

ACS 5000

Medium voltage AC drive for control of motors up to 6.9 kV



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ABB



ACS 5000 – making a difference

The evolution of ABB’s ACS drives platform for motors up to 6.9 kV has led to a drive with unbeatable efficiency, reliability and footprint.

Leading the way

As the originator of AC drives technology, ABB has over 35 years of application know-how in all industrial sectors. ABB knows how to convert customer requirements into reliable world-class products, which fulfill customer’s future needs.

The ACS 5000, the latest member of the world’s most successful drives family, confirms ABB’s market leadership.

Revolution by evolution

The ACS 5000 is based on ABB’s renowned ACS platform, that has been used in thousands of drives worldwide. The combination of well-proven building blocks from existing ABB medium voltage drive products with the Voltage Source Inverter Multilevel-Fuseless (VSI-MF) topology, has revolutionized the drives industry – it simplifies the drive, increases its reliability and efficiency and results in the most application-friendly high-power drive available on the market.

The ACS 5000 was developed to specifically meet the requirements of the growing number of applications driven by standard motors up to 6.9 kV.

Benefits:

- Highest reliability due to lowest parts count
- Highest system efficiency due to multilevel-fuseless topology, IGBTs and DTC
- Smallest footprint due to highest power density
- Optimal network friendliness due to 36-pulse configuration
- Lowest cost of ownership due to high efficiency and simplified installation, commissioning and maintenance
- Ultimate control performance due to DTC
- Suitable for standard motors

Fields of application

Industries	Applications
Cement, Mining and Minerals	Grinding mills, conveyors, fans and pumps
Chemical, Oil and Gas	Compressors, extruders and pumps
Metals	Blast furnace blowers, fans and pumps
Pulp and Paper	Fans and pumps
Power Generation	Gas turbine starters, ID/FD fans and pumps
Water	Pumps
Other Applications	Test stands and wind tunnels

ACS 5000 – Highest performance and lowest cost of ownership

ABB engineers developed a drive that provides advantages over other medium voltage drives in reliability, efficiency and power density – features that have a direct impact on the customer's cost of ownership.

Highest reliability and efficiency

Thanks to the combination of well-proven components and an innovative topology, the ACS 5000 has a reliability and efficiency unmatched on the market.

IGCT semiconductors

The ACS 5000 uses an advanced and proven power semiconductor switching device known as IGCT. It combines the best of two traditional semiconductor technologies: the fast switching of the IGBT/IEGT with the proven reliability and low losses of the GTO.

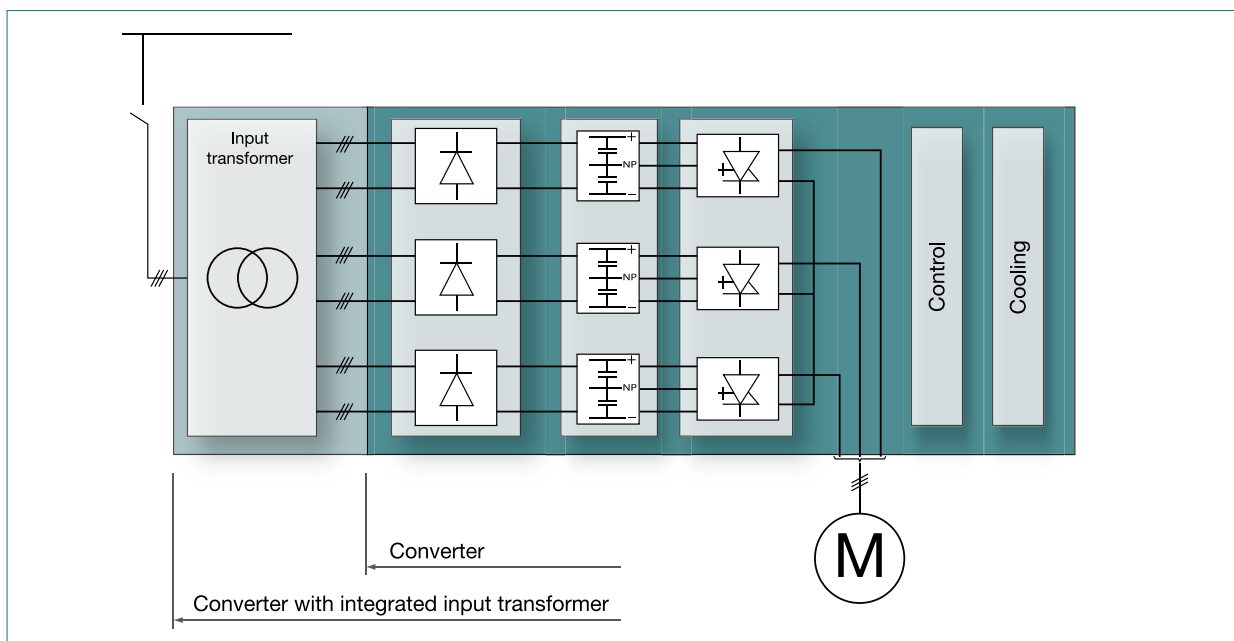
The use of IGCTs results in a low parts count, providing an intrinsically less complex, more efficient and reliable drive.

Fuseless

The converter design does not require any medium voltage power fuses, which are known to be unreliable, costly and subject to aging. Instead of fuses the ACS 5000 uses IGCTs/thyristors, which provide much faster and more reliable protection for the power components. The ACS 5000 protection scheme responds in less than 25 μ sec, about two hundred times faster than fuses.

Long-life DC-link capacitors

Advanced, self-healing, environmental friendly foil capacitors, designed for a long lifetime, are used in the DC-link. ABB has clearly distinguished itself with this technology compared to unreliable and maintenance-intensive designs based on electrolytic DC-link capacitors.



ACS 5000 Voltage Source Inverter Multilevel-Fuseless (VSI-MF) topology

Powerful and application-friendly

During development of the ACS 5000, special attention was given to the entire drive system to provide highest configuration flexibility and ensure powerful and application-friendly performance.

Smallest footprint

The ACS 5000 is based on a unique concept which enables operation of motors up to 6.9 kV without making the drive more complex. Thanks to the Voltage Source Inverter Multilevel-Fuseless (VSI-MF) topology the high motor voltage is achieved without series connection of semiconductors. This reduces the parts count to a minimum resulting in a power density up to 1 MVA/m³ for the complete drive, including control, cooling and auxiliaries, which is unmatched in the medium voltage drives market.

Motor friendly

The ACS 5000 topology has an optimum number of switching levels, which provides a multilevel output waveform. This allows the use of standard motors up to 6.9 kV without compromising reliability.

