

# HVAC

## Heating, ventilation and air conditioning

Components and systems



## New challenges in the air conditioning sector

Anyone designing and manufacturing air conditioning equipment and systems is well aware of the expectations of their customers, which can be summed up as a need for increasingly high quality standards to respond to the ever changing market demands for comfort, simple and safe usage, rapid maintenance and high levels of efficiency. Today, however, new and specific needs have arisen alongside the traditional demands of the market: a growing awareness of environmental and energy saving issues, as well as pledges made by industrialised

countries at international level, with the resultant provision of regulations and laws, now call, and will continue to do so, for us to operate in an increasingly determined way according to criteria which do not just focus on the initial cost, but first and foremost take into consideration the advantages offered by a correct environmental impact, throughout the life of the equipment. These advantages take the form of both overall benefits for the general public and considerable savings for the user which, continuing throughout the useful life of the equipment itself, can by far exceed the limited savings which may be obtained by purchasing technically outdated solutions.



## “Energy saving”: the cutting edge design method

The most forward-looking professionals well understand the value of modern design, which aims to create “energetically correct” equipment, as they now often termed. The problem, quite the opposite, is finding suitable components on the market, ones which effectively satisfy the new needs and are reliable; but that are also backed by manufacturers with recognised experience, who can guarantee the necessary service all over the world.

With this in mind, ABB offers its organisation as the ideal partner for air conditioning designers and installers, since it is able to offer a full range of products and technologies for power distribution and automation, as well as professional and effective service, thanks to an organisation which is present in over 100 countries all over the world.

Considering some commonly accepted statistical data, for example the fact that in countries like the United States air

conditioning accounts for over 40% of power consumption and, in general, that motors use the greater part of electric power consumed by industry and the service sector, it is not hard to understand that any technological improvement in electric motors and their operation will certainly produce useful advantages in terms of power and the environment. From this point of view, ABB first of all offers two important solutions: high-performance **EFF I** category motors (according to the agreement signed in 1999 by major manufacturers), which permit power savings of up to 20%, and static frequency converters which, by controlling the start-up, stopping and speed of fans, compressors and pumps far more efficiently than traditional solutions, can lead to power savings of 30% to 60%.

Merely as an example, some significant figures show just how valid new technologies can be: it is estimated that, in general, in one year the use of frequency converters permits a reduction by many tens of thousands of GWh in power consumption, with a consequent reduction of tens of millions of tons of CO<sub>2</sub> released into the environment.

## Functional plant improvement

Over and above the evident positive aspects related to energy saving and safeguarding the environment, choosing new products and new technologies for air conditioning systems leads to considerable improvements in the construction and operation of equipment.

If we consider only general aspects, without going into the technical details, there are many advantages to be gained from using frequency converters: precise regulation of flow rate and pressure; rapid adjustment of pump and fan speeds to varying operating conditions; lower consumption at low speeds;

operation at variable speed and power, without the need to continually stop and restart the system which is on the contrary indispensable in many traditional appliances to maintain optimum working conditions; reduction of mechanical and electrical stress on components; less wear and therefore a reduction in repairs and time required for maintenance; reduction in the noise produced by the fans; smaller-sized mechanical components and thus less space required for installation; improvement in the power factor, which approaches 1 without needing to be compensated by capacitors; elimination of registers and further reductions in the number of components.



## ABB: motors, drives ... and much more

If high-performance motors and frequency converters are the two most specific ABB solutions permitting the achievement of the greatest financial and operational advantages from HVAC systems, the range of products offered by ABB for air conditioning applications is far wider. First of all the very extensive range of appliances and systems for low voltage power distribution, including switchboards in metal and in insulating material, control, protection and measurement devices, cabling and connection components, cable ducts, appliance holders and gangways. There is also a very extensive choice of industrial control, protection and automation products: overload cut-out switches, contactors, control and signalling units, programmable logic controllers, limit switches and sensors, process instrumentation, as well as soft starters that mitigate mechanical stress during the startup of pumps

and fans working at a fixed number of revolutions.

