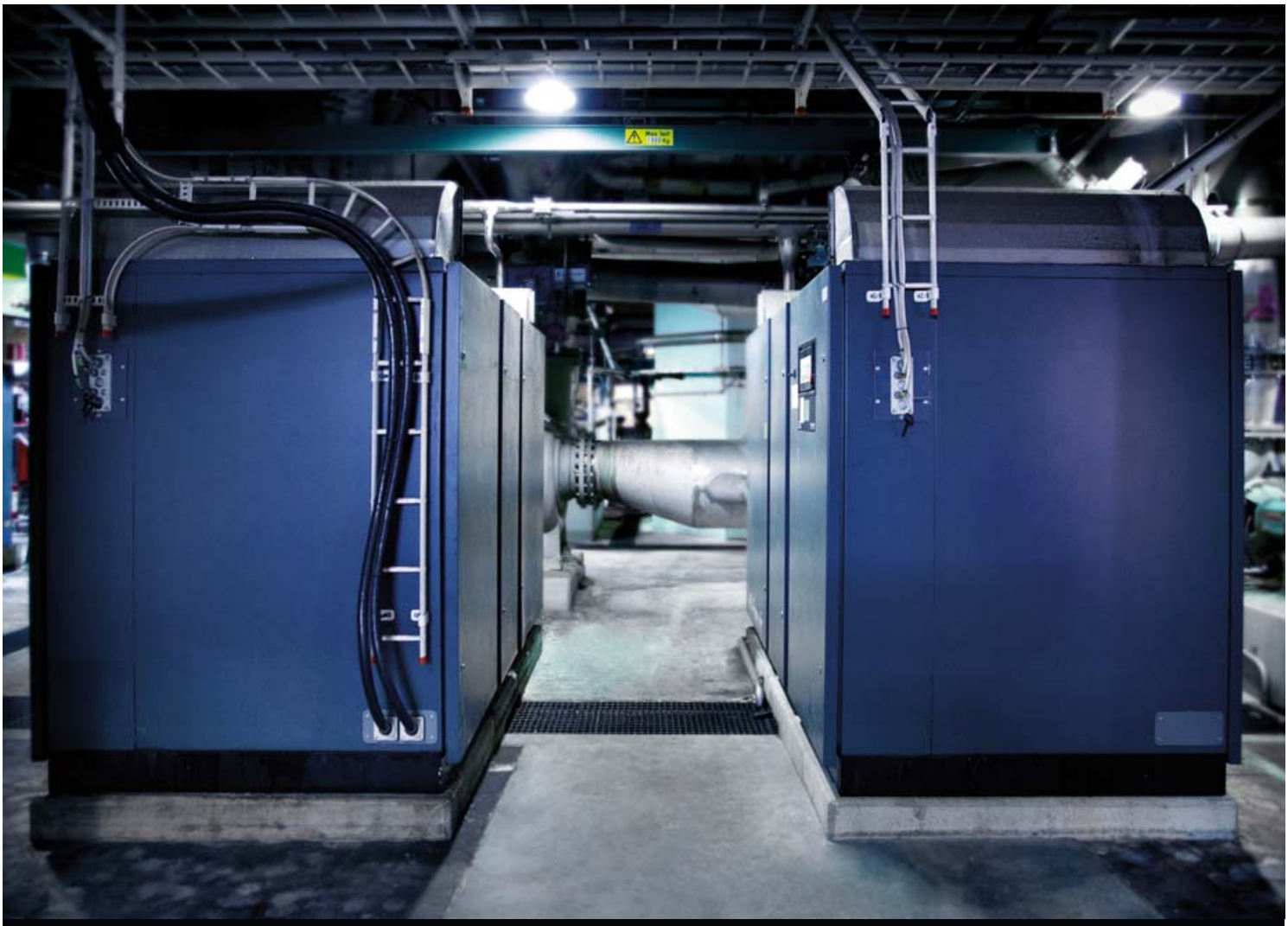


Compression at maximum efficiency with stationary compressors

Smooth startup. High pressure control. Energy savings. Everything counts.

Compressors play an important role in manufacturing, from powering pneumatic tools on production lines to machines in the process industry. Our automation offering improves reliability and gives you many advantages in compressor systems. We can help you best select and size drives to meet your requirements. A wide range of components from one supplier simplifies the ordering process and helps you save time. Easy commissioning helps meet tight R&D schedules for OEM manufacturing.

