Product brochure

Medium voltage AC drive
ACS 6000, 3 – 36 MW, up to 3.3 kV

Power and productivity
for a better world™

ACS 6000 – one of the world's most successful MV multidrives

ABB's ACS 6000 medium voltage drive provides the optimum solution for applications where high power and maximum reliability is required. Since its introduction, the ACS 6000 has gained an excellent reputation for high quality and reliability. As a result ABB has worldwide one of the largest installed bases of medium voltage multidrives incorporating the latest technology.

Modular drive for demanding applications

ABB's ACS 6000 is a modular drive designed for the most demanding single-motor or multi-motor applications. The optimum configuration for each application is reached by combining the standardized modules resulting in lower investment costs and a smaller footprint. The ACS 6000 is available with several different inverter modules in the power range from 3 to 13 MVA.

Several motors can be linked to the ACS 6000 via the common DC bus, enabling multi-motor operation with only one multidrive converter. A multidrive, common DC bus converter principle offers a solution with optimum efficiency.

Worldwide references

Since its market introduction in 1999, the ACS 6000 has gained an excellent reputation for high quality and reliability.

To date, ABB has installed ACS 6000 medium voltage drives with a total rated power of more than 20,000 MVA.

The ACS 6000 medium voltage drive can be used in a wide range of industries.

Fields of application

Industries	Applications
Cement, mining and minerals	Mine hoists, conveyors, crushers and mills
Chemical, oil and gas	Pumps, compressors, extruders, mixers and blowers
Marine	Main propulsion, thrusters, shaft generators, pumps and compressors
Metals	Rolling mills, coilers, pumps and fans
Pulp and paper	Fans, pumps, refiners and chippers
Power generation	Fans and pumps
Water	Pump applications, fresh water and waste water
Other applications	Test stands, wind tunnels and grid simulators

Key features

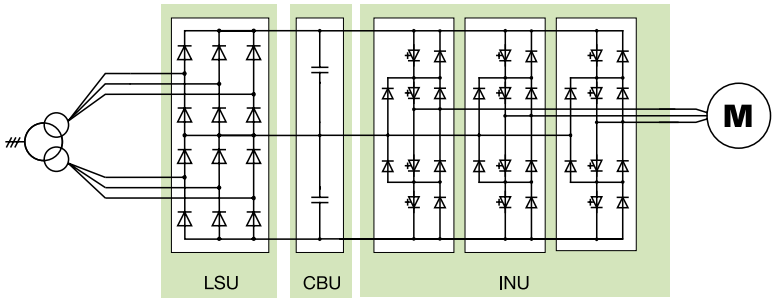
The ACS 6000 medium voltage drive for speed and torque control of 3 – 36 MW induction or synchronous motors is a member of the ABB AC drives product family. It offers a number of unique key features.

Powerful performance

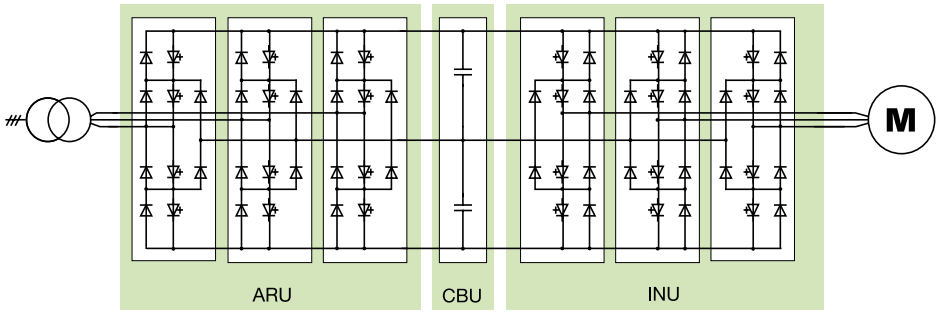
Fast and accurate process control in combination with low energy consumption results in top performance. The motor control platform of the ACS 6000 is based on ABB's award-winning Direct Torque Control (DTC) technology. DTC provides the highest torque and speed performance ever achieved in medium voltage drives. As a result, control of the drive is immediate and smooth under all conditions.

