ABB Medium Voltage Products
ABB Medium Voltage Products business unit
Main facts

- Total global market 2012 > $25.4 billion
- 12,500 employees in around 70 countries
- Global leader in medium voltage business

- Development, production and delivery of the full range of medium voltage products (1-52kV)
- Sales through direct sales people, system integrators (including ABB), and channel partners, such as OEMs and distributors
- Coverage of over 100 countries through focused sales forces
ABB Medium Voltage Products
Where our products are used

- Utility substations
- Distribution lines
- Industrial plants
- Ships

- Utility generation
- Utility transmission
- Utility distribution
- Transportation
- Heavy industrial process plants
- Light industrial parks
- Hospitals
ABB Medium Voltage Products
Product Group structure

- Apparatus
- Distribution Automation
- Integrated Products
- Finished Products
- Service
- Primary Switchgear
- Secondary Switchgear
- Modular Systems

“Assembled to Order”
“Engineered to Order”
ABB Medium Voltage Products
Value chain / OEM business model

Original Equipment Manufacturers (Panel Builders)
ABB Medium Voltage Products
Indoor apparatus – vacuum and SF6 circuit breakers

- **Ratings**
  - 12 … 40.5kV ; 630 … 4000A
  - 12.5 … 50kA (SF6), 12.5 … 63kA (vacuum)

- **Types**
  - VD4: Vacuum breaker (spring driven)
  - Vmax: Low end vacuum breaker (spring driven)
  - VM1: Vacuum breaker (magnetic driven)
  - HD4: SF6 breaker (spring driven)

- **Versions**
  - Fixed and withdrawable
  - Primary and secondary distribution
  - Spring and magnetic actuator mechanism
  - IEC, GB, GOST and ANSI standards

- **Manufactured in**
  - Global factories: Germany & Italy
  - Regional factories: China - India
  - Customization: USA, Poland, Egypt

- **Innovations**
  - Embedded pole vacuum technology
  - SF6 autopuffer breaking technique
  - Circuit breakers fully interchangeable
  - Integrated protection device, i.e. eVD4
ABB Medium Voltage Products
Indoor apparatus – vacuum contactors

- Ratings
  - 7.2 ... 12kV
  - 400A
  - up to 1.000.000 mechanical operations
- Types
  - V-Contact VSC: magnetically driven
- Versions
  - Fixed version
    - SCO (single command operated) [1]
    - DCO (double command operated) [1]
  - Withdrawable versions for OEM PowerCube module and UniGear switchgear
    - SCO (single command operated) [1]
    - DCO (double command operated) [1]
- Manufactured in
  - Italy & China
  - Customisation: India
- Innovations
  - Electronic feeders
  - Magnetic actuator
  - Slimline construction

[1] SCO: Electrical latching feature
DCO: Mechanical latching feature
ABB Medium Voltage Products
Indoor apparatus – SF6 sealed switches

- **Ratings**
  - 12 … 24kV; 630 … 800A; up to 25kA

- **Types**
  - GSEC – half metal groundable and half insulated tank
  - SHS2 – metal groundable tank
  - SFG - insulated tank

- **Versions**
  - Switch-disconnector (single or double spring operating mechanism with optional motor operation )
  - Switch-disconnector with fuses (double spring operating mechanism with optional motor operation )
  - Isolator (SHS2 only) (no spring operating mechanism)

- **Manufactured in**
  - Italy (SHS2 and GSEC)
  - China (SFG)

- **Features**
  - Three position (Open/close/earth)
  - Suitable for panel width 375mm
  - Up to 5000 operation on open/close operation
  - Up to 1000 operation on open/earth operation
ABB Medium Voltage Products
Indoor apparatus – air insulated switches

- Ratings
  - 12 ... 36kV
  - 400 ... 1250A
  - up to 30kA

- Types
  - NAL/NALF - wall mounted
  - AirSwitch - rotary type

- Versions
  - Switch-disconnector with or without fuses (single or double spring operating mechanisms)
  - Mechanically interlocked earthing switch
  - Isolator (AirSwitch)