On most industrial sites, the demand for compressed air or cold production varies according to the time, the day or the season. If a compressor is not able to adjust compression by varying the speed of the motor, the energy bill is unnecessarily high. Variable speed technology can change this.

Our drives help you save energy during consumption under partial loads. The drives will vary the speed of the compressor motor to correspond to the actual demand. They also react quickly to changes in demand, so you do not have to keep higher discharge pressures in reserve to compensate. We offer a wide selection of PLCs, operator panels and low voltage products, such as circuit breakers, that can be easily integrated with all of the ABB components. By working closely together with OEMs, ABB has developed an automation product offering that enables precise, dependable and energy-efficient compressor operation.

Contents

Air compressors

In an air compressor room one or more stationary compressors run in parallel. To make sure compressed air is available all the time, the mechanical and electrical quality of the compressor is vital. One compressor station can include a lot of electrical components, like motors and drives for cooling, condensation water and pumping lubricating oil, as well as dryer and compression elements. Heat and dust together make the compressor environment very demanding for electrical components.

PLCs and operator panels (HMIs): Extreme condition variants for more demanding environments

– PLCs and HMIs with adaptive and IEC 61131-3 programming customized to the precise application needs

Motors for control of compression element and cooling motors inside compressor station.

– An extensive selection of cast iron motors ensures the right motor can be found for any type of compressor.
– IE4 synchronous reluctance motors (SynRM) and drive packages provide high efficiency without the use of permanent magnets.
– Compared to an induction motor the high output SynRM provides more power at the same frame size or the same power up to two frame sizes smaller.

Our variable speed drives quickly react to discharge pressure differences and have the torque control needed to keep the pressure stable, from high-torque demands at startup to continual use.

- With variable speed control, energy savings can be achieved through lower consumption at partial loads.
- With hexagonal motor control, you are able to run the motor similarly to a direct online motor, without heating the motor over nominal ratings.
- The drive‘s direct torque control (DTC) or vector control ensures accurate pressure control for your compressors.
- Our drives support virtually any type of motor, including high speed motors.
- With integrated safe torque off (STO) for machinery safety as a standard, you are able to achieve the SIL 3 safety level for the compressor and leave the main contactor off.
- Flange mounting is an option for the drive for better thermal management.

Ammonium compressors

In an ammonium compressor cooling system, liquid loops are responsible for regulating the temperature. To accomplish this, a number of applications must work together: compressor, condenser, evaporator, chiller and pumps. All of these must operate motors as efficiently and simply as possible.

Cooling tower

- Reducing the rate of condenser water flow can keep the spray nozzles from covering the fill and causing problems for the chiller.
- The pump speed can be controlled to maintain a constant flow as the strainer loads.
- The drive can also indicate when the strainer needs to be cleaned.
- Fan speed can be adjusted according to incoming water temperature.
- The drive can be programmed to control bypass valves for water flow.

Pumping station

You can save energy over traditional throttling valves by controlling your pumps with variable speed drives. As well as saving energy, you will benefit various extra functions like:

- return water temperature control
- de-icing control for heating
- stall heating for motor insulation
- belt and bearing maintenance notifications
- reduction of mechanical stress and reduced need for make-up water

Compressor

ABB drives are suitable to run all kind of compressor and motor types used for compressing ammonium. Even high speed motors are supported. By using the drive's internal programmability, interlockings between different functions can be built according to process needs.

Cooling circuit

Variable speed drives can be useful in such a system to:

- set the primary flow for the desired flow according to ΔT without closing the throttling valve
- work with a flow meter to maintain constant flow in the chiller

ABB offering for compressor applications
ABB’s programmable logic controllers (PLCs) and control panels

PLCs to control cooling compressor stations

Efficiency and performance are the result of accurate and advanced control. ABB supplies a full range of low voltage control products to safely start, protect and control compressors. The AC500, AC500-eCo, AC500-S and AC500-XC scalable PLC ranges provide solutions for small, middle and high-end applications. Our AC500 PLC platform offers different performance levels and is the ideal choice for high availability, extreme environments or safety solutions. Our AC500 PLC platform offers interoperability and compatibility in hardware and software, from compact PLCs up to high-end and safety PLCs. For more information, visit **www.abb.com/plc**