Key product features

- Modular design for optimum configurations
- Common DC bus for single and multi-motor operation and minimized energy consumption
- Line Supply Unit (LSU) for two-quadrant operation with a constant power factor of 0.95 over the whole speed range
- Active Rectifier Unit (ARU) for regeneration and power factor correction
- DTC control platform for exceptionally high torque and dynamic performance
- High level of personal safety and drive availability due to superior arc protection



12-pulse LSU single drive



6-pulse ARU single drive

ARU	Active Rectifier Unit
CBU	Capacitor Bank Unit
INU	Inverter Unit
LSU	Line Supply Unit

ACS 6000 inverter topology

High efficiency and reliability

The ACS 6000 uses a power semiconductor known as IGCT (Integrated Gate Commutated Thyristor), which is an ideal switch for high-power medium voltage applications. The use of IGCTs results in low parts count, providing an efficient and reliable drive.

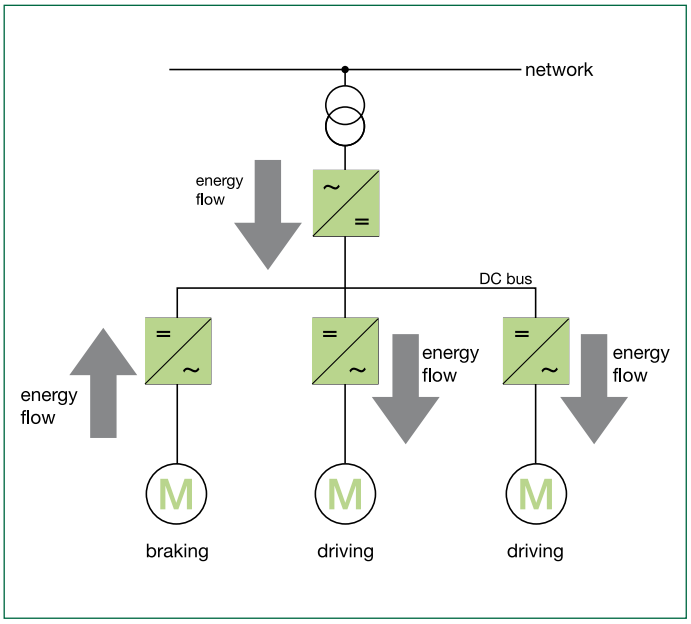
High availability

Maximum reliability and short repair time results in a drive with high availability.

Optimized energy flow

The common DC bus allows several motors to be connected to the same DC bus, providing an optimized energy flow.

The braking energy generated in one motor can be transferred to other inverters via the common DC bus without power consumption from the supply network. Due to the near unity power factor throughout the whole speed range the energy efficiency is optimal.



Optimized energy flow with common DC bus, e.g. cold reversing steel mill

Optimum configuration

The modular design of the ACS 6000 allows the optimum configuration of any drive system. Each configuration, consisting of well-proven and certified modules, exactly fits the customer's requirements.

Smooth system integration

The ACS 6000 integrates easily into the industrial environment because it can be optimally configured for single-motor and multi-motor applications without additional control equipment. The high power density and compact design and the drive's communication abilities minimize the overall installation and operational costs. The drive can be connected to the network through one or several transformers depending on power and harmonics requirements. A transformerless solution is also available for certain applications.

ACS 6000 water cooled

Power Electronic Building Block (PEBB),
One phase leg of a three-level Voltage Source Inverter (VSI) topology, which can be used both as an AC to DC or DC to AC converter

Active Rectifier Unit (ARU)
Self-commutated, 6-pulse, 3-level voltage source inverter with IGCT technology

Terminal Unit (TEU) and Control Unit (COU)
Contains the power terminals and the control swing frame

Inverter unit (INU)
Self-commutated, 6-pulse, 3-level voltage source inverter with IGCT technology

Capacitor Bank Unit (CBU)
DC capacitors for smoothing the intermediate DC voltage

Voltage Limiter Unit (VLU)
Optional dynamic DC voltage limiter

Water Cooling Unit (WCU)
Supplies deionized water for cooling the main power components

Modular use, one design

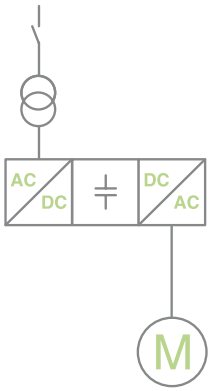
The ACS 6000 is based on a modular product platform, expanding in line with customer's requirements.

The ACS 6000 is designed as a set of modules. The modules are arranged according to the required output power, motor configuration and process needs.