Network friendly

The ACS 5000 is equipped with a 36-pulse diode rectifier to minimize harmonics. It meets the most stringent requirements for current and voltage harmonic distortion as defined by IEEE, IEC and EN. This eliminates the need for costly harmonics analysis or installation of network filters when applying a new drive.

Powerful performance

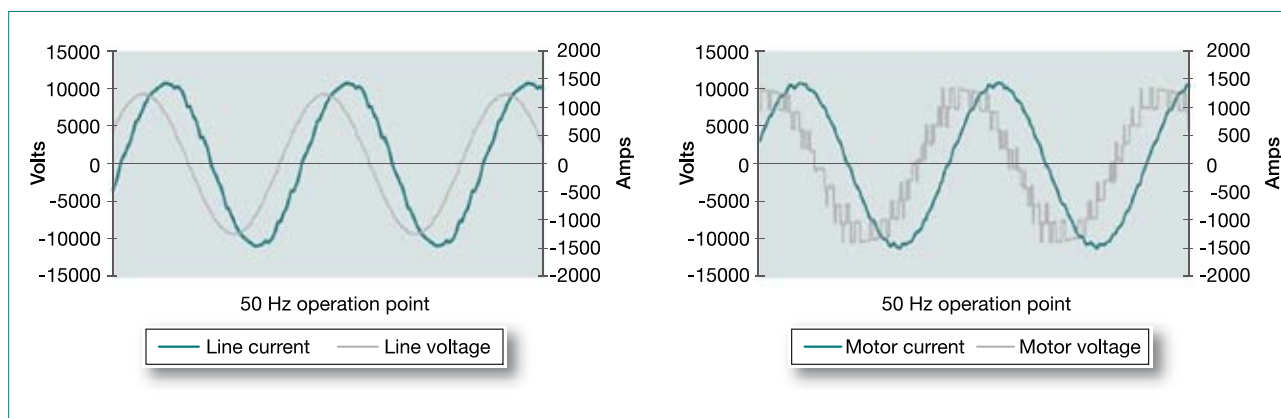
Fast and accurate process control in combination with low energy consumption results in top performance. The ACS drive control platform is ABB's award-winning Direct Torque Control (DTC), resulting in the highest torque and speed performance as well as the lowest losses ever achieved in medium voltage drives. Control of the drive is immediate and smooth under all conditions and the audible noise in the motor is considerably reduced compared to other control methods.



Transformer flexibility

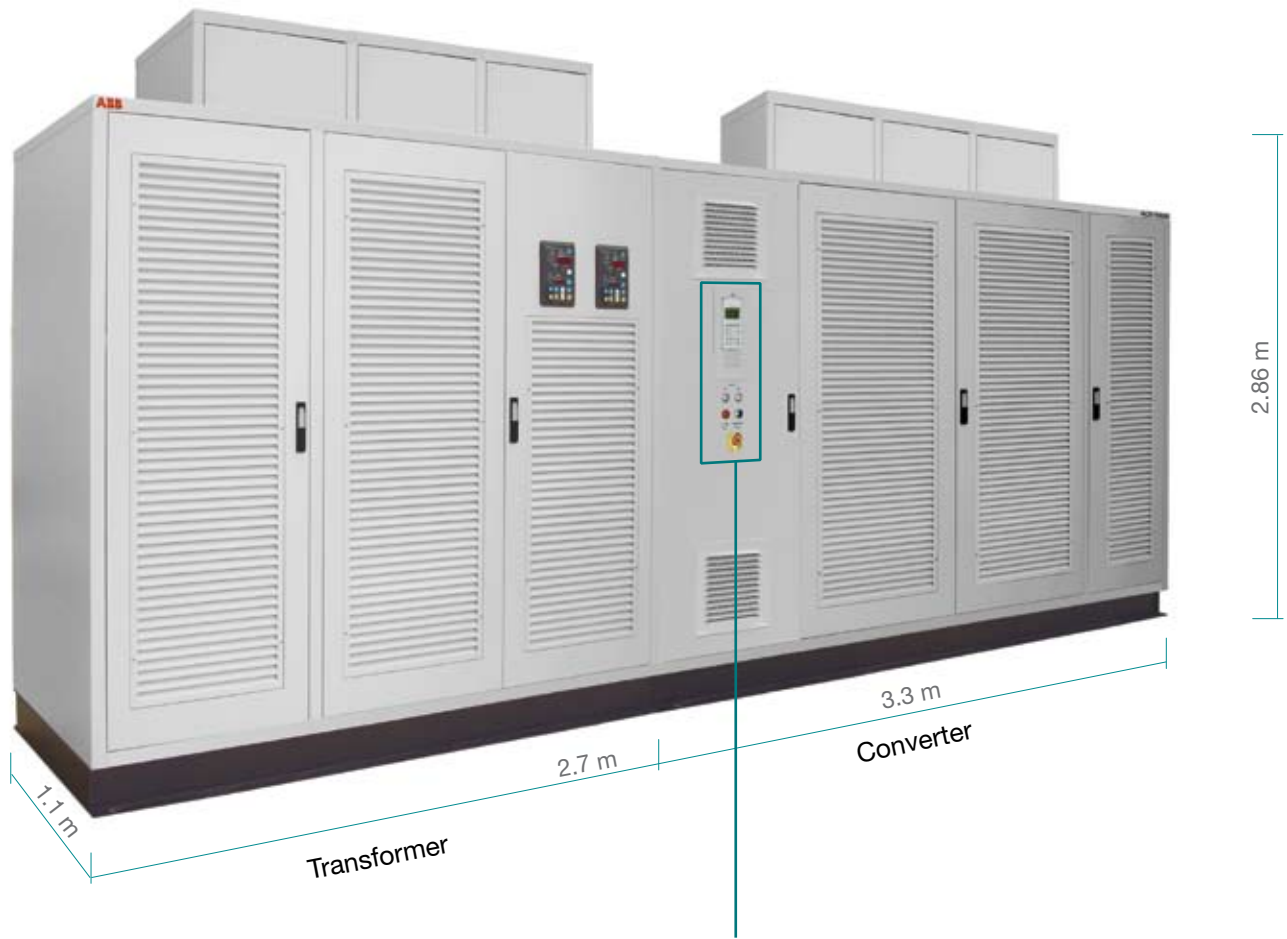
For highest transformer flexibility, the air-cooled ACS 5000 is available with a separate input transformer or, in the lower power range, with an integrated input transformer.

The integrated input transformer allows simple and quick installation and commissioning, whereas the separate transformer permits a flexible transformer configuration. Depending on the customer's infrastructure, the transformer can be placed either inside or outside the electrical room.