Control panels on the compressor door

The CP600-eCo and CP600 HMI control panels offer a wide range of features and functionalities for maximum operability. ABB control panels are distinguished by their robustness and easy usability, providing all the relevant information from production plants and machines at a single touch. For more information, visit **www.abb.com/plc**

ABB offering for compressor applications
All-compatible drives portfolio

The all-compatible drives share the same architecture; software platform, tools, user interfaces and options. Yet, there is an optimal drive for everything, from the smallest water pump to the biggest cement kiln, and everything in between. For compressors, there is a wide variety of drives to match your needs.

When used with air compressors, the drives reduce energy consumption, air consumption and leakage, and provide improved pressure control. Refrigeration compressors used with drives can achieve high total efficiency, even at reduced load, and energy-efficient capacity control. In refrigeration screw compressors, smooth capacity control enables precise regulation of the refrigeration temperature. For more information, visit **www.abb.com/drives**

Retrofitting for compressor stations

ABB drives can be used for retrofitting air and cooling compressors. If existing compressor controller cannot be updated, then the ABB programming tools can help to add extra control functions in the compressor system. Also fieldbus communication interfaces can be customized to better match with the existing automation system. Direct torque control (DTC) or vector control provides sufficient accuracy to run the compressor according to torque without PID pressure sensor feedback.

All-compatible drives for compressors
Benefits for your application

ABB all-compatible drives are suitable for many different compressor applications: stationary air compressors, cooling compressors, vacuum compressors, hermetic cooling compressors, and many more.

Feature	ACS380	ACS580	ACS880
	Adaptable performance and flexibility for small power compressors	**Effortless and efficient drive control for wide range of compressor applications**	**Flexibility and high performance for all compressor applications**
All-compatible offering with wide voltage and power ranges	The all-compatible offering is suitable for all kind of industrial environments. Same user interface and connectivity tools can be used to connect drives in different sizes and enclosure classes for easy compressor integration. It also enables a quick learning curve to operate equipment because they all share the same software structure.		
1-phase, 200–240 V	0.25–2.2 kW		
3-phase, 208–240 V			0.75–75 kW
3-phase, 380–415 V			0.75–1,400 kW
3-phase, 380–480 V (ACS880 up to 500 V)	0.25–7.5 kW	0.75–500 kW	0.75–1,600 kW
3-phase, 525–690 V			5.5–3,200 kW
Mounting options	ABB drives offering covers several different mounting methods. From this wide offering, it's possible to select the right drive for the right place.		
Enclosure	Drive module (IP20)	Wall-mounted (IP21 or IP55) Drive module (IP00 or IP20) Cabinet-built (IP21, IP42 or IP54)	Wall-mounted (IP21 or IP55) Drive module (IP00 or IP20) Cabinet-built (IP22, IP42 or IP54)
Side-by-side mounting	x	x	x
Flange mounting		x (up to 250 kW)	x (up to 630 kW)
Horizontal mounting		x	x
Marine certifications available			Marine type approval + possibility for product certification
Firmware and programmability	The basic drive features fulfil the standard compressor requirements, and if more sophisticated functions are needed, adaptive programming and IEC-61131-1-3 programming tools can be used for seamless drive integration with existing and new systems.		
Basic compressor control features	x	x	x
Stall protection	x	x	x
Configurable functions to supervise pressure and temperature	x	x	x
Motor temperature monitoring	x	x	x
Different parameter access levels	x	x	x
Direct PTC/Pt100 sensor connectivity	x	x	x
Flying start to catch the rotating motor	x	x	x
Adaptive programming	x	x	x
Motor preheating		x	x
IEC61131-1-3 programming			x
PFC for multicompressors	PFC control guarantees wider air volume supply by switching on and off parallel compressor stations based on the need.		
PFC		x	
Primary setting menu for easy commissioning for PFC multicompressors		x	