Depending on the application, the following three basic types of configurations are used:

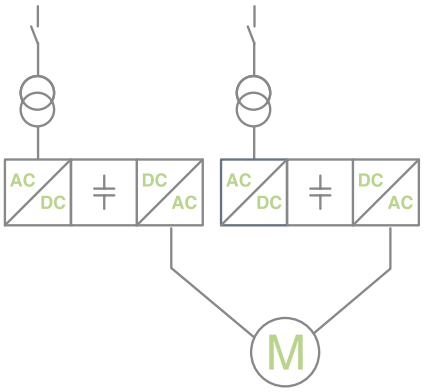
Single-motor drive configurations

For synchronous, induction and permanent magnet motors. Single-motor configurations are commonly used in applications which require large, independent and decentralized drives.



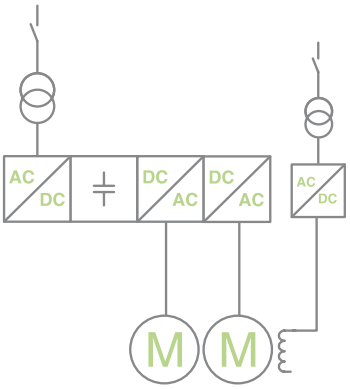
Redundant drive configurations

For motors with two winding systems. Single drives can be configured to allow various schemes for redundancy offering greater availability of the drive system.



Multi-motor drive configurations

For multiple synchronous or induction motors or a combination of both types. Up to eight motors can be linked to a common DC bus, enabling multiple motor operation. Synchronous and/or induction motors, high or low power, any combination is possible in order to provide the optimum configuration.



Benefits of modularity

- Converter rating optimally adapted to customer requirements.
- Each configuration consists of well-proven modules, minimizing the risk of design errors even when extensive systems are engineered.
- The compact, standardized design and the integrated water-cooling system reduce space requirements and have positive impacts on room air conditioning.
- Multidrive topologies with common DC bus are available.
- Reduced installation and commissioning time.

Common DC bus

The ACS 6000 modularity is based on the common DC bus converter principle, where several motors (synchronous and induction) can be connected to the same DC bus. With several different sizes of inverter modules available, the optimum configuration for a specific application can be reached by combining the modules with minimum engineering effort. By linking the modules in parallel, the power can be increased to 36 MVA.

Multidrive topologies with a common DC bus offer a solution with optimum efficiency. Energy regenerated from one section in braking mode can be directly used by another section via the DC bus without power consumption from the supply network.

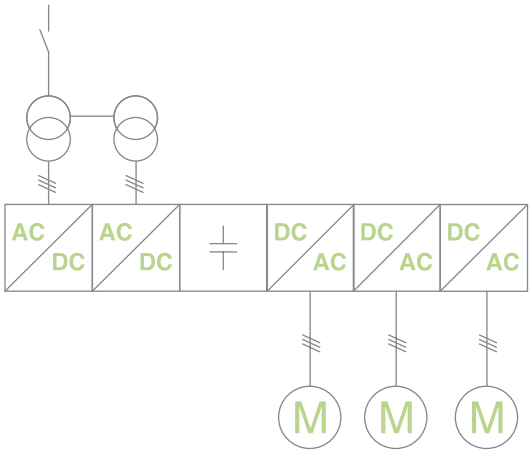


Diagram of common DC bus principle

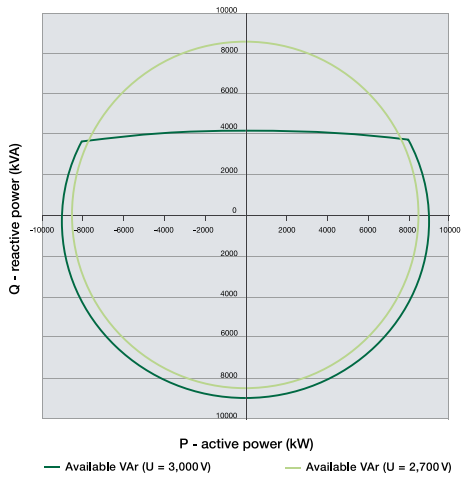
ACS 6000 modules

Active Rectifier Unit (ARU), Inverter Unit (INU)

The Active Rectifier Unit (ARU) rectifies the AC line voltage and charges the DC link capacitors whereas the Inverter Unit (INU) inverts the DC voltage to the AC motor voltage.

The layout and equipment of the INU and the ARU are identical. They are self-commutated, 6-pulse, 3-level voltage source inverters, incorporating IGCT technology for a reliable, fuseless operation with a minimum number of drive components.

