

APPLICATION GUIDE

ACH580

Managing total cost of
ownership of HVAC systems



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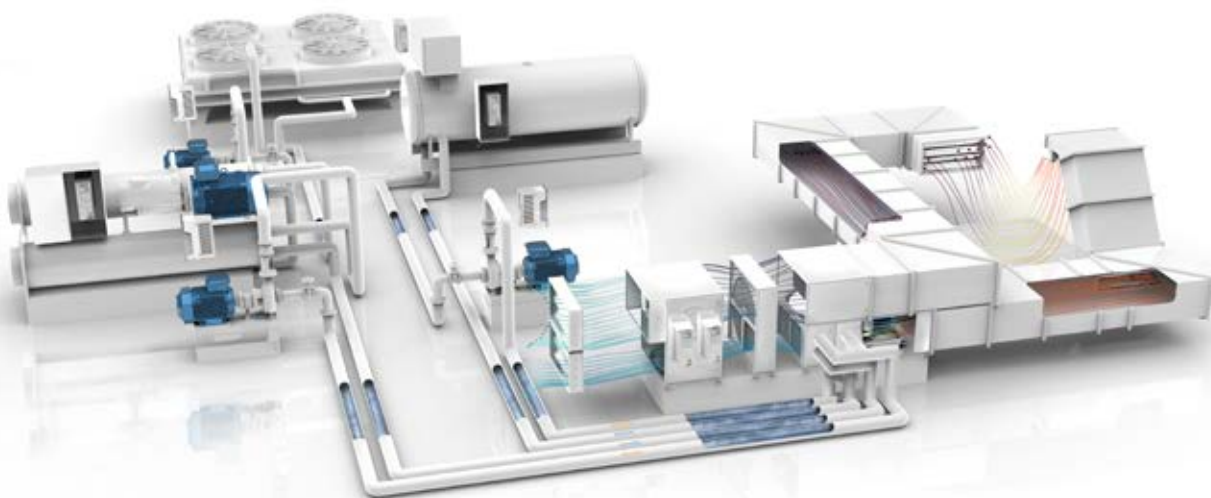
Creating a climate of efficiency with the ACH580

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Figure 01. Example
setup of HVAC
systems

In most buildings HVAC systems account for up to 50% of the total energy consumption. Initial investment costs of HVAC represent only roughly 20% of total cost of ownership (TCO). The ACH580 enables customers to create the optimum microclimate within buildings for efficiency and at the same time to reduce TCO. Choosing the right products matter and the decisions you make at the beginning of the purchase journey undoubtedly have impact on TCO. A good quality air-handler can easily last in excess of 25 years if installed and subsequently maintained correctly. Twenty five years for mechanical equipment may sound ideal but it's only natural that complications may occur as a result of lack of maintenance, proper operation of systems, etc. This is when drives and motors need replacing prematurely and TCO is adversely affected. Find out how you can maximize the lifespan of your drive and motor and create a microclimate for years of efficiency.

Benefits

- Fans and pumps are controlling quadratic or cubic loads where reduction of speed by 25 percent can result in 30 to 50 percent reduction in energy consumption thanks to affinity laws. Consequently, using a drive to control a fan or a pump instead of running the motor direct on line will allow for huge energy savings.
- Tested motor-drive packages offer verified efficiency levels with different kinds of motors. Whether you utilize traditional AC induction motors, PM motors or the ACH580 drive and energy-efficient IE4 SynRM motor package, we can deliver the optimum performance in the most energy efficient manner possible.
- Up-to-date energy efficiency information thanks to energy monitoring function which shows the estimated savings compared to running the motor direct online.



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Figure 01.