Feature	ACS380	ACS580	ACS880
	Adaptable performance and flexibility for small power compressors	**Effortless and efficient drive control for wide range of compressor applications**	**Flexibility and high performance for all compressor applications**
Energy efficiency	These features reduce the operation cost by enabling the optimized consumption as well as improved energy efficiency.		
Real-time clock to optimize energy consumption	x (if external assistant panel is used)	x	x
EnergySave calculator tool	x	x	x
PID sleep mode when not in use		x	x
Support for IE4-class motors	x	x	x
Support for IM, SynRM and PM motors	x	x	x
Regenerative support			x
Low harmonic support			x
Monitoring and maintenance	With the help of these features the users can, for example, prevent overdimensioning of the drive, see if any abnormal situations have occurred, identify the need for preventive maintenance, and easily track faults as well as perform troubleshooting.		
Maintenance counter	x	x	x
Load curve statistics	x	x	x
Fault logger	x	x	x
EnergySave calculator	x	x	x
Support for different languages	13 languages with an external assistant control panel	14 languages	15 languages
Motor speed/frequency control	High starting torque allows the system to be dimensioned according to the normal use, which reduces the investment cost. Hexagonal flux control mode also reduces motor heat losses and net capital in motor stock. In addition, dedicated features for high speed applications allow low current derating.		
Scalar and vector control support	x	x	
Scalar and direct torque control (DTC) support			x
Hexagonal flux control mode		x	x
Advanced high speed motor control			x
Optimized variant for high speed (up to 2,000 Hz) and high switching frequency			x
Safety	Built-in STO in drives together with additional safety functions enhance application safety, and the ATEX-certified PTC thermistor guarantees safe motor temperatures even in a potentially explosive environment.		
STO function	x	x	x
ATEX-certified PTC thermistor connection		x	x
Shell ATEX-approved			x
Customization	In addition to technical benefits, the ABB all-compatible drives portfolio can offer to a compressor manufacturer, ABB all-compatible drives support flexible customization to support brand recognition and user experience.		
Brand labeling	x	x	x
Customized parameter macros	x	x	x

Programming tools
Application programming

Adaptive programming

Adaptive programming is a common application programming tool for the ABB all-compatible drives. It is offered as default in the ABB all-compatible drives without licensing. This world-class programming interface takes easy drive adaptation to a new level. The combination of function and sequence blocks enables good flexibility without adding complexity. Adaptive programming offers an easy alternative for simple programming needs.

IEC programming

ABB ACS880 industrial drives can be ordered with the application programming functionality. It allows you to add your own program code to the drive using the ABB Automation Builder programming tool. The programming method and languages are based on the IEC 61131-3 programming standard. ABB Automation Builder is also used for configuring and programming the ABB AC500 PLC family of devices.

With the drive application programming, you can create application-specific features on top of the drive firmware functionality. You can utilize the standard and extension I/O and communication interfaces of the drive along with the appropriate firmware signals. Your program is executed in parallel with the drive control tasks using the same hardware resources.

In addition, you can create your own parameters and events (faults and warnings) that are visible on the ACS-AP-x control panel and in the Drive composer pro/entry commissioning tools.

Tools:

- 3AUA0000108087, Drive composer pro DCPT-01, single workstation license
- 3AUA0000145150, Drive composer pro DCPT-01, for 10 workstations
- 3AUA0000145151, Drive composer pro DCPT-01, for 20 workstations
- 3AUA0000108087, Drive composer entry DCET-01, free download from ABB website
- Automation Builder, for drive IEC programming

Customization and late configuration

ABB Drives also provides tools to customize the user interface and to load all software content efficiently into the drives.

With the Drive Customizer PC tool, machine builders can adapt the UI to the customer application by defining different access levels and parameter macros. Drive Customizer also includes functionality to modify drive texts and to add a customized drive boot logo. This tool can further be used to package the UI modifications and IEC application program and adaptive program to one loading package.

For loading the software content into the drives, ABB Drives offers efficient tools for all all-compatible drives. The memory unit copy station is used to efficiently copy software packages to multiple memory units for industrial drives. CCA-01 is used to load software packages into standard and industry-specific drives without a mains supply.