The ARU allows four-quadrant operation for regenerative braking, which reduces the overall energy consumption. It controls the power factor to unity in the whole operating range even at very low speeds. Optionally the ARU can be dimensioned to compensate reactive power generated by other loads connected to the same network.



Principle diagram showing the available active and reactive power of the ARU

Line Supply Unit (LSU)

The Line Supply Unit (LSU), designed for two-quadrant operation, maintains the power factor at 0.95 in the whole operating range.

Typically, the LSU is used for applications which only require two-quadrant operation. If short-term braking capability is needed, a Resistor Braking Unit (RBU) with internal or external resistors can be installed.

Technology highlights

Reliability has been the main guiding principle of the research and development activities for ABB's medium voltage AC drives.

Part count
The fewer the parts the higher the reliability. ABB uses high power semiconductor switching devices and a topology that brings down the part count to a minimum. This results in a reliable, compact and service-friendly drive.

Fuseless design
The ACS 6000 medium voltage drive is designed to operate safely without fuses, resulting in less spare parts and better overall reliability. This allows fast startup after safety interruptions.

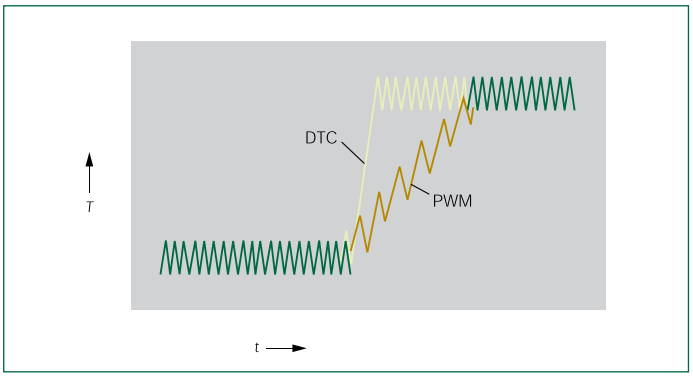
Encoderless
Encoders are known to cause failures due to their exposed position on the motor. ABB's ACS 6000 medium voltage drive can operate without encoder, thereby reducing maintenance costs and ensuring high levels of availability.

IGCT semiconductors
The ACS 6000 uses a power semiconductor known as IGCT (Integrated Gate Commutated Thyristor), which is an ideal switch for high-powered medium voltage applications. The use of IGCTs results in low parts count, providing an efficient and reliable drive.

Low losses
The inherently low total losses of the IGCT require low cooling capacity and small cooling equipment.

Control
The ACS drive control platform is based on ABB's award-winning Direct Torque Control (DTC), resulting in the highest torque and speed performance as well as 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.

What is Direct Torque Control?
DTC is a revolutionary motor control method for AC drives that allows accurate control of both motor speed and torque without pulse encoder feedback from the motor shaft.
In DTC, stator flux and torque are used as primary control variables. The motor state calculations are updated 40,000 times a second (ie, every 25 µs) in the advanced motor software model by the high-speed digital signal processor. Due to the continuous updating of the motor state and the comparison of the actual values to the reference values, every single switching in the inverter is determined separately. DTC ensures the absolute lowest losses by switching the power semiconductors only when necessary.



Typical torque (T) response of a DTC drive, compared with flux vector control with open loop Pulse Width Modulation (PWM)

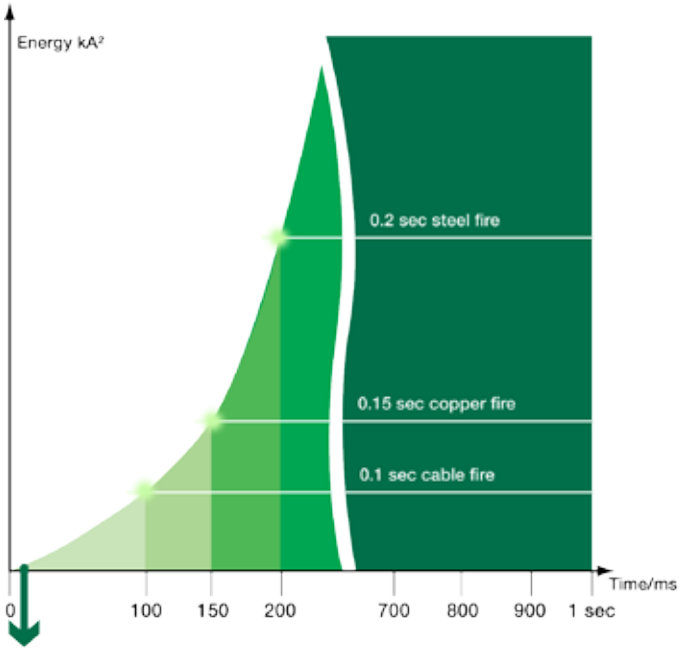
Fast response to mains fluctuations and process side changes
The exceptionally fast torque step response of the ACS 6000 means that it can respond to process and mains changes extremely fast. This enables easy handling of power-loss situations and sudden load changes.