ACS 5000 air cooled

Understanding the industries' requirements led ABB to design the air-cooled ACS 5000 up to 7 MVA. It is available with integrated or separate input transformer.

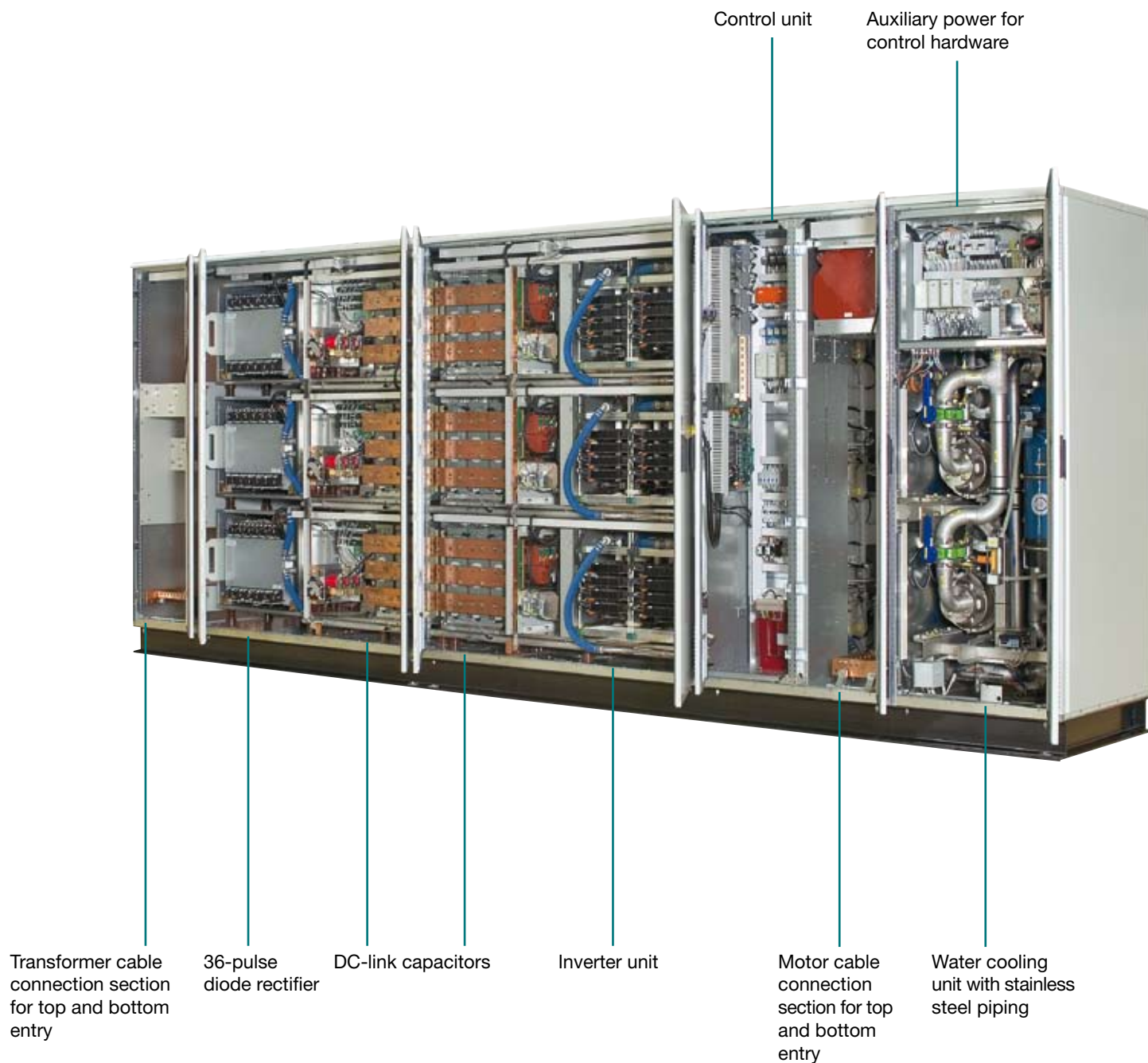


- User-friendly drive control panel for local operation
- Keypad with multi-language display
 - Main supply on/off pushbuttons
 - Emergency stop pushbutton

Air-cooled ACS 5000 with integrated transformer, 3.5 MVA, 6.9 kV

ACS 5000 water cooled

Understanding the constraints of limited space inspired ABB to increase the power density up to 1 MVA/m³ for the complete drive, including control, cooling and auxiliaries, thus saving valuable space. It is available up to 22 MVA.



Water-cooled ACS 5000, 12 MVA, 6.9 kV

The evolution of ABB's VSI-MF topology

ABB has been driving the evolution of state-of-the-art medium voltage drive technologies for more than 35 years.

VSI

In general, today's state-of-the-art medium voltage drive products are based on one of two basic inverter topologies: Voltage Source Inverter (VSI), employing a DC-link capacitor and providing a switched voltage waveform, and Current Source Inverter (CSI), employing a DC-link inductor and providing a switched current waveform.

For more than two decades, ABB has been pioneering the development of VSI-based medium voltage drives. Today, the VSI is the preferred topology on the market.

Advantages of VSI

A VSI can be implemented without the need for additional input or output filters, which are a must in a CSI topology with self-commutated semiconductors.