Lastly, it should not be forgotten that ABB can supply building automation systems using the *twisted pair* bus technique which permit the integration of HVAC systems into a single management and supervision logic, controlling all the technological installations in a building.

In order to increasingly effectively satisfy the demands of professionals in this sector, ABB constantly updates the technological and functional characteristics of its equipment and increases its overall range, to ensure that users may in any case find the support necessary to attain their respective quality, safety and reliability goals.

In general, and depending upon the application for which each type of equipment is to be used, ABB products are compliant with the major international standards, in particular with those in force in Europe and North America, and with the requirements of the Shipping Bureaus.



# Overview

## LV motors

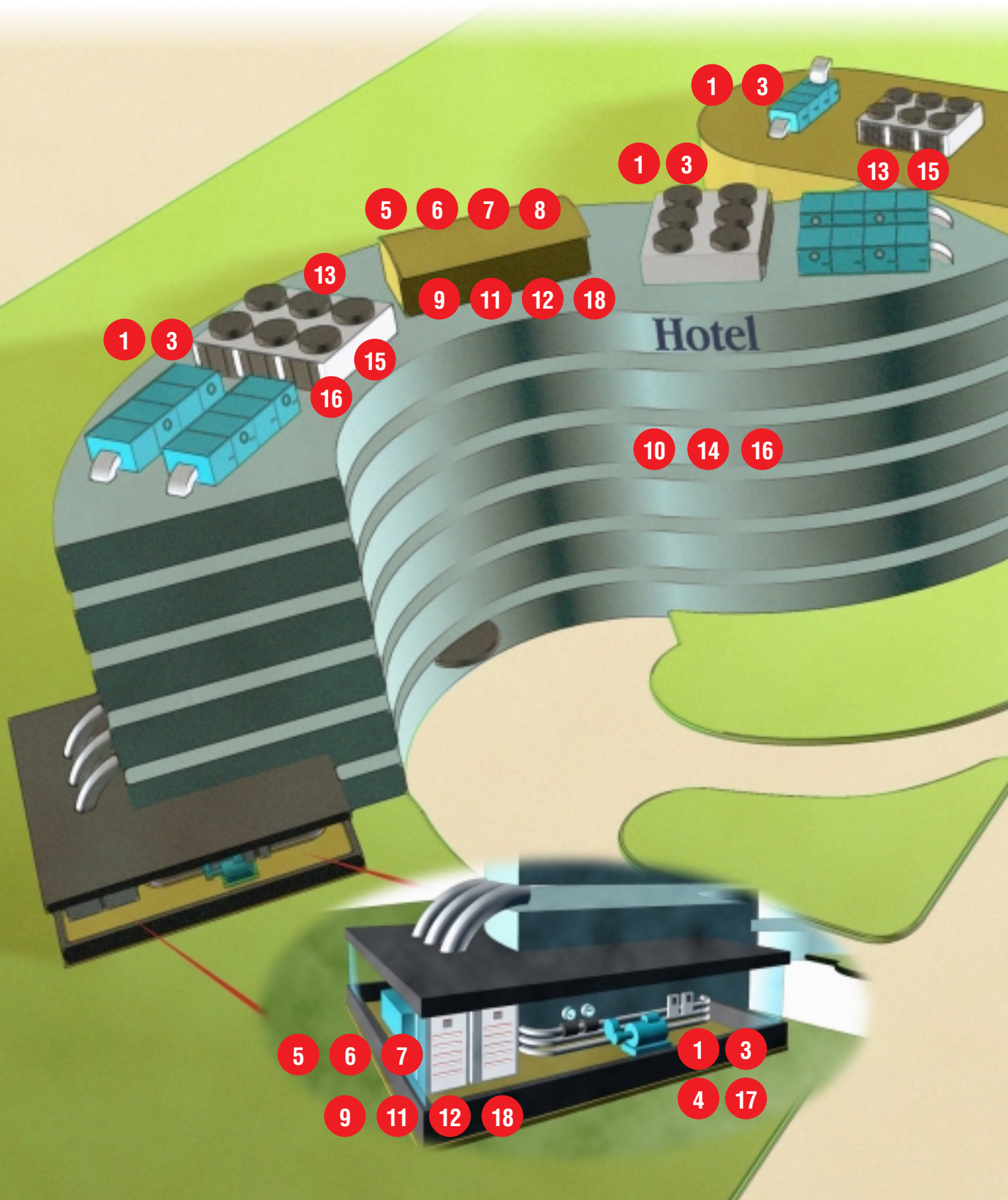
- 1 Standard motors
- 2 Smoke venting motors