Safety

The ACS 6000 provides the highest level of personal and equipment safety.

High level of personal safety

Electric arcs represent a hazard source for people and goods. For systems where large and dangerous arc fault currents can occur, special attention is required. Therefore, the ACS 6000 is equipped with a superior protection function and ABB's Arc Guard System™. This IAC classified solution assures very fast arc detection and elimination (less than 6 ms) to protect people and equipment and eliminate unnecessary production stops.



Arc extinction within ≤ 6 ms

Certified functional safety features

The ACS 6000 is equipped with SIL (safety integrity level) 3 and PL (performance level) e certified functional safety features to help system integrators design safe and reliable systems.

Available functions

Emergency off — stop category 0 according to IEC 60204-1
The emergency switching-off function disconnects power to a system or part of it should the risk of an electric shock arise.

Emergency stop — stop category 1 according to IEC 60204-1
The machine speed is brought to a standstill through controlled deceleration and then the power to the motor is cut off.

Safe torque-off (STO) — according to IEC 61800-5-2
This function brings the machine safely into a no-torque state and / or prevents it from starting accidentally.

ACS 6000 for induction and synchronous motors

Depending on the power rating and the application characteristics, the ACS 6000 can be used with induction and synchronous motors.

ACS 6000 for induction motors

Squirrel cage induction motors are the workhorses of the industry due to their versatility, reliability and simplicity. ABB's broad range of medium voltage AC induction motors includes ribbed cast iron fan cooled motors and modular type welded frame motors.

The ACS 6000 is typically used with induction motors for applications such as pumps, fans, compressors, conveyors, hoists, mills, crushers and propulsion systems.

ACS 6000 for synchronous motors

Synchronous motors are typically considered for higher power ratings (e.g. above 8 MW to more than 100 MW). In addition to their high power capabilities, synchronous motors offer a wide field weakening range as well as the benefits of high efficiency and high performance.

The ACS 6000 synchronous drive is ideal for applications which require dynamic response and high torque, such as rolling mills and mine hoists and for high power applications, such as marine propulsion drives.

Permanent magnet motors

For special applications (e.g. low speed pumps) the ACS 6000 can be used with permanent magnet motors.

System integration

The ACS 6000 medium voltage drive with its modular concept allows optimum integration into the customer's industrial environment.

The ACS 6000 can either be installed to control just one motor, or to control several motors with comprehensive control features, minimizing overall installation and operational costs. The drive can be supplied by one or several transformers depending on power and harmonics requirements. Even a transformerless solution is available for certain applications.

Smooth integration into existing systems

Control system

ABB offers an open communication strategy enabling connection to a PLC (Programmable Logic Controller) or a DCS (Distributed Control System). Fieldbus connectivity with a wide variety of protocols is available.

The ACS 6000 product family platform offers the possibility to monitor the transformers as well as the motors with the drive's control system.

Commissioning

The ACS 6000 is easy to commission. In its multidrive configuration, the ACS 6000 is much faster to commission than the equivalent number of single drives.

ACS 6000 system integration

- Low network harmonics
- High power factor in the whole operating range
- Optional reactive power (VAr) compensation
- Small footprint
- Fast commissioning
- EMC compliant

Maintenance

Simple and efficient maintenance is an important factor in lowering operating costs. The modular concept of the ACS 6000 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 6000 is designed to allow easy front access to the drive's components.

Redundant cooling

The cooling equipment is available with redundant pumps, which increases availability.

ACS 6000 phase module exchange

Monitoring and diagnostics

The ACS 6000 is available with an intelligent monitoring and diagnostics system, which allows secure access to the drive from any location in the world.