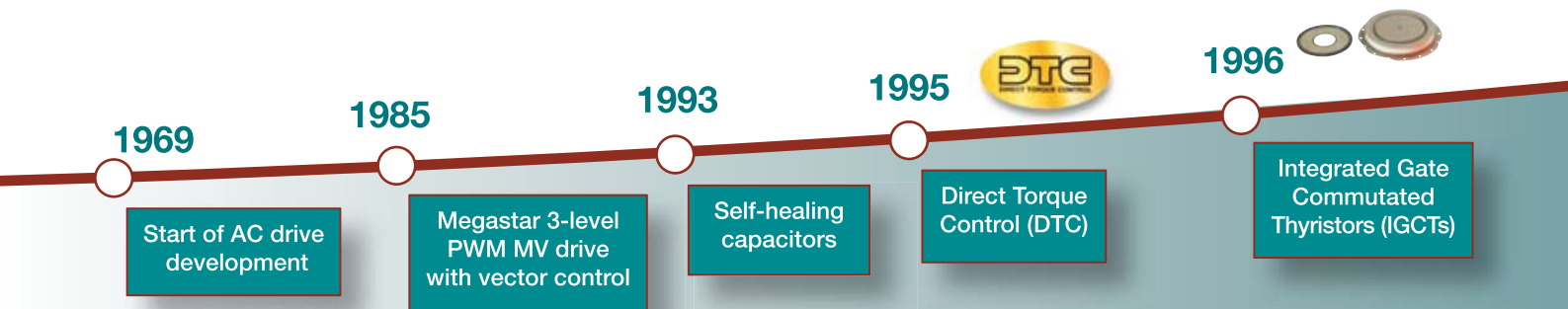
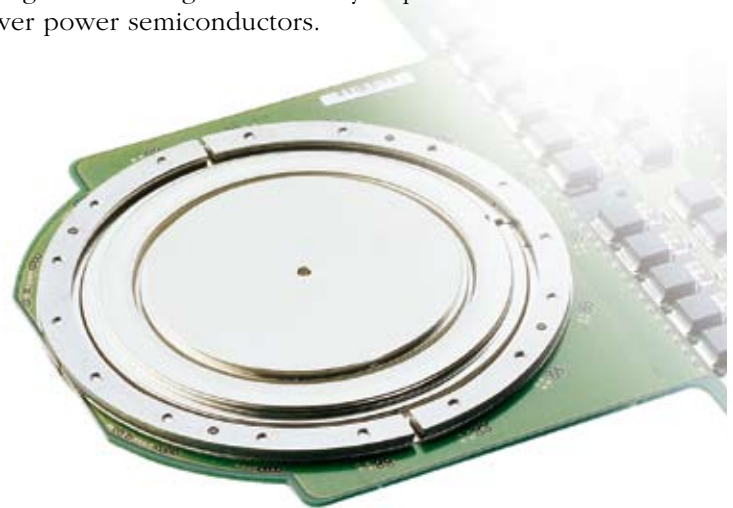
A VSI allows a very reliable and highly efficient input rectifier topology by means of a simple diode bridge. Besides excellent efficiency and reliability, diode bridges feature a high power factor (typically >0.95), which is constant over the whole speed range. The CSI topology either uses a thyristor rectifier or an active rectifier unit with self-commutated components, which are inherently less reliable and efficient. In addition, a thyristor rectifier has a worse power factor on the supply side and typically needs additional compensation equipment.

Furthermore, the VSI topology has a more superior dynamic control performance than the CSI topology.

IGCT

In 1996 ABB introduced IGCT (Integrated Gate Commutated Thyristor) semiconductors, fast switching power switches that have inherently low losses. Until then the power switches for medium voltage drives had been either GTOs or IGBTs. For medium voltage applications such devices led to compromises in design that increase cost and complexity of high-powered drives.

IGCT-based high-powered medium voltage drives are more reliable than medium voltage drives using IGBTs as they require fewer power semiconductors.



PEBB

The heart of the inverter is the Power Electronic Building Block (PEBB). It replaces complex power electronics circuits with a single, multi-function device.

The very high power density of the PEBB is based on the use of snubberless IGCTs, enabling reduced parts count and a compact mechanical arrangement. As a result, the size for a complete system for a given power rating has been reduced by 50 % compared to other available solutions.

In 1999 ABB launched the ACS 6000, the first PEBB-based variable speed drive for single and multi-motor applications. Since its introduction, the ACS 6000 has gained an excellent reputation for high quality and reliability. As a result, ABB has the largest installed base of medium voltage multidrives worldwide.



VSI-MF topology

Based on the successes of the IGCT and PEBB technologies, ABB developed the Voltage Source Inverter Multilevel-Fuseless (VSI-MF) topology.

By combining power electronic building blocks higher voltages can be reached, enabling reliable and efficient operation of motors up to 6.9 kV.

Motor-friendly with low parts count

In order to get a sinusoidal voltage to the motor, the number of switching levels would have to approach infinity. However, too many switching levels decrease reliability and efficiency because the number of components increases.

The ACS 5000 topology provides the optimal solution because it has enough switching levels to enable the use of standard motors while at the same time keeping the parts count to a minimum.

Compared to other available solutions, the VSI-MF topology provides a number of advantages:

- Higher power density and smaller footprint
- Smooth output waveform suitable for standard motors
- Increased reliability
- Higher efficiency



1997



ACS 1000
First IGCT-based
MV drive

1999



ACS 6000
First MV multidrive
with PEBB
technology

2003



Extension of
PEBB technology
covering 3 – 27 MVA

2005

ACS 5000
First MV drive
with VSI-MF
topology

ACS 5000 – features and benefits

The ACS 5000 is designed to deliver value through reliable process control and low cost of ownership.

Benefits	Features
Highest reliability for minimum downtime	ABB's revolutionary IGCT power switching device results in lowest parts count, providing a less complex, more reliable converter.
Highest efficiency	The ACS 5000 multilevel-fuseless topology results in a drive with unmatched efficiency.
Cost savings due to smaller electrical room and easier layout	Smallest footprint
Suitable for standard motors	The ACS 5000 provides a multilevel output waveform for increased motor friendliness.
Elimination of network harmonics to avoid penalties and system interferences. Costly harmonic analysis or network filters are not required.	The ACS 5000 36-pulse rectifier meets the most stringent requirements of international standards for current and voltage harmonic distortion.
Faster and easier maintenance	The ACS 5000 has a modular design simplifying maintenance. It has been designed to allow easy front access to the drive's components. The cooling equipment is available with redundant fans or pumps to allow maintenance during operating hours.
Highest input transformer flexibility: <ul style="list-style-type: none"> • Integrated transformer for quick installation and commissioning. • Separate transformer for a minimal need for air-conditioning. The losses from the transformer do not dissipate into the electrical room. 	Flexible input transformer configuration. The air-cooled ACS 5000 is available with an integrated or a separate input transformer, which can be placed outside the electrical room.
Fast, accurate and robust process control for constant product quality, minimum raw material waste and minimum machinery wear.	The fast control provided by Direct Torque Control (DTC) allows optimum process control and exact motor performance with minimum torque ripple and lowest energy consumption.
User-friendly drive monitoring and remote diagnostics	DriveMonitor™ provides monitoring and control access to the drive even from remote locations.
Round the clock access to drive specialists and spare parts	ABB, the largest drives supplier worldwide, has a global support network, which provides assistance and spare parts 24 hours/day, 365 days/year.

Simple system integration

The ACS 5000 allows smooth and simple system integration into the customer's industrial environment.

Open control system

ABB offers an open communication strategy, enabling connection to higher-level process controllers. The ACS 5000 can be installed with all major fieldbus adapters for smooth integration, monitoring and controlling of different processes, according to customer requirements.

DriveOPC

DriveOPC is a software package, which allows communication between ABB drives and the customer's Windows®-based applications.