## Drives

- 3 LV converters

## Command and protection

- 4 Soft-starters
- 5 Automatic circuit breakers
- 6 Contactors and thermal overload relays
- 7 Command and signalling units
- 8 Programmable logic controllers
- 9 Isolators



### Building automation systems

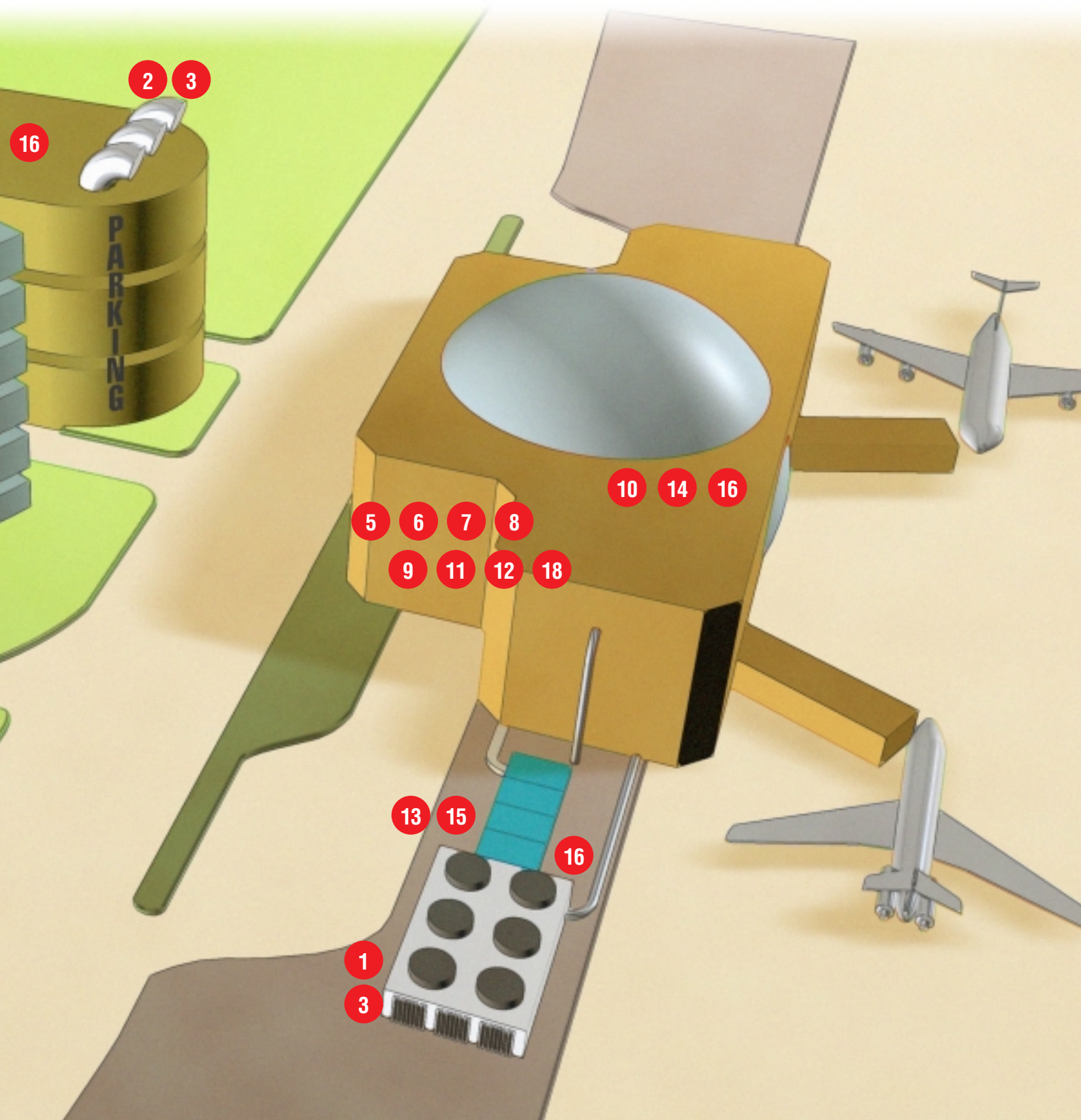
- 10 ABB i-bus twisted pairs bus

### Enclosures and wiring components

- 11 Switchboards, distribution boards and cabinet
- 12 Thermoplastic and halogen free wiring ducts
- 13 Metal trunkings
- 14 Plastic enclosures
- 15 Cable trays

### Process instrumentation and measurements devices

- 16 Physical measuring instrumentation
- 17 Actuators and I/P converters
- 18 Measurement instruments and energy meters





## ■ Command and protection

### Circuit-breakers and switches



#### Automatic

MCBs (depending on the series): In up to 100 A; Icu up to 25 kA  
MCCBs (depending on the series): In up to 630 A;  
Icu 830/414 V c.a.) up to 200 kA



#### Isolators

Switch disconnectors: from 16 to 3150 A  
Switch fuses: from 16 to 160 A  
Enclosed safety switches

### Motor protection and command



#### MCCBs

Moulded-case: In up to 630 A; Icu (400 V c.a.) up to 50 kA  
Modular motor starters: regulation field from 0.1 to 100 A

#### Contactors and miniature size contactors

For power up to 400 kW (depending on the series)