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

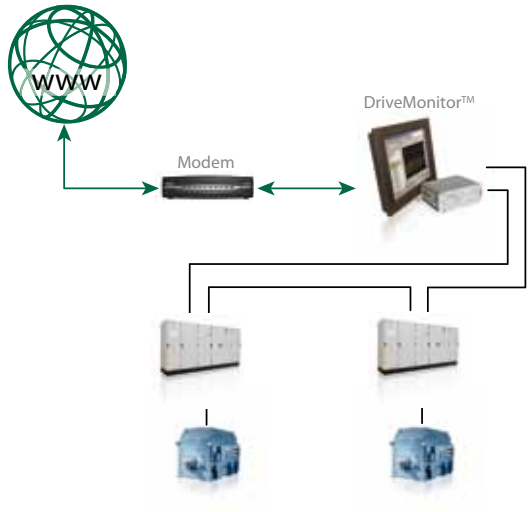
– Easier root cause analysis – reduced Mean Time To Repair (MTTR)

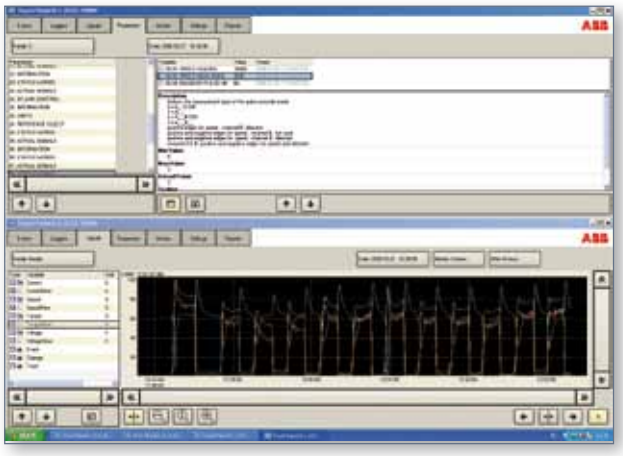
DriveMonitor™ allows real-time access to the drive. It supports monitoring and diagnostics of ABB drives for new and existing installations.

The optional tool consists of a hardware module, 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. As experts can gain access to the drive remotely, DriveMonitor™ also helps cut maintenance costs by reducing on-site work.

With extra diagnostic packages, DriveMonitor™ can also monitor other drive system components, such as main circuit breaker, transformer and the driven motor. Special packages related to the application, such as rolling mills, pumps and compressors, can be integrated into the system.





Testing

Thorough testing ensures proven functionality and performance and reduces commissioning time.

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

Routine test

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

ACS 6000 single drive

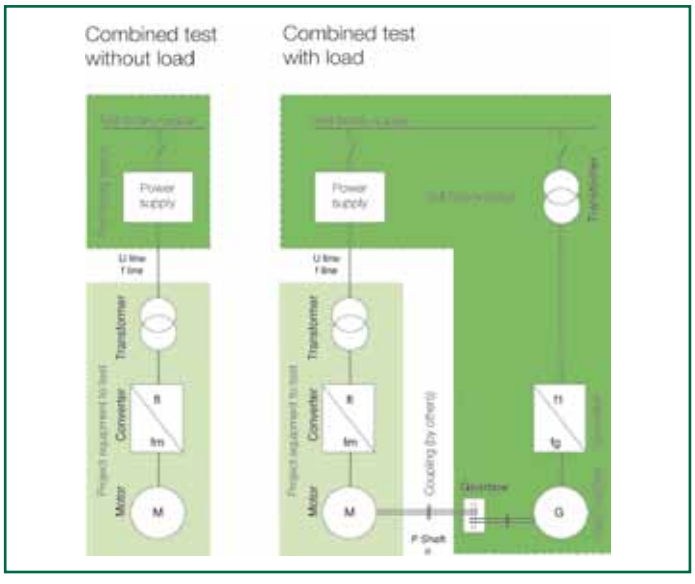
Tests of the ACS 6000 single drive additionally include load and functional tests on the test field motor.

ACS 6000 multidrive

The multidrive modules are tested separately one by one as well as in a line-up, where the control functionality of the entire drive system is tested.

Combined test

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.



Service and support

The ACS 6000 is backed by unrivalled service and support from the customer's initial inquiry throughout the entire life cycle of the drive system.

Installation and commissioning

Proper installation and commissioning, done by qualified and certified commissioning engineers, reduces start-up time, increases safety and reliability and decreases life-cycle costs. In addition, operators can be given practical training by experienced specialists on site.

Training

ABB provides extensive training for its medium voltage drives. A range of training programs is offered from basic tutorials to programs tailored to the customer's specific needs.

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
- providing a smooth transition to a new technology at the end of the life cycle

Services for ABB's medium voltage drives

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

Global network, local presence

Aftersales 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.

