ACS2000 industrial drive
The flexibility you require. The reliability you expect.
9AKK107045A7281, REV. B
Get more using less

Our medium voltage drives run your motors based on the demands of your process rather than running them at full speed and ensure optimized power consumption and process efficiency. This will add up to cost and time savings for you.
The forerunner of technology
Cornerstones of innovation

Over
45 years
of experience

1969: AC drive development started
1975: High power PWM drive
1985: 3-level pulse width modulation (PWM) MV drive with digital flux vector control
1995: Direct torque control (DTC)
1997: IGBT based MV drive with DTC
1999: IGBT based high power LV drive with DTC, air and liquid cooled
2005: First MV drive with VSI-MF topology
2009: Insulated gate bipolar transistor (IGBT), active neutral point clamping 5 level (ANPC-5L) MV drive
2009: All-compatible platform
2011: Easy to use, reliable and efficient general purpose MV drive
2014: Model predictive direct torque control (MPDTC)
2018: VSI-MF: voltage source inverter multilevel-fuseless

AC drive development started
High power PWM drive
3-level pulse width modulation (PWM) MV drive with digital flux vector control
Direct torque control (DTC)
IGBT based MV drive with DTC
IGBT based high power LV drive with DTC, air and liquid cooled
First MV drive with VSI-MF topology
Insulated gate bipolar transistor (IGBT), active neutral point clamping 5 level (ANPC-5L) MV drive
All-compatible platform
Easy to use, reliable and efficient general purpose MV drive
Model predictive direct torque control (MPDTC)
You choose, we respond. Globally.

The service network is well structured to ensure you have all the experts close at hand. We have local drives and control service units complemented by external ABB value providers in over 60 countries.
The ACS2000 Industrial drive

Power range: 250 kW – 3.68 MW (335 – 5000 HP)
Output voltage: 4.0 – 6.9 kV
Input voltage: 4.0 – 6.9 kV*
Air cooled

* Higher than 11 kV on request
Reliable across all applications

The ACS2000 masters simple and demanding applications and fulfills the needs for your specific performance.
The ACS2000 industrial drive
The flexibility you require.
Configurable drive to meet your specific needs

Different configurations of the ACS2000 adapt the drive to **meet the requirements of your application and fit into your industrial environment.**

- Market specific design
- Certificates & standards
- Safety requirements
- Collaboration with technical experts
- Servicability
- Industry specific options
- Technical features
Use the ACS2000 in every global operation

Market specific product variants make the drive compatible with common **IEC and NEMA motor voltages**.

<table>
<thead>
<tr>
<th>NEMA market specific design</th>
<th>IEC market specific design</th>
</tr>
</thead>
<tbody>
<tr>
<td>- NEMA motors</td>
<td>- IEC motors</td>
</tr>
<tr>
<td>- Americas</td>
<td>- EMEA / Asia Pacific</td>
</tr>
<tr>
<td>- ANSI / IEEE / NEMA industry standards</td>
<td>- IEC / EN / CE industry standards</td>
</tr>
<tr>
<td>- 4.16 kV</td>
<td>- 6.0 kV / 6.6 kV / 6.9 kV</td>
</tr>
<tr>
<td>- UL / CSA certification</td>
<td></td>
</tr>
</tbody>
</table>
Design flexibility for smooth integration into your supply network

Easy grid connection using an integrated or external transformer, or a direct-to-line connection.

**Direct-to-line**
- Small footprint, light weight
- Easy to retrofit to DOL motors
- Simple installation

**External transformer**
- Lower heat loss in e-room
- Galvanic isolation
- Voltage matching

**Integrated transformer**
- Simple installation
- Galvanic isolation
- Voltage matching
Design flexibility for smooth integration into your supply network

The drive is available with two line side connection configurations DFE and AFE.

**Diode front end (DFE) – 24 pulse**
- Simple
- Reliable diode 24-pulse rectifier solution enables compliance with all common harmonic standards
- DFE enables drive configurations for industry specific solutions e.g. motors in hazardous areas or long motor cables

**Active front end (AFE)**
- Regenerative
- Innovative AFE solution, which is compliant with all common harmonic standards
- The AFE feature enables regeneration, which allows energy efficient continuous braking leading to significant energy savings.

**Integrated transformer**
- Small footprint, light weight
- Easy to retrofit to DOL motors
- Simple installation

**External transformer**
- Lower heat loss in e-room
- Galvanic isolation
- Voltage matching

**Direct-to-line (DTL)**
- Simple installation
- Galvanic isolation
- Voltage matching
Benefit from the compact footprint

Due to ACS2000’s **compact size and light weight**, you will save on transportation costs and need less space in the electrical room.