Benefits

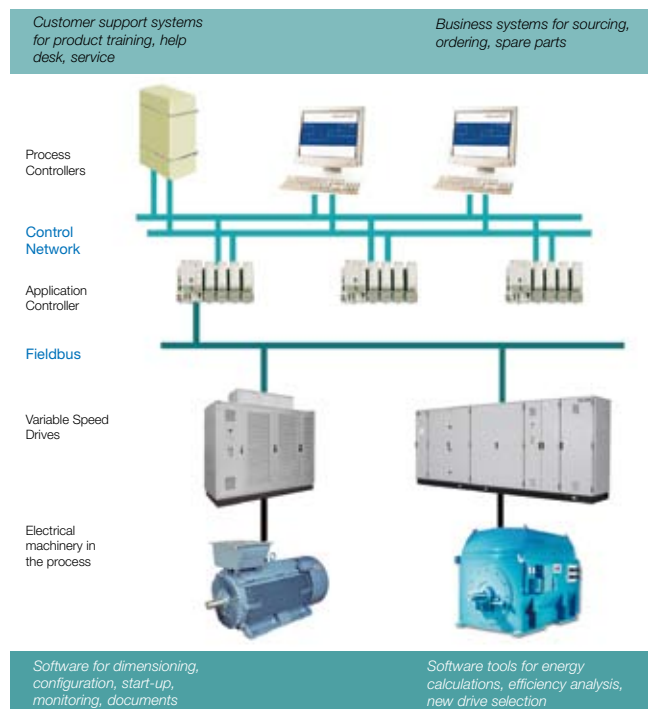
- Standard interface
- Remote connection via LAN (Local Area Network)
- Access to:
 - drive control
 - signals and parameters
 - data and fault loggers

IndustrialIT

ABB's IndustrialIT means increased standardization and seamless interaction of different ABB products. The ACS 5000 is certified to bear the IndustrialIT Enabled symbol, a special mark indicating that the drive can be easily integrated into the IndustrialIT architecture in a 'plug & produce' manner.

Benefits

- Easy integration of the drive into customer's industrial environment
- All drive information readily available in electronic form
- Drive communication with the environment through control panels, standardized fieldbus adapters and interfaces (OPC, OLE for Process Control)
- Easy to use start-up and maintenance tools



Principle of IndustrialIT

Monitoring and diagnostics

The ACS 5000 is available with an intelligent monitoring and diagnostics system, which allows secure access to the drive from any location in the world.

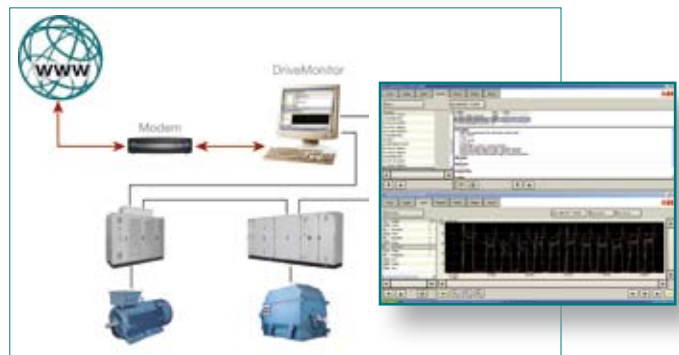
DriveMonitor™ allows real-time access to the drive. It supports monitoring, configuration and diagnostics of ABB drives for new and existing installations.

The optional tool consists of a hardware module inside the drive, as well as a software layer that automatically collects and analyzes selected drive signals and parameters.

Long-term monitoring functions deliver important information on equipment status, maintenance tasks needed and possible performance improvements. Diagnostic procedures and trending can cover not only the converter itself but other parts of the shaft train as well.

Benefits:

- Early detection to avoid costly repairs
- Reduction of process-critical faults
- Optimization of maintenance cost and schedule over the product life cycle
- Long-term statistics for optimization of process performance
- Easier root cause analysis - reduced Mean Time To Repair (MTTR)



Maintenance

Simple and efficient maintainability is an important factor in keeping operating costs down. The modular concept of the ACS 5000 implies minimal maintenance.

Reliable components

ABB drive technologies, such as IGCT power semiconductors and the multilevel-fuseless topology, provide a low parts count, which increases reliability, extends Mean Time Between Failures (MTBF) and improves availability.

Easy access

The ACS 5000 has been designed to allow easy front access to the drive's components.

Redundant cooling

The cooling equipment is available with redundant fans or pumps to allow maintenance during operating hours, which minimizes downtime.



The water-cooled ACS 5000 inverter phase modules are mounted on sliding rails.

Testing, service and support

The ACS 5000 is backed by unrivalled service and support from the customer's initial inquiry throughout the entire life cycle of the drive system.

Testing

ABB is committed to ensuring the reliability of every drive it delivers. To verify that quality standards and customer requirements are fully met every component of a drive is subjected to thorough testing in ABB's modern test facilities.

Routine tests and functional tests form an integral part of the scope of supply of ABB's medium voltage drives. They are performed in accordance with international standards and ABB quality assurance procedures.

Additionally, ABB can perform a combined test with the complete drive system – including transformer, converter and motor – to verify the performance and to ensure a smooth integration into the customer's facility.

Installation and commissioning

Proper installation and commissioning of the equipment, done by ABB's qualified and certified commissioning engineers, will reduce start-up time, increase safety and reliability and decrease life-cycle costs. In addition, operators can be given practical training by experienced specialists on site.

Life-cycle management

ABB's drive life-cycle management model maximizes the value of the equipment and maintenance investment by maintaining high availability, eliminating unplanned repair costs and extending the lifetime of the drive.

Life-cycle management includes:

- providing spare parts and expertise throughout the life cycle
- providing efficient product support and maintenance for improved reliability
- adding functionality to the initial product by following the upgrade path
- providing a smooth transition to a new technology at the end of the life cycle

Training

Extensive training for ABB's medium voltage drives can be provided at the ABB University. A range of training programs is offered from basic tutorials to programs tailored to the customer's specific needs. → www.abb.com/abbuniversity

Global network, local presence

After sales service is an integral part of providing the customer with a reliable and efficient drive system. The ABB Group of companies operates in more than 100 countries and has a worldwide network of service operations. Wherever you are, ABB is there for you.

