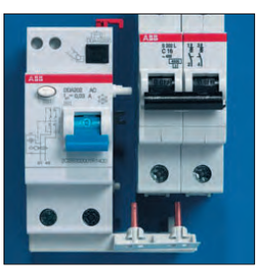
MDRCs-Other devices
The range of ABB MDRCs also includes bells, transformers etc.

Various accessories

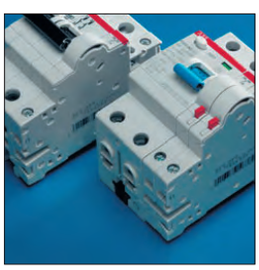
System pro *M* compact®: Products complying to all the relevant Railway requirements

MCBs are also available with an integrated auxiliary contact (1 NO or 1 NC). Existing installations can be easily upgraded to include auxiliary switch functionality.

Availability of a quite wide range of factory fitted RCBOs.



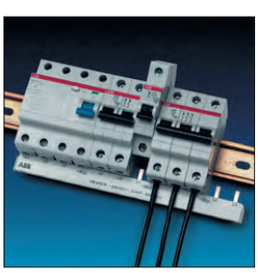
RCD-blocks DDA 200 2P, 3P, 4P up to 40 A fit into two modules. Versions in 63 A sizes are supplied with two additional terminals for remote tripping.



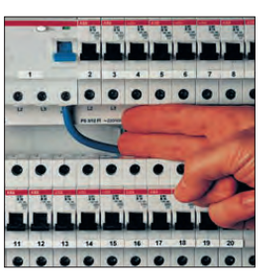
Universal signal/auxiliary and auxiliary contacts fit on S 200, F 200 and DS 200.

Without busbars two terminal spaces can be used for cables with different cross sections: incoming supply with supplementary terminal up to 50 mm^2 from the front side.

Safe connection between DDA 200 and S 200 thanks to not losable coupling elements, opportunely shaped pins and plastic clamps.



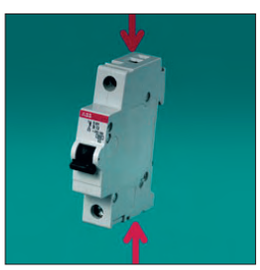
Special quick fastening for an easy removal of the devices from the assembly pressing upwards, both for MCBs S 200 and RCCBs F 200: the only in the market that can be removed without a screwdriver.



More working space between component rows.

- Fire resistance, comply with hazard level HL 4 according to NFF 16-101/102, prEN 45545-1/-2
- Shock and vibration resistance pursuant to DIN IEC 60068, DIN EN 50155/EN 61373 (railway application)
- UC Breakers for DC-Applications
- MCBs complying to UL 489/ CSA 22.2 No.5
- Special characteristics K and Z

New System pro *M* compact® range is compatible with the System pro *M* range, thanks to the configuration of new vs old terminals.



Supply from top or bottom either with cables or busbars.

Safe terminal technology: the terminals offer protection from misconnection.

Most recent applications

Type	Client	Country	Use on	Applications
TGV	*SNCB*	*Belgium*	*High Speed*	*ADO terminal blocks*
Renaissance VIA Rail	*Montreal*	*Canada*	*Commuter*	*Contactors, circuit-breakers, transformers, traction fans and motors, ground fault monitor*
Vancouver Sky Train	*Vancouver*	*Canada*	*Sky Train*	*Contactors, overload, MCBs, RCCBs, relays*
JetTrain	*Bombardier*	*Canada*	*High Speed*	*Contactors, overload, drives, relays*
GO Transit	*Toronto*	*Canada*	*Bi-Level*	*Contactors, ditch light pulser*
Metro	*Montreal*	*Canada*	*Metro*	*Traction fans and motors*
Via Rail LRC	*Montreal*	*Canada*	*Commuter*	*Liquid level monitor, DC contactors*
AMT	*Montreal*	*Canada*	*Commuter*	*Battery Voltage Monitor, DC contactor, HVAC Control panel*
Electrotrains	*Region of Jiangsu*	*China*	*Train*	*MCCB, ACB*
Shenzhen subway		*China*	*Subway*	*MNS switchboards, ACB*
Trains with variable trim		*Finland*	*Train*	*MCCB, MCB, inverters, contactors, fans*
TGV R /Alstom		*France*	*High Speed*	*Contactors, circuit-breakers*
TGV Duplex /Alstom		*France*	*High Speed*	*Contactors, fans and motors*
TGV PBKA / Alstom		*France*	*High Speed*	*Contactors, fans and motors*
TGV A / Alstom		*France*	*High Speed*	*Contactors, fans and motors*
TGV PSE / Alstom	*SNCF*	*France*	*High Speed*	*Contactors, fans and motors*
Eurostar	*SNCF*	*France*	*High Speed*	*Contactors, fans and motors*
CORAIL	*SNCF*	*France*	*Commuter*	*Contactors, fans and motors*
X-TER / Alstom	*SNCF*	*France*	*TGV Bi-level*	*Contactors, fans and motors*
Metro	*Lyon*	*France*	*Metro*	*Contactors, fans and motors*
Euro-Tunnel		*France*	*High Speed*	*MCCB, MCB, RCCB*
Tramways	*Town of Strasbourg*	*France*	*Tramways*	*Motors, MCB*
Electrotrains	*SNCF*	*France*	*Train*	*MCCB*
ZTER	*SNCF*	*France*	*Train*	*ADO terminal blocks, contactors, modular devices*
TER 2N/Alstom	*SNCF*	*France*	*Bi-level*	*ADO terminal blocks, contactors, motors, fans, modular devices*
Tramways CITADIS/Alstom		*France*	*Tramways*	*ADO terminal blocks, contactors*
TGV	*SNCF*	*France*	*High Speed*	*ADO terminal blocks, contactors*
ICE		*Germany*	*High Speed*	*Contactors, MCB*
Z2N		*Germany*	*Locomotive*	*Fans and motors*
Z2N5		*Germany*	*Locomotive*	*Fans and motors*
M12N		*Germany*	*Locomotive*	*Fans and motors*
E412	*DB*	*Germany*	*Locomotive*	*Fans and motors*
E464	*DB*	*Germany*	*Locomotive*	*Fans and motors*
BR101	*DB*	*Germany*	*Locomotive*	*Fans and motors*
BR145/146	*DB*	*Germany*	*Locomotive*	*Fans and motors, transformers*
BR185	*DB*	*Germany*	*Locomotive*	*Fans and motors, transformers, inverters*
DE2000	*DB*	*Germany*	*Locomotive*	*Fans and motors*
E402B	*DB*	*Germany*	*Locomotive*	*Fans and motors*