- Manufactured in
  - Poland

- Features
  - Gas blast and air pressure integrated arc extinguishing system
  - Designed for easy installation inside panels and kiosks
  - Variety of accessories
  - Electrical endurance: class E3
  - Up to 2000 operation mechanical lifetime

[1] AirSwitch: up to 24 kV, 400/630A and up to 16 KA only
[2] Both available also in motorized version
[3] For selected ratings only
Current limiting fuses

- **Ratings**
  - 3.6 ... 36kV
  - 6 ... 315A
  - up to 50kA

- **Types**
  - CEF – back up fuses
  - CMF – motor protection fuses

- **Versions**
  - Indoor/outdoor
  - Different length

- **Manufactured in**
  - Poland

- **Features**
  - Designed and tested for cooperation with switch disconnectors and for SF6 compact switchgear
  - High breaking capacity
  - Low power losses
  - Dimensions according to DIN and BS
  - Striker pin medium type
ABB Medium Voltage Products
Current limiters and Ultra Fast Earthing Switches

Current limiters type “Iₚ-Limiter”
- **Ratings**
  - ... 40.5 kV; ... 5,000 A; ... 210 kAₚ [1]
- **Versions**
  - Fixed or Truck mounted; Loose component supply
- **Manufactured in**
  - Germany
- **Description**
  - Solves short-circuit problems in new substations and substation extensions
  - Peak short-circuit current will never be reached

Ultra Fast Earthing Switch type “UFES”
- **Ratings**
  - ... 40.5 kV; ... 100 kAₚ [2]
- **Available for**
  - UniGear ZS1; ABB Service retrofit (also as extension for arc protection relays type „REA“); loose component supply
- **Manufactured in**
  - Germany
- **Description**
  - Active internal arc protection
  - Works on principle of 3-phase short-circuit earthing
  - Extinction of internal arcs in < 4 ms after detection
  - Drastic reduction of destructive impacts

[1] Rated interrupting current (RMS)
[2] Short-time withstand current
ABB Medium Voltage Products
Vacuum interrupters and embedded poles

- Ratings
  - 3.6 ... 40.5kV
  - ... 4000 A \[^1\]
  - up to 63 kA \[^2\]

- Types
  - P series – EP for indoor applications
  - PT series – Thermoplastic Embedded Poles
  - OP series – EP for outdoor applications
  - VG series – VI for circuit breaker applications
  - VS series – VI for contactor and switch applications

- Manufactured in
  - Germany, India

- Features
  - Complete product family universal in application
  - Excellent switching capabilities
  - Long electrical and mechanical life
  - Sturdy design and compact dimensions
  - Direct embedding of vacuum interrupters (optimum protection against dust and dirt)
  - Easy assembly on a switching device
  - Maintenance free for life

\[^1\] 4000A with forced cooling
\[^2\] Embedded poles up to 50 kA
ABB Medium Voltage Products
Indoor sensors

**IEC current & voltage sensors**

- **Ratings**
  - 0.72 … 24 kV; 80 A / 150mV, 10 000:1 V
  - Current accuracy 0.5 / 5P630
  - Voltage accuracy 0.5 / 3P

- **Types**
  - Current sensors: KEVCD, KECA, KECR, KEVCR, KECL
  - Voltage sensors: KEVA, KEVCY,
  - Combined sensors: KEVCD, KEVCY, KEVCR

- **Versions**
  - Metering + protection, special applications

- **Manufactured in**
  - Czech Republic
ABB Medium Voltage Products
Indoor instrument transformers

IEC current & voltage transformers
- Ratings
  - 0.72 … 40.5 kV; 1 A … 20 kA
- Types
  - TPU, TPE, KOKS, BDG, etc.: current transformer
  - TJC, TJP, TDC: voltage transformer
- Versions
  - Metering, protection, power supply, special applications
- Manufactured in
  - Czech Republic, Poland, Egypt

ANSI current & voltage transformers
- Ratings
  - 0.6 … 34.5 kV; 1 A … 50 kA
- Versions
  - Metering, protection, power supply, control power transformer, special applications
- Manufactured in
  - USA
ABB Medium Voltage Products
Indoor instrument transformers