Services for ABB's medium voltage drives

- Supervision of installation and commissioning
- Training
- Remote diagnostics
- Customized maintenance contracts
- Local support
- 24 × 365 support line
- Spare parts and logistics network
- Worldwide service network

Data sheet ACS 5000 with integrated transformer

Motor Data				Converter		Converter Data			
Type	Voltage kV	Shaft Power kW* hp*		Cooling	Type Code**	Power kVA	Current A	Length mm	Weight*** kg
Induction motors	6.0	1460	1960	Air cooled	ACS 5060-36L35A-1a35-Ax-TI A 24 5	1700	160	5700	7700
	6.0	1800	2410		ACS 5060-36L35B-1a35-Ax-TI A 24 5	2100	200	5700	7700
	6.0	2150	2880		ACS 5060-36L35C-1a35-Ax-TI A 24 5	2500	240	5700	7700
	6.0	2570	3440		ACS 5060-36L35D-1a35-Ax-TI A 34 5	3000	290	6000	9200
	6.0	3090	4140		ACS 5060-36L70E-1a70-Ax-TI A 34 5	3600	350	6400	10200
	6.0	3690	4940		ACS 5060-36L70G-1a70-Ax-TI A 45 5	4300	410	6700	11200
	6.0	4120	5520		ACS 5060-36L70H-1a70-Ax-TI A 45 5	4800	460	6700	11200
	6.6	1630	2180		ACS 5066-36L35A-1a35-Ax-TI A 24 5	1900	170	5700	7700
	6.6	2150	2880		ACS 5066-36L35B-1a35-Ax-TI A 24 5	2500	220	5700	7700
6.6	2490	3340	ACS 5066-36L35C-1a35-Ax-TI A 34 5	2900	250	6000	9200		
Induction motors	6.6	2830	3790	ACS 5066-36L35D-1a35-Ax-TI A 34 5	3300	290	6000	9200	
	6.6	3090	4140	ACS 5066-36L70E-1a70-Ax-TI A 34 5	3600	310	6400	10200	
	6.6	3690	4940	ACS 5066-36L70F-1a70-Ax-TI A 45 5	4300	380	6700	11200	
	6.6	4120	5520	ACS 5066-36L70G-1a70-Ax-TI A 45 5	4800	420	6700	11200	
	6.9	1720	2300	ACS 5069-36L35A-1a35-Ax-TI A 24 5	2000	170	5700	7700	
	6.9	2150	2880	ACS 5069-36L35B-1a35-Ax-TI A 24 5	2500	210	5700	7700	
6.9	2570	3440	ACS 5069-36L35C-1a35-Ax-TI A 34 5	3000	250	6000	9200		
Induction motors	6.9	3000	4020	ACS 5069-36L35D-1a35-Ax-TI A 34 5	3500	290	6000	9200	
	6.9	3090	4140	ACS 5069-36L70E-1a70-Ax-TI A 34 5	3600	300	6400	10200	
	6.9	3690	4940	ACS 5069-36L70F-1a70-Ax-TI A 45 5	4300	360	6700	11200	
	6.9	4120	5520	ACS 5069-36L70G-1a70-Ax-TI A 45 5	4800	400	6700	11200	
	6.0	1660	2220	ACS 5060-36L35A-1s35-Ax-TI A 24 5	1700	160	5700	7700	
	6.0	2150	2880	ACS 5060-36L35B-1s35-Ax-TI A 24 5	2200	210	5700	7700	
6.0	2540	3400	ACS 5060-36L35C-1s35-Ax-TI A 34 5	2600	250	6000	9200		
Synchronous motors	6.0	2930	3930	ACS 5060-36L35D-1s35-Ax-TI A 34 5	3000	290	6000	9200	
	6.0	3410	4570	ACS 5060-36L70E-1s70-Ax-TI A 45 5	3500	340	6700	11200	
	6.0	3710	4970	ACS 5060-36L70F-1s70-Ax-TI A 45 5	3800	370	6700	11200	
	6.0	4100	5490	ACS 5060-36L70G-1s70-Ax-TI A 45 5	4200	400	6700	11200	
	6.6	1760	2360	ACS 5066-36L35A-1s35-Ax-TI A 24 5	1800	160	5700	7700	
	6.6	2150	2880	ACS 5066-36L35B-1s35-Ax-TI A 24 5	2200	190	5700	7700	
6.6	2730	3660	ACS 5066-36L35C-1s35-Ax-TI A 34 5	2800	240	6000	9200		
Synchronous motors	6.6	3120	4180	ACS 5066-36L35D-1s35-Ax-TI A 34 5	3200	280	6000	9200	
	6.6	3710	4970	ACS 5066-36L70E-1s70-Ax-TI A 45 5	3800	330	6700	11200	
	6.6	4100	5490	ACS 5066-36L70F-1s70-Ax-TI A 45 5	4200	370	6700	11200	
	6.9	1850	2480	ACS 5069-36L35A-1s35-Ax-TI A 24 5	1900	160	5700	7700	
	6.9	2150	2880	ACS 5069-36L35B-1s35-Ax-TI A 24 5	2200	180	5700	7700	
	6.9	2730	3660	ACS 5069-36L35C-1s35-Ax-TI A 34 5	2800	230	6000	9200	
Synchronous motors	6.9	3120	4180	ACS 5069-36L35D-1s35-Ax-TI A 34 5	3200	270	6000	9200	
	6.9	3710	4970	ACS 5069-36L70E-1s70-Ax-TI A 45 5	3800	320	6700	11200	
	6.9	4100	5490	ACS 5069-36L70F-1s70-Ax-TI A 45 5	4200	350	6700	11200	

Notes: * Indicative information: induction motor efficiency 97.5 %, power factor 0.88;
synchronous motor efficiency 97.5 %, power factor 1.0.

** 'x' indicates the number of installed converter cooling fans.

*** Weight indications are approximate; listed without excitation unit (for synchronous motors).

General dimension:	Air cooled	Water cooled
Cabinet height	2360 mm excl. cooling fans 2863 mm incl. cooling fans 2963 mm with redundant cooling fans	2360 mm excl. A/A heat exchangers 2700 mm incl. A/A heat exchangers
Cabinet depth	1100 mm	1000 mm

Excitation unit for synchronous motor drives (stand-alone cabinet)

Dimensions 800 x 1000 x 2200 mm (L x D x H)
Weight 500 – 800 kg

Data sheet ACS 5000 for induction motors (external transformer)