#### Thermal overload & protection relays

Bi-metal  
Electronic

#### Starters

DOL, star-delta, reversing for normal and severe starters

#### Soft starters

From 3 A to 1800 A (depending on the series)

#### Command and signalling units (modular and compact versions)

Push-buttons, switches, warning lights, luminous floor boxes

### Programmable logic controllers



#### Logic modules

AC010: from 12 to 40 I/O

#### PLCs

Up to 1000 I/U in remote configuration

### Devices for auxiliary functions



#### Electronic timers

#### Electronic industrial relays

For current, voltage, temperature, phase controls etc.

### Equipment mounted components



#### Limit switches and sensors

## ■ Enclosures and wiring components

### Sheet-steel boards



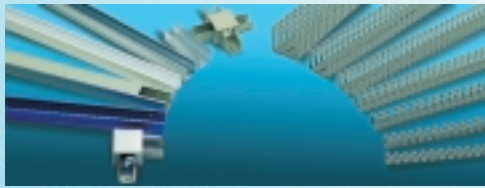
#### Boxes, multipurpose enclosures

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

### 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

## ■ Motors and generators

### LV motors and generators



#### Three-phase induction motors

Aluminium, cast iron and steel frames;  
**EFF 1** and **EFF 2** efficiency classes

#### Single-phase motors

#### Motors for hazardous area (ATEX)

Non-sparking EEx nA  
Increased safety EEx e  
Flameproof EEx d/EEx de  
Dust Ignition Proof (DIP)

