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life of the equipment itself, can by far exceed the limited savings which may be obtained by purchasing technically outdated solutions.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 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 CO2 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
1 Soft-starters
2 Automatic circuit breakers
3 Contactors and thermal overload relays
4 Command and signalling units
5 Programmable logic controllers
6 Isolators
Building automation systems
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**
  - MCCBs (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

### Motors and generators

**LV motors and generators**

- Three-phase induction motors
  - Aluminium, cast iron and steel frames;
  - EFF1 and EFF2 efficiency classes

- Single-phase motors

- Motors for hazardous area (ATEX)
  - Non-sparking EEx nA
  - Increased safety EEx e
  - Flameproof EEx d/EEx de

- 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

### Terminal blocks assemblies

**Terminals for remote controls**

- Self stripping connections in A.D.O. technology
- Screw and spring terminals
- Faston terminals

**Power connections**

- Studs
### 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 4000 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 kW

### 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

Banners 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 (e.g. 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 backup 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 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 fulfill their expectations.
Examples of applications

Main types of machines equipped with ABB products

<table>
<thead>
<tr>
<th>Air Handling Units - AHU</th>
<th>Mini Chillers</th>
<th>Condensers</th>
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</thead>
<tbody>
<tr>
<td>Primary pumping systems</td>
<td>Heat Pumps</td>
<td>Supply/Exhaust Fans</td>
</tr>
<tr>
<td>Secondary pumping systems</td>
<td>Split, MultiSplit</td>
<td>Fans, chiller compressor</td>
</tr>
<tr>
<td>Condenser water pumps</td>
<td>Direct expansion systems</td>
<td>AHU</td>
</tr>
<tr>
<td>Chillers</td>
<td>Cooling Towers</td>
<td>AHU</td>
</tr>
</tbody>
</table>

Most recent HVAC systems provided with machines equipped with ABB products

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