Motor Data				Converter		Converter Data			
Type	Voltage kV	Shaft Power		Cooling	Type Code**	Power kVA	Current A	Length mm	Weight*** kg
		kW*	hp*						
Induction motors	6.0	1460	1960	Air cooled	ACS 5060-36L35A-1a35-Ax	1700	160	3300	3000
	6.0	1800	2410		ACS 5060-36L35B-1a35-Ax	2100	200	3300	3000
	6.0	2150	2880		ACS 5060-36L35C-1a35-Ax	2500	240	3300	3000
	6.0	2570	3440		ACS 5060-36L35D-1a35-Ax	3000	290	3300	3000
	6.0	3000	4020		ACS 5060-36L70E-1a70-Ax	3500	340	3700	4000
	6.0	3350	4490		ACS 5060-36L70F-1a70-Ax	3900	380	3700	4000
	6.0	3690	4940		ACS 5060-36L70G-1a70-Ax	4300	410	3700	4000
	6.0	4460	5980		ACS 5060-36L70H-1a70-Ax	5200	500	3700	4000
	6.0	5230	7010		ACS 5060-36L70J-1a70-Ax	6100	590	3700	4000
	6.6	1630	2180	Air cooled	ACS 5066-36L35A-1a35-Ax	1900	170	3300	3000
	6.6	2060	2760		ACS 5066-36L35B-1a35-Ax	2400	210	3300	3000
	6.6	2490	3340		ACS 5066-36L35C-1a35-Ax	2900	250	3300	3500
	6.6	2830	3790		ACS 5066-36L35D-1a35-Ax	3300	290	3300	3000
	6.6	3260	4370		ACS 5066-36L70E-1a70-Ax	3800	330	3700	4000
	6.6	3690	4940		ACS 5066-36L70F-1a70-Ax	4300	380	3700	4000
	6.6	4120	5520		ACS 5066-36L70G-1a70-Ax	4800	420	3700	4000
	6.6	4890	6550		ACS 5066-36L70H-1a70-Ax	5700	500	3700	4000
	6.6	5750	7710		ACS 5066-36L70J-1a70-Ax	6700	590	3700	4000
	6.9	1720	2300	Air cooled	ACS 5069-36L35A-1a35-Ax	2000	170	3300	3000
	6.9	2150	2880		ACS 5069-36L35B-1a35-Ax	2500	210	3300	3000
	6.9	2570	3440		ACS 5069-36L35C-1a35-Ax	3000	250	3300	3000
	6.9	3000	4020		ACS 5069-36L35D-1a35-Ax	3500	290	3300	3000
	6.9	3430	4600		ACS 5069-36L70E-1a70-Ax	4000	330	3700	4000
	6.9	3860	5170		ACS 5069-36L70F-1a70-Ax	4500	380	3700	4000
	6.9	4290	5750		ACS 5069-36L70G-1a70-Ax	5000	420	3700	4000
	6.9	5150	6900		ACS 5069-36L70H-1a70-Ax	6000	500	3700	4000
	6.9	6010	8050		ACS 5069-36L70J-1a70-Ax	7000	590	3700	4000
6.0	4500	6000	Water cooled	ACS 5060-36L12L-1a12-W2	5200	500	6830	7700	
6.0	6000	8000		ACS 5060-36L12N-1a12-W2	7000	670	6830	7700	
6.0	7500	10100		ACS 5060-36L12Q-1a12-W2	8700	840	6830	7700	
6.0	8900	11900		ACS 5060-36L12R-1a12-W2	10400	1000	6830	7700	
6.0	10500	14100		ACS 5060-36L18S-2a12-W3	12200	1170	9430	10800	
6.0	13500	18100		ACS 5060-36L18U-2a12-W3	15700	1510	9430	10800	
6.0	15400	20600		ACS 5060-36L18V-2a12-W3	18000	1730	9430	10800	
6.0	16000	21400		ACS 5060-36L24X-2a12-W3	18700	1800	10430	12300	
6.6	4900	6600		ACS 5066-36L12L-1a12-W2	5700	500	6830	7700	
6.6	6600	8800	ACS 5066-36L12N-1a12-W2	7700	670	6830	7700		
6.6	8200	11000	ACS 5066-36L12Q-1a12-W2	9600	840	6830	7700		
6.6	9800	13100	ACS 5066-36L12R-1a12-W2	11400	1000	6830	7700		
6.6	11500	15400	ACS 5066-36L18S-2a12-W3	13400	1170	9430	10800		
6.6	14800	19800	ACS 5066-36L18U-2a12-W3	17300	1510	9430	10800		
6.6	15400	20600	ACS 5066-36L18V-2a12-W3	18000	1570	9430	10800		
6.6	17700	23700	ACS 5066-36L24X-2a12-W3	20600	1800	10430	12300		
6.9	5100	6800	Water cooled	ACS 5069-36L12L-1a12-W2	6000	500	6830	7700	
6.9	6900	9200		ACS 5069-36L12N-1a12-W2	8000	670	6830	7700	
6.9	8600	11500		ACS 5069-36L12Q-1a12-W2	10000	840	6830	7700	
6.9	10300	13800		ACS 5069-36L12R-1a12-W2	12000	1000	6830	7700	
6.9	12000	16100		ACS 5069-36L18S-2a12-W3	14000	1170	9430	10800	
6.9	15400	20600		ACS 5069-36L18V-2a12-W3	18000	1510	9430	10800	
6.9	18400	24700		ACS 5069-36L24X-2a12-W3	21500	1800	10430	12300	

Data sheet ACS 5000 for synchronous motors (external transformer)