Products for Generator circuit breakers
- Ratings
  - CT: 0.72kV; 2 kA ... 57 kA
  - VT: 24kV
- Types
  - BDG 072: current transformer
  - TJP/TJC-G: voltage transformer
- Versions
  - Metering, protection
- Manufactured in
  - Czech Republic
ABB Medium Voltage Products
Outdoor instrument transformers

**IEC current & voltage transformers**
- Ratings
  - 12 … 40.5 kV
  - 1 … 2500 A
- Types
  - TPO : current transformer
  - TJO, TDO : voltage transformer
- Versions
  - Metering, protection, power supply, special applications
- Manufactured in
  - Poland, USA

**ANSI current & voltage transformers**
- Ratings
  - 5 … 34.5 kV
  - 5 … 4000 A
- Versions
  - Metering, protection, power supply, special applications
  - Combined unit also available
- Manufactured in
  - USA, Czech Republic, Poland
Passive voltage indicator “VisiVolt™”

- Ratings and types
  - VV-A: 3 … 15 kV
  - VV-B: 13.8 … 40.5 kV

- Manufactured in
  - Poland

- Features
  - Applicable on any unscreened medium voltage system; for permanent installation
  - Information on voltage presence status of the system available all the time
  - Outdoor and indoor application
  - Good visibility in all lighting conditions
  - Fully maintenance free and passive device
  - Resistant to overvoltages and fault currents
  - Easy installation using cable ties
  - Very small dimensions and compact design
VT Guard

- Solution for ferroresonance elimination

- Ratings and types
  - 100 … 200 V

- Manufactured in
  - Czech Republic

- Features
  - Protection of power networks from ferroresonance effects
  - Protection of voltage transformers from potential ferroresonant overcurrent
  - Elimination of ferroresonance phenomena
  - Active damping device
  - To be connected to open delta of VTs
  - DIN size
ABB Medium Voltage Products
Outdoor apparatus – Circuit Breakers

Live Tank Breakers
- Ratings: up to 40.5 kV
- Types: OVB & OHB
- Manufactured in: India and China
- Features:
  - Vacuum interruption improves reliability
  - Telescopic structure for flexible installation

Dead Tank Breakers
- Ratings: up to 38 kV
- Type: R-MAG
- Manufactured in: US and Mexico
- Features:
  - Magnetic actuation reduces maintenance
  - Vacuum interruption improves reliability & environment friendly
  - Electronic controller reduces setup time and increases flexibility

Pole Mounted Breakers
- Ratings: up to 12 kV
- Type: PVB
- Manufactured in: China
- Features:
  - Magnetic actuation reduces maintenance
  - Vacuum interruption improves reliability & environment friendly
  - Compact design for optimized installation
ABB Medium Voltage Products
Outdoor apparatus – Switches and Sectionalizers

**Overhead single & three phase switches**
- Ratings: up to 38 kV
- Types: Sectos, NPS, GridGuard, R, S.
- Versions
  - Vacuum, SF6, air interruption for different applications
  - SF6 and air insulation
- Manufactured in: US, Poland, China, Australia
- Features
  - Complete variants for every market requirement
  - Sealed contacts for longer life
  - Automated for many thousands operations lifespan
  - Feeder Automation capabilities

**Fused cutouts and single-phase switches**
- Ratings: up to 38 kV
- Types: ICX, NCX, LBU, EU, V.
- Manufactured in: US, China and Australia
- Features: Porcelain and silicone insulators

**Electronic single & three phase sectionalizers**
- Ratings: up to 38 kV
- Type: AutoLink
- Manufactured in: Argentina
- Features
  - Resettable counts
  - Resettable actuation current
Reclosers – Single and Three Phase
- Ratings: up to 38 kV
- Types: GridShield, OVR-1, OVR-3
- Manufactured in: US, Argentina and China
- Features
  - Magnetic actuation reduces maintenance
  - Solid dielectric to increase lifespan and eliminate maintenance
  - Special controls available – loop & distribution automation schemes, automatic setting changes, exceeding protection features to improve reliability and safety