A clear vision for the HVAC industry

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Figure 2. ACH580
with SynRM motor

For over 20 years, ABB has been a leader in HVAC motor control innovations. The ACH580 is the next generation in dedicated HVAC specific variable-speed drives and offers the best efficiency in motor/drive packages with our Synchronous Reluctance Motors (SynRM). We led the industry with our BACnet integration capabilities and we now offer BACnet over IP. Our goal has been to provide best in class products and to better communicate the true cost of ownership of drives and motors when applied to any variable speed HVAC application. A broad range of life cycle services including preventive maintenance are of paramount importance at ABB in order to ensure a drive's lifetime of up to 20 years. These measures are all taken to ensure your HVAC equipment can continue to deliver, today and in the future.

ACH580 as a complete package

ABB is able to provide a complete package including variable-speed drives, motors and automation solutions for all HVAC applications ranging from air handling systems to primary and secondary pumps, chillers and many more.

ABB's portfolio for HVAC includes:

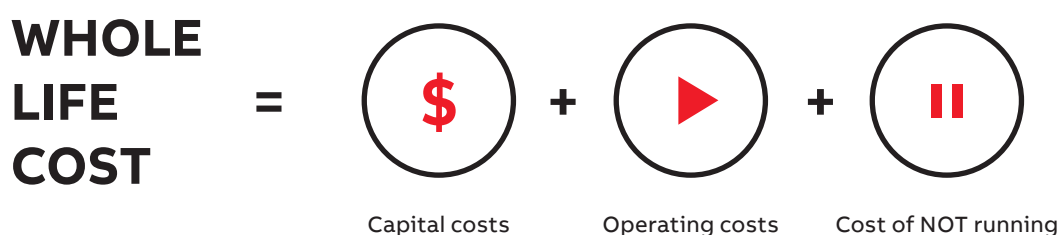
- Low voltage variable-speed drives
- Medium voltage variable-speed drives
- Low and medium voltage motors
- Synchronous reluctance motor (SynRM) and drive packages
- Transformers
- DC drives
- Soft starters
- Power factor compensation equipment
- Harmonic filters
- Mechanical power transmission products
- Scalable PLCs
- Human machine interfaces (HMIs)



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Figure 02.

The true cost of ownership

Cost of ownership – or whole life cost - has been, traditionally, the purchase price plus the cost of running. However costs associated with ownership are often overlooked: the cost of not running the HVAC.



Capital cost

Investment costs of the HVAC systems - either a new construction or retrofit.



Operating costs

A key element of operational cost is the energy used by the application. It is also about discovering ways how variable speed drives and high efficiency motors can improve productivity. The cost of maintenance that is increasing the lifetime and avoiding the high cost of unplanned downtimes should be regarded as investment costs and not part of operating costs. Even though it is contrary to current thinking, only maintenance that does not increase the lifetime should be included in the operating costs. Preventive maintenance pays for itself by avoiding the high cost of a unplanned outage. There will be no surprises that equipment gets broken unexpectedly or that there are unplanned downtimes. Preventive maintenance gives you the advantage of paying less due to proper planning.



Cost of NOT running

This is the most overlooked aspect of ownership. What is the cost incurred as a result of an interruption to a process? This can range from downtime to loss of reputation. The important aspect here is how to minimize the cost of not

running. Often companies rely on a rapid response to failures. But what if the risk of failure was substantially reduced in the first place? The cost of maintenance is always less than the cost of failure. Typically, the cost of emergency repairs are two to three times more costly than planned maintenance activities. So a structured maintenance regime (see page 9) drives down the whole life cycle cost.

In addition, HVAC systems that are not running properly will have a significant impact on critical zones:

- Commercial building: Loss of productivity which will negatively impact tenants satisfaction and commercial output, and the ability to lease space and ultimately reduce rent income.
- Schools: A climate that does not support concentration and learning will reduce attendance and reduce tuition paid.
- Healthcare: A well-functioning HVAC system is absolutely critical in healthcare facilities as the lack of a safe climate will have a severe impact on the well-being of patients and the costs of downtime are high.
- Data centers: Depending on the hosted clients, downtime can cost millions of dollars per minute.