Type	Client	Country	Use on	Applications
Brennero line	*FS*	*Italy*	*Locomotive*	*Motors*
Intercity trains	*FS*	*Italy*	*Locomotive*	*Motors*
Tramways	*ATM Milano*	*Italy*	*Tramways*	*Motors, MCB*
Commuters' trains	*FS*	*Italy*	*Locomotive*	*Motors, MCB*
Line 3 of Milan subway	*ATM Milano*	*Italy*	*Subway*	*Motors, MCB, contactors*
ETR 500/ETR 460 carriages	*FS*	*Italy*	*High Speed*	*Motors, MCB, fans*
Trolley-buses	*Town of Naples*	*Italy*	*Trolley-buses*	*MCB*
CO.TRAL.L. railways	*Roma*	*Italy*	*Train*	*MCCB, MCB, contactors*
Emergency lighting in tunnels	*FS*	*Italy*	*Tunnels*	*Switchboards cabled with MCB and 1000V MCCB, supervision systems*
LRV Kuala Lumpur	*Kuala Lumpur*	*Malaysia*	*LRV*	*MCB, RCCB, MCCB*
Metro	*Mexico City*	*Mexico*	*Metro*	*Fans and motors*
EMU trains		*Norway*	*High Speed*	*MCCB, MCB, contactors*
Tramways	*Town of Oporto*	*Portugal*	*Tramways*	*Motors*
AVE		*Spain*	*Commuter*	*Fans and motors*
TGV	*Madrid-Barcelona*	*Spain*	*High Speed*	*ADO terminal blocks*
Bangkok subway	*MRTA*	*Thainland*	*Subway*	*ArTu switchboards*
Metro	*Instanbul*	*Turkey*	*Metro*	*MCCB*
R110	*NewYork*	*USA*	*Metro*	*MCCB*
New York City R-142	*New York*	*USA*	*Subway*	*Circuit-breakers, transfer contactors*
Long Island Rail Road M7	*Long Island*	*USA*	*Commuter*	*Contactors, circuit-breakers*
North East Corridor/Maryland B	*oston-NY-WA*	*USA*	*Sub-Urban*	*Contactors, overload, drives, relays*
Jacksonville Monorail	*Jacksonville*	*USA*	*Monorail*	*Contactors, overload, bar contactors*
BARTA	*San Francisco*	*USA*	*Train*	*Circuit-breakers*
AEM7	*New Jersey*	*USA*	*Locomotive*	*Fans and motors, traction, transformers propulsion*
Hiawata Corridor	*Minneapolis*	*USA*	*LRV*	*Circuit-breakers, DC contactors, ground fault relay*
Hudon Bergen	*New Jersey*	*USA*	*LRV*	*DC contactors, O/Ls, sensors*
R46 Refurbishements	*New York*	*USA*	*Metro*	*DC contactors*
CometV Refurbishements	*New jersey*	*USA*	*Metro*	*DC contactors*
ALP46	*New Jersey*	*USA*	*Locomotive*	*Contactors, transformers, fans and motors*

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ABB STOTZ-KONTAKT GmbH

P.O. Box 10 16 80, 69006 Heidelberg, Germany
Eppelheimer Straße 82, 69123 Heidelberg, Germany
Telephone: +49 (0) 6221/701-0
Fax: +49 (0) 6221/701-240

www.abb.de/stotz-kontakt