#### Special for use with drives

#### Integral motors

#### Smoke venting motors

### MV motors



#### Induction

Modular: output power up to 18000 kW  
Slip Ring: output power up to 8000 kW  
Ribs cooled: output power up to 2250 kW  
Flameproof: output power up to 4500 kW

#### Synchronous

Output power up to 70 MW

#### DC Motors

Output power up to 3200 kW

## ■ Drives

### LV converters



**PWM technology (ACS50, ACS100, ACS140, ACS160, ACS550, ACH550)**  
For all applications up to 355 kW



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

### Direct current drives



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

### MT converters



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

## ■ Process instrumentation

### Instrumentation for chemical and physical measuring



**Pressure, differential pressure, level**  
Complete range of smart electronic transmitters, also Fieldbus  
Pneumatic transmitters

**Temperature**  
Field and control panel transmitters  
Thermocouples, thermoresistances and cables  
Barriers and remote I/O

**Flow**  
Electromagnetic flowmeters  
Vortex, Swirlmeters  
Variable area  
Thermal mass and Coriolis mass flowmeters  
Sensyflow mass flowmeters for air and gas  
Battery-powered meters with GSM transmission

**Liquids analysis**  
Sensors and transmitters for pH/Redox, conductivity,  
dissolved oxygen, turbidity  
Ion selective, colorimetric and UV monitors

**Heat computing**

### Control instruments



**Controllers and recorders**  
Microprocessor based controllers  
Continuous line and multipoint videographic recorders  
Analog and digital indicators

**Process management**  
Scalable process management  
Fieldbus applications

### Regulation and actuation



**Converters**  
Field I/P converters

**Actuators**  
Conventional diaphragm actuators  
Electrical actuators

**Positioners**  
Pneumatic and electro-pneumatic, also Smart



## Other products

### Building Automation systems



**ABB i-bus EIB**  
Twisted pair bus

### 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**

### Measurements devices



**Electronic energy meters**  
Single-phase and three-phase meters

**Measurements instruments**  
Digital and analogue instruments

## 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 the PDF format and can be downloaded for free. The news section provides for the most updated information about products.