Achieving savings through best in class HVAC products and support

High reliability thanks to high-quality drives

As a leader for HVAC drives ABB has been developing testing methods and quality processes for more than 20 years. During research and development phase products are designed and tested, both internally and by third parties, to meet product standards and safety requirements. Every manufactured product is verified to meet quality criteria by extensive testing during production. Result is proven technology that you can rely on to keep your HVAC system running.

Unrivalled energy efficiency

Operating electric motors with variable speed drives brings lower power consumption. Thanks to the drive you can run your motor at lower speed, using only the energy that is actually required by the process. This will also result in lower heat losses for both the drive and the motor so that less A/C is needed in electric rooms leading to reliable performance and ultimately a lower energy bill. This also means less investment in electrical network compensation devices, such as filters as well as reduced harmonic distortion in the electrical network.

Lower energy bills

Thanks to affinity laws reducing the speed of a pump, fan or compressor with a variable-speed drive by 25 percent can lead to a 30 to 50 percent reduction in energy consumption. In some cases even savings of up to 80 percent can be achieved. These savings translate directly into lower energy bills, freeing up capital for investment elsewhere.

Reduced CO₂ emissions

An assessment highlights potential pollution levels and gas emissions such as CO₂ reductions so that local environmental regulations can be fulfilled.

Higher process quality and reliability

The motor control behavior in normal and abnormal situations is excellent, being able to handle efficiently short supply voltage drops, take control of an already rotating motor, detect and protect equipment from cable and motor short-circuits ensuring continuity and high availability.

Increased productivity through better comfort

Properly designed HVAC system components ensure maximum comfort in buildings and other indoor facilities. A comfortable and safe environment will maximize productivity of the people that live and work there, improving output quality and reducing operating costs. In addition, components within a drive-train have also many features that contribute to maintain comfort and high productivity including alarms before malfunction and diagnostics to help personnel locate any faults.

Minimal mechanical wear

Using the drive-train more efficiently and eliminating overcapacity reduces stress and strain on machinery, meaning less maintenance will be required.