Data sheet ACS 6000

Inverter type
Voltage Source Inverter Neutral-Point Clamped (VSI-NPC)

Motors
Induction, synchronous and permanent magnet motors

Standards
All common standards including EN, IEC, CE, GOST
Marine standards optional

Input
Medium voltage input transformer for 6, 12 or 24-pulse diode rectifier, 6, 12 or 18-pulse active rectifier
Variation: ±10% of nominal voltage, down to
–25% safe operation with derated output

Auxiliary voltage
Common 400 – 690 VAC, 3-phase, 50 Hz/60 Hz

UPS (Uninterruptible 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 (higher on request)

Rated output voltage
Standard: 3.0 – 3.3 kV
Optional: 2.3 kV

Efficiency of converter
Typically > 98.5% (incl. auxiliaries)

Ambient temperature
+5°C to 45°C (higher with derating)
31°F to 113°F (higher with derating)

Enclosure classes
Standard: IP32
Optional: up to IP54

Available modules
- Active Rectifier Unit (ARU)
- Braking Chopper Unit (BCU)
- Capacitor Bank Unit (CBU)
- Control Unit (COU)
- Customer Interface Unit (CIU)
- Excitation Unit (EXU)
- Input Filter Unit (IFU)
- Input Reactor Unit (IRU)
- Inverter Unit (INU)
- Isolator Unit (ISU)
- Line Supply Unit (LSU)
- Resistor Braking Unit (RBU)
- Terminal Unit (TEU)
- Voltage Limiter Unit (VLU)
- Water Cooling Unit (WCU)

Control interface (optional)
All common fieldbuses including Profibus, Modbus, DeviceNet, ABB Advant Fieldbus AF100

Protective functions
Converter:
Overcurrent, short circuit, earth fault, phase loss, overvoltage, undervoltage, overtemperature, output frequency, network disturbance, cooling supervision
Motor:
Overload, underload, stall protection

Maritime properties
- Marine certification: available for Lloyd's, DNV, ABS and others
- Mechanics: Vibration dampers, maritime handgrips, anti-condensation heaters, locking device for 90° open doors
- Various redundancy schemes

Optional
- Motor supervision I/Os
  - Fault/alarm: overtemperature, vibration of bearings
  - PT 100: winding and bearing temperatures
- Transformer supervision I/Os
  - Fault/alarm: overtemperature, overcurrent
  - PT 100: winding temperatures
- Hardwired signals: drive control and drive status indication
  - References: start/stop, speed/torque, etc.
  - Actual feedbacks: ready/running, current/voltage/power, etc.
- Braking chopper

Data sheet ACS 6000 single drive

Motor data			Converter	Converter data			
Voltage	Shaft power *		Type code	Power	Current	Length***	Weight ***
kV	kW	hp		kVA	A	mm	kg
3,100 V - induction motors - single drives with LSU							
3.1	4300	5800	ACS 6105-L12-1a5	5000	915	4400	3900
3.1	6000	8000	ACS 6107-L12-1a7	7000	1300	4900	4300
3.1	7700	10300	ACS 6109-L12-1a9	9000	1650	4900	4400
3.1	10000	13400	ACS 6114-L12-1a12**	12000	2150	6300	5300
3.1	12000	16100	ACS 6114-L12-2a7	14000	2600	8600	7300
3.1	15400	20600	ACS 6209-L12-2a9	18000	3300	9400	8100
3.1	20200	27200	ACS 6214-L24-2a12**	24000	4300	11800	9500
3.1	23200	31000	ACS 6214-L24-3s9	27000	4950	13700	12600
3,300 V - induction motors - single drives with ARU							
3.3	6000	8000	ACS 6107-A06-1a7	7000	1300	5600	5100
3.3	7700	10300	ACS 6109-A06-1a9	9000	1650	5600	5200
3.3	10500	14000	ACS 6113-A06-1a13**	13000	2375	6000	5400
3.3	12000	16100	ACS 6207-A12-2a7	14000	2600	10000	9500
3.3	15400	20600	ACS 6209-A12-2a9	18000	3300	10400	10300
3.3	21000	28200	ACS 6213-A18-2a13**	26000	4750	11200	10700
3.3	23200	31100	ACS 6309-A18-3a9	27000	4950	16600	14500
3.3	31500	42200	ACS 6313-A18-3a13**	36000	7125	16600	14700
3,100 V - synchronous motors - single drives with LSU							
3.1	4800	6400	ACS 6105-L12-1s5	5000	915	5200	4300
3.1	6800	9100	ACS 6107-L12-1s7	7000	1300	5700	4700
3.1	8700	11600	ACS 6109-L12-1s9	9000	1650	5700	4800
3.1	11200	15000	ACS 6114-L12-1s12**	12000	2150	7100	5700
3.1	13600	18200	ACS 6114-L12-2s7	14000	2600	9400	7700
3.1	17400	23200	ACS 6209-L12-2s9	18000	3300	10200	8600
3.1	22400	30000	ACS 6214-L24-2s12**	24000	2150	10600	9900
3.1	26100	35000	ACS 6214-L24-3s9	27000	4950	14500	13000
3,300 V - synchronous motors - single drives with ARU							
3.3	6800	9100	ACS 6107-A06-1s7	7000	1300	6400	5500
3.3	8700	11600	ACS 6109-A06-1s9	9000	1650	6400	5600
3.3	11200	15000	ACS 6113-A06-1s13**	13000	2375	6800	6000
3.3	13400	18200	ACS 6207-A12-2s7	14000	2600	10800	9900
3.3	17400	23200	ACS 6209-A12-2s9	18000	3300	11200	10700
3.3	22400	30000	ACS 6213-A12-2s13**	26000	4750	12000	11100
3.3	26100	35000	ACS 6309-A18-3a9	27000	4950	17400	14900
3.3	33600	45000	ACS 6313-A18-3a13**	36000	7125	17400	15100