Motor Data				Converter		Converter Data			
Type	Voltage kV	Shaft Power kW* hp*		Cooling	Type Code**	Power kVA	Current A	Length mm	Weight*** kg
Synchronous motors	6.0	1660	2220	Air cooled	ACS 5060-36L35A-1s35-Ax	1700	160	3300	3000
	6.0	2150	2880		ACS 5060-36L35B-1s35-Ax	2200	210	3300	3000
	6.0	2540	3400		ACS 5060-36L35C-1s35-Ax	2600	250	3300	3000
	6.0	2930	3930		ACS 5060-36L35D-1s35-Ax	3000	290	3300	3000
	6.0	3410	4570		ACS 5060-36L70E-1s70-Ax	3500	340	3700	4000
	6.0	3800	5090		ACS 5060-36L70F-1s70-Ax	3900	380	3700	4000
	6.0	4190	5610		ACS 5060-36L70G-1s70-Ax	4300	410	3700	4000
	6.0	5070	6790		ACS 5060-36L70H-1s70-Ax	5200	500	3700	4000
	6.0	5950	7970		ACS 5060-36L70J-1s70-Ax	6100	590	3700	4000
	6.6	1850	2480	Air cooled	ACS 5066-36L35A-1s35-Ax	1900	170	3300	3000
	6.6	2340	3140		ACS 5066-36L35B-1s35-Ax	2400	210	3300	3000
	6.6	2830	3790		ACS 5066-36L35C-1s35-Ax	2900	250	3300	3000
	6.6	3220	4310		ACS 5066-36L35D-1s35-Ax	3300	290	3300	3000
	6.6	3710	4970		ACS 5066-36L70E-1s70-Ax	3800	330	3700	4000
	6.6	4190	5610		ACS 5066-36L70F-1s70-Ax	4300	380	3700	4000
	6.6	4680	6270		ACS 5066-36L70G-1s70-Ax	4800	420	3700	4000
	6.6	5560	7450		ACS 5066-36L70H-1s70-Ax	5700	500	3700	4000
	6.6	6530	8750		ACS 5066-36L70J-1s70-Ax	6700	590	3700	4000
	6.9	1950	2610	Air cooled	ACS 5069-36L35A-1s35-Ax	2000	170	3300	3000
	6.9	2440	3270		ACS 5069-36L35B-1s35-Ax	2500	210	3300	3000
	6.9	2930	3930		ACS 5069-36L35C-1s35-Ax	3000	250	3300	3000
	6.9	3410	4570		ACS 5069-36L35D-1s35-Ax	3500	290	3300	3000
	6.9	3900	5230		ACS 5069-36L70E-1s70-Ax	4000	330	3700	4000
	6.9	4390	5880		ACS 5069-36L70F-1s70-Ax	4500	380	3700	4000
6.9	4880	6540	ACS 5069-36L70G-1s70-Ax		5000	420	3700	4000	
6.9	5850	7840	ACS 5069-36L70H-1s70-Ax		6000	500	3700	4000	
6.9	6830	9150	ACS 5069-36L70J-1s70-Ax		7000	590	3700	4000	
6.0	5100	6800	Water cooled	ACS 5060-36L12L-1s12-W2	5200	500	6830	7700	
6.0	6800	9100		ACS 5060-36L12N-1s12-W2	7000	670	6830	7700	
6.0	8500	11400		ACS 5060-36L12Q-1s12-W2	8700	840	6830	7700	
6.0	10100	13500		ACS 5060-36L12R-1s12-W2	10400	1000	6830	7700	
6.0	11900	15900		ACS 5060-36L18S-2s12-W3	12200	1170	9430	10800	
6.0	15300	20500		ACS 5060-36L18U-2s12-W3	15700	1510	9430	10800	
6.0	17600	23600		ACS 5060-36L18V-2s12-W3	18000	1730	9430	10800	
6.0	18200	24400		ACS 5060-36L24X-2s12-W3	18700	1800	10430	12300	
6.6	5600	7500		Water cooled	ACS 5066-36L12L-1s12-W2	5700	500	6830	7700
6.6	7500	10100	ACS 5066-36L12N-1s12-W2		7700	670	6830	7700	
6.6	9400	12600	ACS 5066-36L12Q-1s12-W2		9600	840	6830	7700	
6.6	11100	14900	ACS 5066-36L12R-1s12-W2		11400	1000	6830	7700	
6.6	13100	17600	ACS 5066-36L18S-2s12-W3		13400	1170	9430	10800	
6.6	16900	22600	ACS 5066-36L18U-2s12-W3		17300	1510	9430	10800	
6.6	17600	23600	ACS 5066-36L18V-2s12-W3		18000	1570	9430	10800	
6.6	20100	26900	ACS 5066-36L24X-2s12-W3		20600	1800	10430	12300	
6.9	5900	7900	Water cooled		ACS 5069-36L12L-1s12-W2	6000	500	6830	7700
6.9	7800	10500		ACS 5069-36L12N-1s12-W2	8000	670	6830	7700	
6.9	9800	13100		ACS 5069-36L12Q-1s12-W2	10000	840	6830	7700	
6.9	11700	15700		ACS 5069-36L12R-1s12-W2	12000	1000	6830	7700	
6.9	13700	18400		ACS 5069-36L18S-2s12-W3	14000	1170	9430	10800	
6.9	17600	23600		ACS 5069-36L18V-2s12-W3	18000	1510	9430	10800	
6.9	21000	28100		ACS 5069-36L24X-2s12-W3	21500	1800	10430	12300	

Excitation unit for synchronous motor drives (stand-alone cabinet)

Dimensions 800 x 1000 x 2200 mm (L x D x H)
Weight 500 – 800 kg

Data sheet ACS 5000

Inverter type

Voltage Source Inverter Multilevel-Fuseless (VSI-MF),
9 levels line-to-line, with fast-switching power semiconductors – Integrated Gate Commutated Thyristors (IGCTs), without parallel or series connected devices

Motors

Induction, synchronous and permanent magnet motors;
2000 – 7000 kVA air cooled
5000 – 22000 kVA water cooled

Standards

All common standards including EN, IEC, CE

Input

Medium voltage input transformer for 36-pulse diode rectifier
Variation: ±10 % of nominal voltage, down to –25 % safe operation with derated output

Auxiliary voltage

Common 400 – 480 VAC, 3-phase,
50 Hz/60 Hz, (up to 690 VAC for water cooled drives)

UPS (Uninterruptable Power Supply)

If available, a UPS can be connected for control power supply, 110 – 240 VAC, single phase or 110/220 VDC. Alternatively the drive can be equipped with back-up capacitors (for short term control power-loss ride-through)

Output frequency

0 to ±75 Hz, up to ±250 Hz optional (higher on request)

Rated output voltage

Standard: 6.0 – 6.9 kV
Optional: 4.16 kV

Efficiency of converter

Typically >98.5 % (incl. auxiliaries)

Input power factor

Fundamental: >0.96 (*Total:* >0.95)

Ambient temperature

+1 °C to 40 °C (higher with derating)
34 °F to 104 °F (higher with derating)

Enclosure classes

Standard: IP21 air cooled
IP32 water cooled
Optional: up to IP42 air cooled
up to IP54 water cooled

Control interface (optional)

All common fieldbuses including Profibus, Modbus, DeviceNet, ABB AF100, others

IndustrialIT Compatible (Level 1)

Protective functions

Converter:

Overcurrent, short circuit, earth fault, phase loss, overvoltage, undervoltage, over-temperature, output frequency, network disturbance, cooling supervision

Motor:

Overload, underload, stall protection

Optional

- Motor supervision I/Os
 - Fault/alarm: overtemperature, vibration of bearings
 - PT 100: winding & bearing temperatures
- Transformer supervision I/Os
 - Fault/alarm: overtemperature, Buchholz
 - PT 100: winding temperatures
- Hardwired signals for remote drive control
 - References: start/stop, speed/torque etc.
 - Status feedback signals: ready/running
 - Analog signals: current/voltage/power etc.
- Redundant cooling fans for air-cooled drives
- Synchronous bypass functionality (for starting of up to six motors)
- Integrated transformer, input voltage range:
 - 6 kV – 6.9 kV, 50 Hz/60 Hz
 - 10 kV – 11 kV, 50 Hz/60 Hz



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