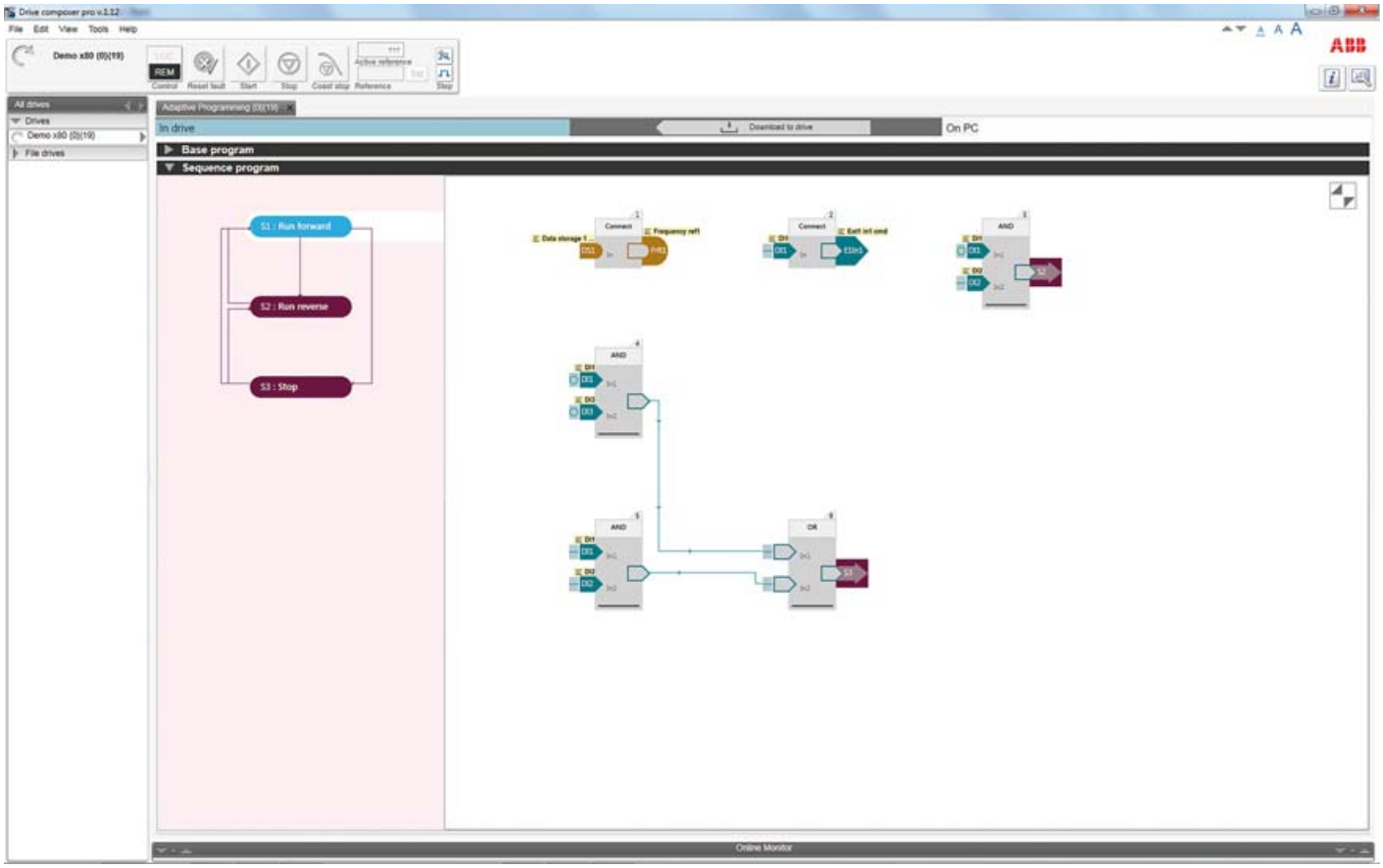
Tools:

- 3AXD50000015936, Drive Customizer PC tool DCZT-01
- 3AUA0000131054, ZMU copy station ZMP-01 kit
- 3AXD50000019865, configuration adapter CCA-01

Programming tools
Adaptive programming example

Solution for compressors

An adaptive program example for a compressor designed by ABB experts provides an easy solution for typical compressor applications. The example can be used as a template for compressor-specific control or fine-tuning compressor operation without external components in new and retrofit installations.



Motor control and energy efficiency guaranteed

Our drives control any type of AC motor for compressors, including induction, permanent magnet and synchronous reluctance motors.

All ABB drives control, run and support the main types of electric motors in compressor applications, including traditional induction motors, permanent magnet motors and, most recently, the most energy-efficient and compact motor generation – SynRM.