Notes:

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

** 12/13 MVA INU power is subject to motor design.

*** Length and weight are approximate values.

Dimensions:

Height: 2,200 mm cabinet height
2,500 mm (incl. cooling fans on top)

Depth: 1,040 mm

Data sheet ACS 6000 multidrive

Motor data			Converter	Converter data			
Voltage	Shaft power *		Type code	Power	Current	Length***	Weight ***
kV	kW	hp		kVA	A	mm	kg
3,100 V - synchronous and induction motors - multidrive examples							
			ACM 6207-L24-1a7-1a7	14000	2600	8600	7450
3.1	6000	8000	- induction motor	7000	1300		
3.1	6000	8000	- induction motor	7000	1300		
			ACM 6214-L24-1a7-1a7-1a7-1a7-1a7	28000	5200	18900	16050
3.1	6000	8000	- induction motor	7000	1300		
3.1	6000	8000	- induction motor	7000	1300		
3.1	6000	8000	- induction motor	7000	1300		
3.1	6000	8000	- induction motor	7000	1300		
3.1	6000	8000	- induction motor	7000	1300		
			ACM 6113-A06-1a7-1a7	13000	2375	9500	7950
3.1	6000	8000	- induction motor	7000	1300		
3.1	6000	8000	- induction motor	7000	1300		
			ACM 6213-A12-2s9-1s9-1s9	26000	4750	16600	16100
3.1	17400	23200	- synchronous motor	18000	3300		
3.1	8700	11600	- synchronous motor	9000	1650		
3.1	8700	11600	- synchronous motor	9000	1650		
			ACM 6209-A12-1s9-1s9-1s7-1a7	18000	3300	19600	17050
3.1	8800	11600	- synchronous motor	9000	1650		
3.1	8800	11600	- synchronous motor	9000	1650		
3.1	6800	9100	- synchronous motor	7000	1300		
3.1	6000	8000	- induction motor	7000	1300		
			ACM 6309-A18-2s9-2s7-1a7	27000	4950	23400	18750
3.1	17400	23200	- synchronous motor	18000	3300		
3.1	12000	16100	- synchronous motor	14000	2600		
3.1	6000	8000	- induction motor	7000	1300		
			ACM 6313-A18-2s13-2s13	36000	7125	23600	15850
3.1	22400	30000	- synchronous motor	26000	4750		
3.1	22400	30000	- synchronous motor	26000	4750		
			ACM 6309-A18-1s9-1s9-1s9-1s7-1s7	27000	4950	26600	22350
3.1	8800	11600	- synchronous motor	9000	1650		
3.1	8800	11600	- synchronous motor	9000	1650		
3.1	8800	11600	- synchronous motor	9000	1650		
3.1	6000	8000	- synchronous motor	7000	1300		
3.1	6000	8000	- synchronous motor	7000	1300		

Notes:

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

** 12/13 MVA INU power is subject to motor design.

*** Length and weight are approximate values.

Dimensions:

Height: 2,200 mm cabinet height
2,500 mm (incl. cooling fans on top)

Depth: 1,040 mm

Contact us

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