Padmount Circuit Breakers and Switches
- Ratings: up to 27 kV
- Type: ReliaPad
- Variants: Vacuum interruption or air switches
- Manufactured in: US
- Features
  - Air insulation reduces maintenance
  - Environmental friendly
Distribution Automation Products

Product applications

- We secure the power distribution by offering solutions for the following application / protection areas:
  - Feeder protection
  - Motor protection
  - Transformer protection
  - Line differential protection for feeders
  - Arc protection
  - Feeder automation for recloser protection and control
  - Generator protection
  - Voltage protection and automatic voltage regulation
  - Capacitor bank protection
The Relion family represents the latest generation of ABB protection and control products

Relion offers the widest range of products for the protection, control, measurement and supervision of power systems for IEC and ANSI markets

Relion products have been designed to implement the core values of the IEC 61850 standard to ensure interoperable and future-proof solutions
ABB Medium Voltage Products
Air-insulated primary switchgear, IEC type

Air-insulated primary switchgear – UniGear range and ZS8.4

- Types and Ratings
  - UniGear ZS1, up to 4000 A / 50 kA at 17.5 kV and 3150 A / 31.5 kA at 24 kV
  - UniGear 550, up to 1250A / 31.5kA at 17.5kV
  - UniGear 500R, removable CB up to 2000A / 31.5kA at 12kV
  - UniGear MCC, compact motor control centre up to 50 kA at 7.2 kV
  - UniGear ZVC, compact motor control centre up to 50kA at 7.2kV
  - UniGear ZS2, 36 kV panel for 2500 A and 31.5 kA
  - UniGear ZS3.2, 40.5 kV up to 3150A and 31.5 kA
  - Type ZS8.4, up to 24kV, 1250A and 25kA.

- Manufactured in
  - IT, CZ, ZA, TR, EG, SA, IN, MY, VN, CN, KR, AU, AR, BR

- Features
  - Cassette type, removable or floor rolling breakers
  - SF6 or vacuum interruption
  - Standard, compact or customized panels
  - Double level (2 high CB panels)
  - Double busbar panels
  - Available with integrated sensors, EC 61850 based control and protection and ultrafast earthing switches
  - Fully arc tested as per IEC 62271-200
  - Marine, nuclear and harsh environment versions
ABB Medium Voltage Products
Air-insulated primary switchgear, ANSI type

- Types and Ratings
  - Advance - metal enclosed non-arc resistant switchgear up to 4000A / 50kA at 15kV
  - SafeGear - arc-resistant switchgear up to 3000A / 50kA at 15kV
  - Advance MCC - metal enclosed non-arc resistant motor control centre up to 50kA at 6.6kV
  - SafeGear MCC - arc-resistant motor control centre up to 50kA at 7.2kV

- Manufactured in
  - US, Mexico

- Features
  - Full ANSI / UL compliance
  - Classic and arc resistant solutions
  - Single and double level panels
  - Spring charged or electro-magnetic CB drives
  - Integrated sensors and controls as required
ABB Medium Voltage Products
Gas-insulated primary switchgear

- Types and Ratings
  - Single busbar
    - ZX0  (…24kV, …1250A, …25 kA)
    - ZX0.2 (…24 kV, …2500A, …31.5 kA)
    - ZX1.2 (…40.5kV, …2500A, …31.5 kA)
    - ZX1.5 (as ZX1.2, 95 kV –1 min)
    - ZX1.5-R (single & double pole version of ZX1.5 for railway)
  - Single or Double busbar
    - ZX2  (…40.5kV, …4000A, …40 kA,)
    - ZX2.2 (as ZX2, ANSI)

- Manufactured in
  - Germany, China

- Features
  - Medium voltage area shielded from surrounding
  - Independent of environmental conditions
  - Increased lifetime & safety
  - Reduced dimensions
  - Busbar-Plug technology for quick and safe installation
ABB Medium Voltage Products
Gas-insulated secondary switchgear

- Types and Ratings
  - SafeLink (...12kV, ...630A, ...20 kA)
  - SafeLink CB (...12kV, ...630A, ...20 kA)
  - SafeRing/Plus (...24 kV, ...1250 A, ...25kA)
  - SafeRing/Plus36 (...40.5 kV, ...630 A, ...25kA)