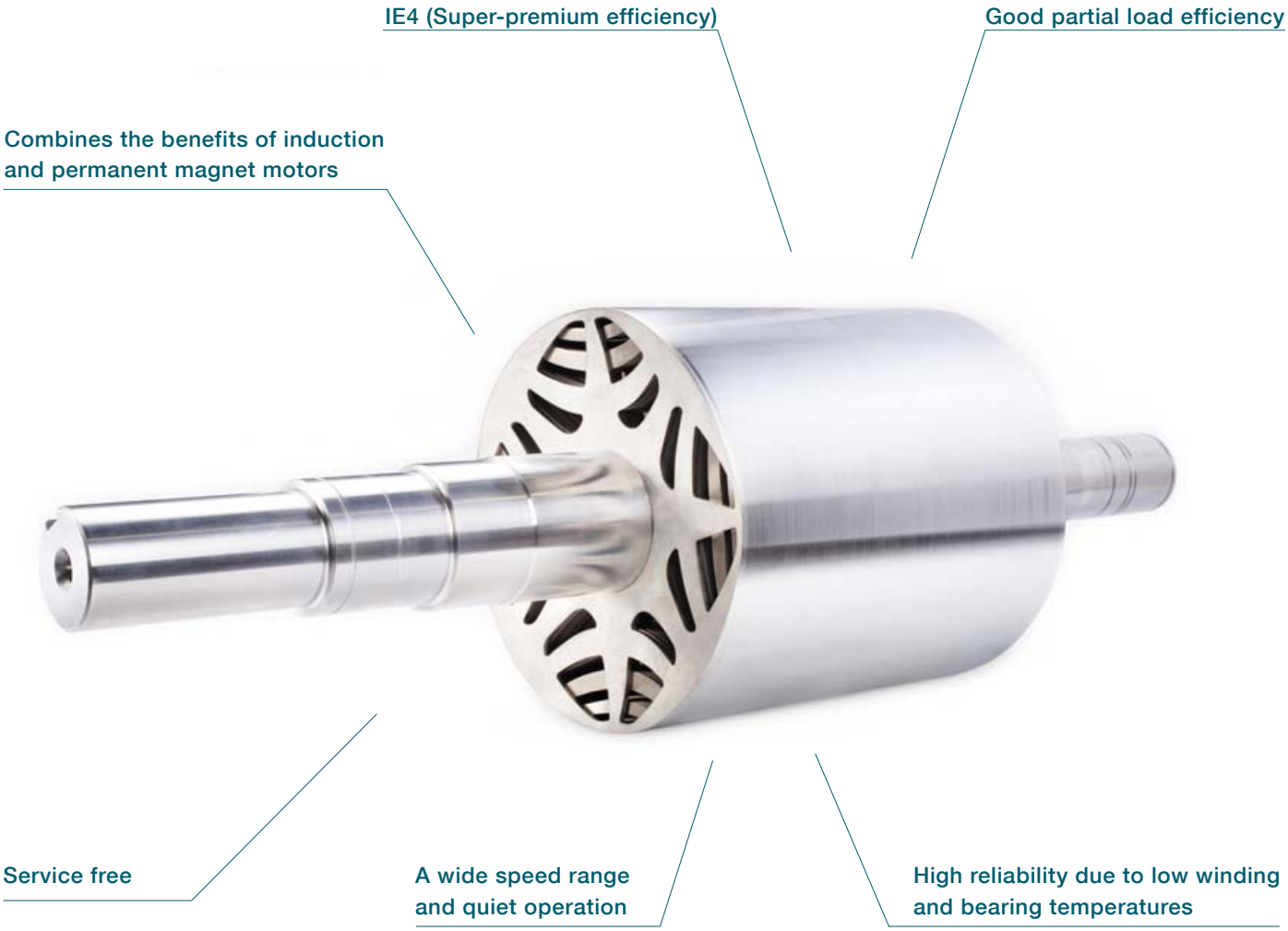
As compressor manufacturers are increasingly asking for packaged solutions, ABB's dedicated drive package teams can propose and provide motor-drive combinations where detailed and committed focus is on a matched, ready-made and optimized, single-source motor-drive solution.