Maximizing profit

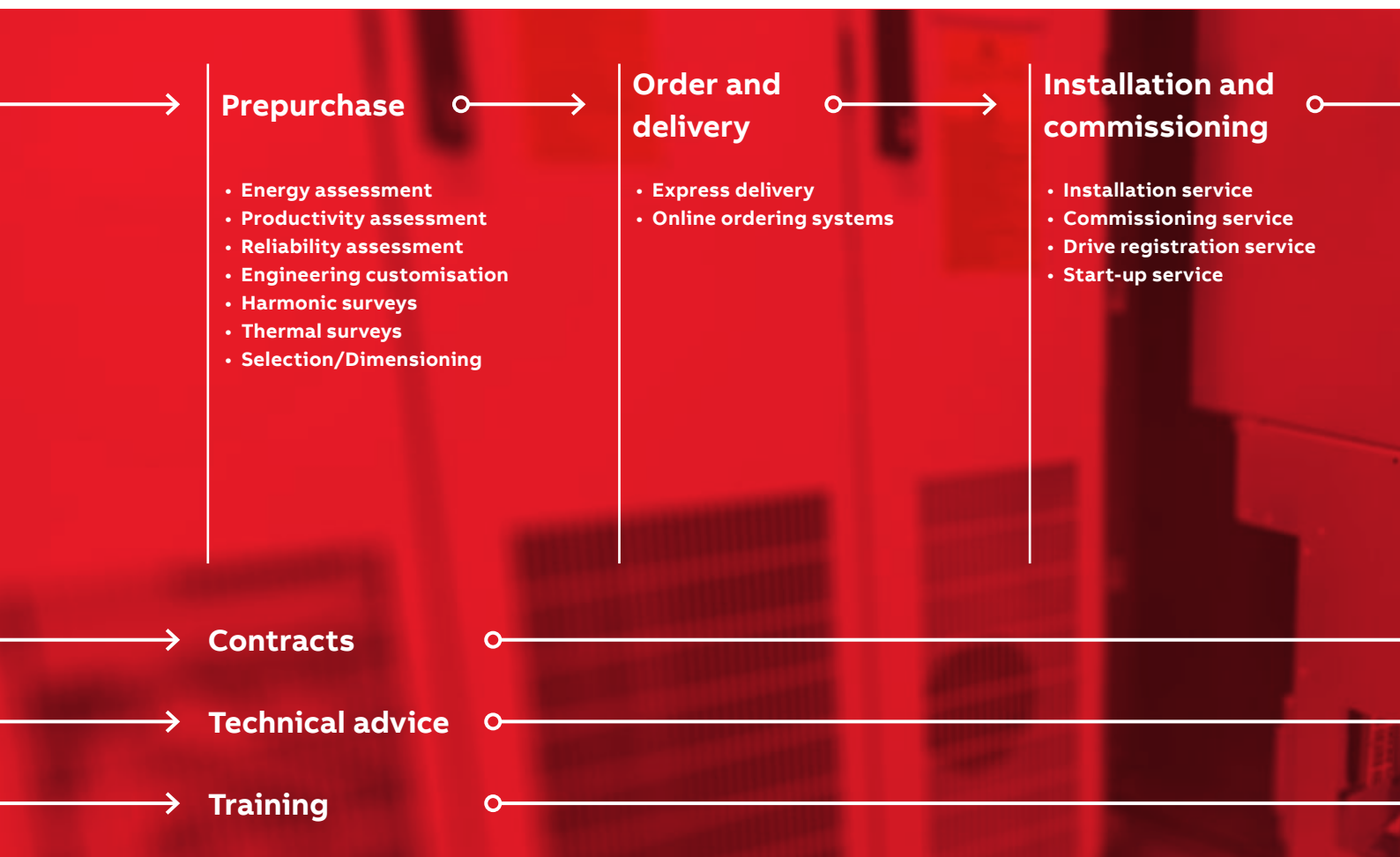
Maintenance actions can be reduced, thus minimizing unexpected interruptions. The uptime of critical applications, in particular, will improve significantly.

Whole life value chain

Proactive maintenance programmes for all elements of an HVAC system keep you competitive by minimizing disruption for your motor-driven applications.

Motor-driven applications found throughout the HVAC sector have a high degree of reliance placed upon them, and perform critical duties and have a high in-service value. A failure of one single part in the HVAC system can result in a loss of production and revenues, in addition to having safety and environmental consequences. To reduce the risk of failure, each element - whether a variable speed drive, motor, bearing, coupling

or gearing - must be properly maintained at the right time in their life cycle. The services offered by ABB and its value providers span the entire life cycle, from the moment a customer makes the first enquiry to disposal and recycling of each component. Throughout the value chain, training, technical support and customized contracts are also available.



Authorized Value Providers

Our partner network delivers sales, support, service and engineering expertise in seamless cooperation with ABB. Being strategically located throughout the world, our partners bring ABB's products and services directly to your site along with the same technical knowledge and back-up,

combined with the best-equipped repair and maintenance facilities available. All providers of products and support services undertake extensive on-going training in all aspects of motors, drives and services. HVAC networks within ABB can support any application, anywhere.

Operation and maintenance

- Spare parts service
- Preventive maintenance service
- Reconditioning service
- System to check availability and order spare parts online
- Drive Exchange service
- Remote support
- Workshop repair service
- On-site repair service
- Reliability, energy, productivity assessments
- Breakdown response service
- Warranty and extended warranties

Upgrade and retrofit

- Hardware upgrade
- Retrofit service
- Drive Exchange service

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For more information
and contact details:

www.abb.com/drives/HVAC
www.abb.com/drivespartners