### Contact lists

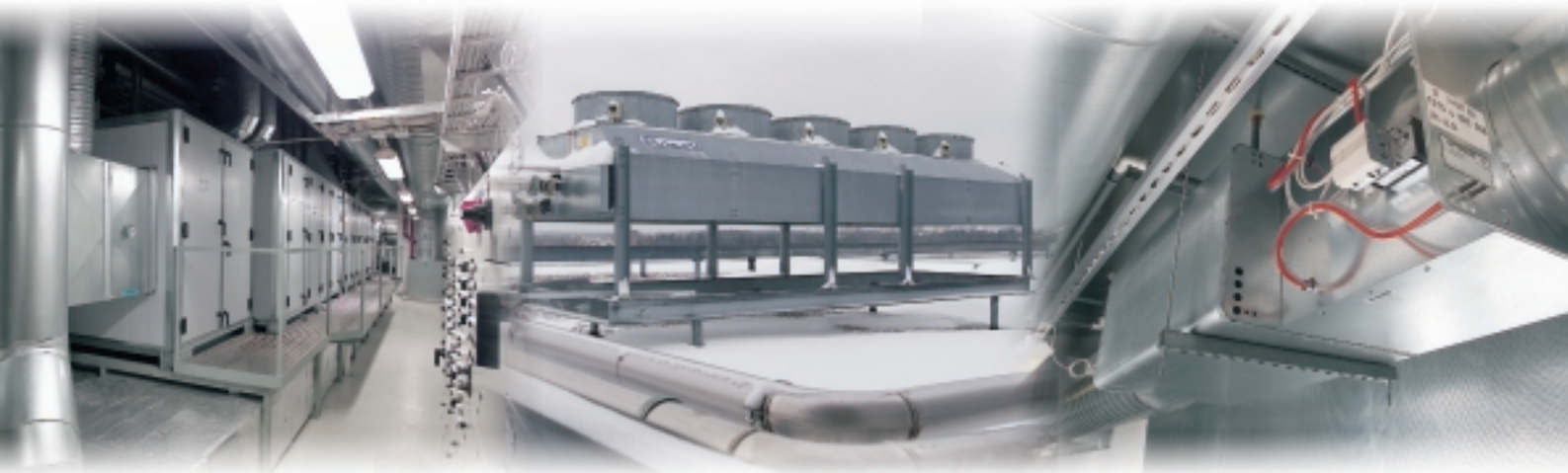


The addresses, e-mails and web sites of ABB local contacts all over the world to be as close as possible to our customers and always fulfil their expectations.

# Examples of applications

## Main types of machines equipped with ABB products

Air Handling Units -AHU	Mini Chillers	Condensers
Primary pumping systems	Heat Pumps	Supply/Exhaust Fans
Secondary pumping systems	Split, MultiSplit	Smoke Extract System
Condenser water pumps	Direct expansion systems	Roof-Top Fans
Chillers	Cooling Towers	



## Most recent HVAC systems provided with machines equipped with ABB products

Castello Sforzesco	Milano	Primary air conditioning Units
Multiscreen cinema	Savigliano (CN)	Supply/exhaust Fans
Glassworks	Dego (SV)	Fans, chiller compressor
Sports hall	Roma - EUR	AHU
Sports hall	Bologna	AHU
Hospital complex	Rimini	AHU
Operating theatres at hospital centre	Modena	AHU
Motor testing room	Modena	Fans
Shopping centre	Torino	AHU, Fans
Shopping centre	Cremona	AHU, Fans
Shopping centre	Montebelluna (TV)	AHU, Fans
Lean rooms for microprocessors	Milano	Absolut filtering systems
Airport	Venezia	AHU, pumping systems
Hotel Park Hyatt	Milano	AHU
Cold storage for meat	Thailand	Refrigeration machines
Pharmaceutical industry (production and laboratories)	Brussels	Absolute filtering systems, AHU
Pharmaceutical industry (production and laboratories)	Germany	AHU
Pharmaceutical industry (production and laboratories)	Ireland	AHU
Ramada Renaissance Hotel	Turkey	AHU
SAS Scandinavia Hotel	Denmark	AHU
Interhotel Palasthotel	Germany	AHU
Hilton International	UK	AHU



# Industrial IT: solutions from ABB

Industrial IT describes the ABB group commitment to bridging the gap between industrial and business assets and the information technology (IT) required to integrate these systems in real time.

This initiative spans every facet of ABB, including technology, marketing, strategic partnerships, and business processes.



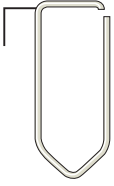
The Industrial IT concept begins with a portfolio of compatible product “building blocks” for power, automation, and information. Bundled with each component is a library of characteristics such as instruction manuals, drawings, configuration tools, etc. supplied in a consistent electronic format. Together, these characteristics – or aspects – form a powerful software shell called an Aspect Object. Products which are tested and certified to this standard are granted the designation Industrial IT Enabled.

As each certified product is physically installed, its corresponding Aspect Object may be copied and pasted into ABB’s architecture for enterprise integration – the Aspect Integrator Platform (AIP) - providing quick access to the information required to configure, operate, evaluate, and optimize the device from

one interface. Beyond this reusable, “plug and produce” installation, the Windows-based architecture allows grouping of Aspect Objects in easy-to-navigate structures so that operations, maintenance, or management personnel can effectively manage each component within the context of its larger system.

Numerous benefits are to be had from a high level information system like Industrial IT that would be difficult to achieve with currently available management solutions: in fact, all the standardized information about characteristics, installation, usage and maintenance are available from the easy-to-use software, as well as technical aspects about devices work.





Automation Technologies

[www.abb.com/lowvoltage](http://www.abb.com/lowvoltage)