ABB's motor-drive package design, selection and commercialization process always considers and concentrates on the compressor manufacturer's desired needs, whether it is for serial or engineered compressor manufacturing.

ABB drives can be a boon to compressor manufacturers, for example:

- Motor duty cycles, permissible motor temperature rise and insulation class with variable speed drives
- Continuous and short-time motor speed and torque capacity, thermal protection and motor-drive package energy efficiency, among other issues

Synchronous reluctance motors



Any motor in any compressor application

ABB's synchronous reluctance motors

ABB's SynRM packages combine benefits both from ABB motors and drives and enable manufacturers to utilize extremely high efficient drive gear in all kind of compressors. All in all SynRM means Super Premium efficiency also under partial loads, at low motor running temperatures, precise vibration-free synchronous speed control, reduction in motor size and lower audible motor noise. Verified package statements for SynRM packages help compressor manufacturers to design the very lowest energy consumption for the compressor installation.

ABB's IEC motors

ABB's IEC low voltage motors are suitable for all compressor applications fulfilling all national and international mandatory efficiency and MEPS regulations. Basically, ABB offers two types of standard IEC induction motors: process performance and general performance motors. Four properties set ABB's process performance motors apart: their efficiency, use of leading-edge technology and virtually limitless options they provide for customization. On the other hand, ABB's general performance motors suit and meet all the basic requirements of most compressor manufacturers with rapid order-to-stock delivery times.

ABB's NEMA motors

ABB's NEMA motors offer the broadest line of energy-efficient motors to meet any application need that compressor manufacturers may have. Designed and built with a focus on reliability and lowest total cost of ownership, these flagship ABB motors meet – and even exceed – all NEMA energy efficiency levels. ABB's NEMA motors are available throughout North America from regional stockists or can be manufactured to fit the most specific compressor application needs in the harshest environments.

Drives service
Your choice, your future

The future of your drives depends on the service you choose.
Whatever you choose, it should be a well-informed decision. No guesswork. We have the expertise and experience to help you find and implement the right service for your drive equipment. You can start by asking yourself these two critical questions:

– Why should my drive be serviced?
– What would my optimal service options be?

From here, you have our guidance and full support along the course you take, throughout the entire lifetime of your drives.

Your choice, your business efficiency
ABB Drive Care agreement lets you focus on your core business. A selection of predefined service options matching your needs provides optimal, more reliable performance, extended drive lifetime and improved cost control. So you can reduce the risk of unplanned downtime and find it easier to budget for maintenance.

We can help you more by knowing where you are!
Register your drive at www.abb.com/drivereg for extended warranty options and other benefits.

Service to match your needs

Your service needs depend on your operation, life cycle of your equipment and business priorities. We have identified our customers' four most common needs and defined service options to satisfy them. What is your choice to keep your drives at peak performance?

Is uptime your priority?

Keep your drives running with precisely planned and executed maintenance.

Example services include:
- Life Cycle Assessment
- Installation and Commissioning
- Spare Parts
- Preventive Maintenance
- Reconditioning
- ABB Drive Care agreement
- Drive Exchange

Is rapid response a key consideration?

If your drives require immediate action, our global network is at your service.

Example services include:
- ✓ Technical Support
- ✓ On-site Repair
- ✓ Remote Support
- ✓ Response time agreements
- ✓ Training

Need to extend your assets' lifetime?

Maximize your drive's lifetime with our services.

Example services include:
- ✓ Life Cycle Assessment
- ✓ Upgrades, Retrofits and Modernization
- ✓ Replacement, Disposal and Recycling

Is performance most critical to your operation?

Get optimal performance out of your machinery and systems.