- Versions
  - With fuses or vacuum CB
  - Optional built-in sensor technology

- Manufactured in
  - Norway, China, India

- Features
  - Medium voltage area shielded from surrounding
  - Independent of environmental conditions
  - Increased lifetime & safety
  - Flexible connections for quick installation
  - Completely insulated design
  - Compact
  - “Maintenance free”
ABB Medium Voltage Products
Air-insulated secondary switchgear

- Ratings
  - Up to 1250A / 25kA at 24kV
- Types
  - UniSec, UniSwitch, UniMix
- Manufactured in
  - Italy, China, Egypt, Argentina, Indonesia
- Features
  - Broad product portfolio, both functionally & accessories-wise
  - Broad application range, industrial, utility & infrastructure applications
  - Withdrawable and removable circuit breakers
  - Switch disconnectors with fuse
  - Flexible protection and controls
  - Easy installation & maintenance
Railway circuit breakers, load break switches, switchgear and application modules

- Ratings
  - 15 kV/16.7 Hz or 25 kV/ 50 HZ

- Versions
  - Indoor and outdoor
  - Single and two-phase

- Manufactured in
  - Switzerland, China

- Features
  - Purpose-built products covering the specific parameters of the railway networks and addressing the end-user concerns
  - Flexible applications and easily built-up modular solutions, with efficient use of space
  - Service continuity with simple maintenance and personnel safety
Main line types: CSS-S and CSS-C

- Metal or concrete housings
- Walk in or non-walk in enclosures
- In ground or above ground
- Medium voltage primary or secondary switchgear with circuit breaker or switch disconnector
- Low Voltage Switchgear types: Fuse lists, Load break switches, or Circuit breakers
- Dry or Oil type Transformer
- Manufactured in: Estonia, Hungary, India, Switzerland, China, Egypt, Vietnam, New Zealand, Norway and Saudi Arabia

- Customer specific or standard designs
- ABB designed, assembled and tested for quality
- Highly corrosion resistant design
- Operates in a radial or loop system
- SCADA ready or remote controlled available
- High Aesthetic Value
- Several layouts to provide flexibility in the operation and low cost maintenance
- Available layouts to accommodate up to two transformers
- Bolt reinforced in lifting points
- Integrated oil collecting pit below transformer
- Top lifting for easy handling including equipment
ABB Medium Voltage Products
Modular systems – e.houses

Pre-fabricated units
- Primary and Secondary Switchgear
- Provided with Low Voltage Switchgear and Automation Equipment if needed
- Climate controlled
- ANSI, GOST, CSA, ASA or IEC Designs
- Oil and Gas, Mining, Infrastructure or Utility Applications
- Manufactured in: Canada, Australia, Saudi Arabia, Hungary, USA, South Korea, UK, Brazil, Peru, Dubai

Mobile units
- Types: MEC
- Up to 20 MVA, 36 kV
- Type tested equipment
- Factory engineering & assembled
- Emergency power expansion
- Manufactured in Saudi Arabia
ABB Medium Voltage Products
Service – Product life cycle services

- **Customer needs:**
  - Life cycle product support
  - Highest product reliability and fast service response
  - Optimized maintenance investment

- **ABB solutions:**
  - Installation and commissioning
  - Spare parts
  - Maintenance and field service
  - Training
ABB Medium Voltage Products
Service – Life extension and upgrade

- **Customer needs:**
  - Exploit the latest technology for highest safety standards
  - Cost-effective life extension
  - Increase functionality

- **ABB solutions:**
  - Retrofit and refurbishment
  - Extension

Original ASEA gas HPA circuit breaker

Retrofitting ABB vacuum VD4-HPA and gas HD4-HPA circuit breakers
ABB Medium Voltage Products
Service – Performance improvement

- **Customer needs:**
  - Reduce risk through pro-active service approach
  - Utilize real-time data for fast recovery
  - Optimize asset performance through condition analysis

- **ABB solutions:**
  - Monitoring and diagnostics
  - Engineering and consulting
  - Site audits