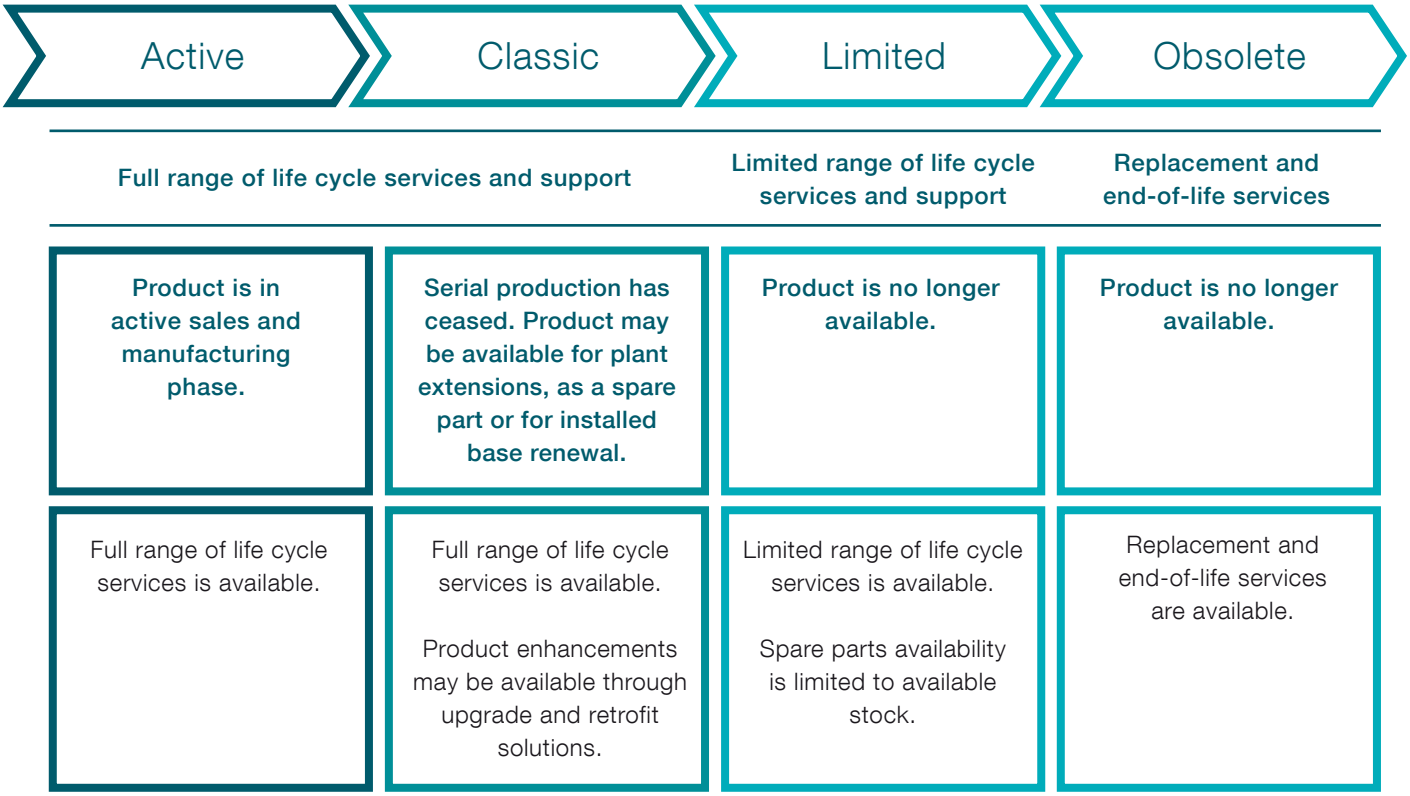
Example services include:
- ✓ Advanced services
- ✓ Engineering and Consulting
- ✓ Inspection and Diagnostics
- ✓ Upgrades, Retrofits and Modernization
- ✓ Workshop Repair
- ✓ Tailored services

Drives service
A lifetime of peak performance

You're in control of every life cycle phase of your drives. At the heart of drive services is a four-phase product life cycle management model. This model defines the services recommended and available throughout drives lifespan.

Now it's easy for you to see the exact service and maintenance available for your drives.

ABB drives life cycle phases explained:



Keeping you informed

We notify you every step of the way using life cycle status statements and announcements.

Your benefit is clear information about your drives' status and precise services available. It helps you plan the preferred service actions ahead of time and make sure that continuous support is always available.

Step 1 **Life Cycle Status Announcement**
Provides early information about the upcoming life cycle phase change and how it affects the availability of services.

Step 2 **Life Cycle Status Statement**
Provides information about the drive's current life cycle status, availability of product and services, life cycle plan and recommended actions.

Notes

Notes

Contact us

www.abb.com/drives
www.abb.com/motors&generators
www.abb.com/drivespartners
www.abb.com/plc

3AUA0000180098 REV B EN 24.11.2016