<table>
<thead>
<tr>
<th>Transformer Type</th>
<th>Length (Frame 1)</th>
<th>Length (Frame 2)</th>
<th>Height</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 6 kV DTL</td>
<td>2’205 mm</td>
<td>3’800 mm</td>
<td>2’490 mm</td>
<td>1’140 mm</td>
</tr>
<tr>
<td>IEC 6 kV AFE external transformer</td>
<td>1’705 mm</td>
<td>3’000 mm</td>
<td>2’490 mm</td>
<td>1’140 mm</td>
</tr>
<tr>
<td>IEC 6 kV DFE external transformer</td>
<td>1’730 mm</td>
<td>2’180 mm</td>
<td>2’530 mm</td>
<td>1’140 mm</td>
</tr>
<tr>
<td>IEC 6 kV DFE integrated transformer</td>
<td>3’330 mm</td>
<td>4’380 mm</td>
<td>2’490 mm</td>
<td>1’140 mm</td>
</tr>
<tr>
<td></td>
<td>2’530 mm</td>
<td>4’930 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2’530 mm</td>
<td>5’130 mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Operation in hazardous areas
For every motor type the ACS2000 enables drive operation.

- **Ex ec (former nA)**
  - Non sparking motors
  - Asynchronous motors up to 23MW
    - HXR 355 – 560 (cast iron)
    - AMI 400 – 1000 (modular)
  - Synchronous motors up to 55MW
    - AMS 710 – 1250
    - AMZ 710 – 2500

- **Ex eb (former e)**
  - Increased safety motors
  - Asynchronous motors up to 7MW
    - HXR 355 – 560 (cast iron)
    - AMI 400 – 630 (modular)

- **Ex db (former d)**
  - Flameproof motors
  - Asynchronous motors up to 7MW
    - AMD... R 355 – 500
    - AMD... T 500 – 900

- **Ex p**
  - Pressurized motors
  - Same products and frames available as for Ex ec

**Synchronous motors**
- ACS5000
- LCI Megadrive

**Gas group IIA, IIB**
- ACS1000
- ACS2000 DFE (EMC or sine filter) / AFE*

**Gas group IIC**
- ACS1000
- ACS2000 DFE / sine filter

**Asynchronous motors**
- ACS1000
- ACS2000 DFE (EMC or sine filter) / AFE*
- ACS5000
- ACS6000

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General: for all cases only grounded EMC or sine filter – floating filters are not permitted in hazardous area

* ACS2000 AFE: dedicated special input transformer required in accordance with ACS2000 transformer specification.

Consider this solution only for 4Q applications - $$$$
Choose an output sine filter to gain perfect output power

Side effects of an inverter such as voltage reflections and common mode voltages will be totally eliminated, resulting in an excellent waveform voltage and current waveform supplied to the motor.

Use a sine filter for:

- **Retrofitting** of old motors with an aged insulation system
- **Very long** motor cables
- Special application such as electric submersible pumps (ESP) and conveyors in underground mines
Best fit for your application
For standard applications in all industries, the ACS2000 is a perfect fit. With a range of pre-engineered options we can easily customize the drive as desired.

Selection of pre-engineered options

- Operation at elevated ambient temperature
- Customized spare parts package
- Insulator and earthing switch up to 13.8 kV
- Customer IOs wired to terminal blocks
- Reduced noise level
- Permanent magnet motor control
- Operation at high altitude
- Marine – design and spot approval
- Operation for 3.3 – 5.5 kV motors
- Integrated transformer up to 22 kV input voltage
- EU preferential origin
- Supply voltage tolerance up to +20%
- Variety of fieldbus communication methods between customer and drive
The ACS2000 industrial drive
The reliability you expect.
High personnel safety
Workforce and property are protected from dangerous electric arcs with the ACS2000’s **arc resistant design**. **Certified functional safety** features and an integrated **DC grounding switch** make your system safe and reliable.

**ABB standard**

*Interlocked doors*

*DC bus grounding switch*

**Arc fault resistant**

Arc fault resistant design and certification in accordance with IEC62271-200

**Functional safety**

SIL3 / Ple certified stop functions in accordance with IEC60204-1

- Emergency off
- Emergency stop

SIL3 / Ple certified safety functions in accordance with IEC61800-5-2

- Safe torque off
High personnel safety

ABB offers IAC certified **arc resistant design with arc elimination** as an option.

**Arc fault**

- Arc faults are caused by a breakdown of the insulation
- Short circuit currents flow through ionized air, called an arc

➢ As a primary effect, high energy is released, causing a pressure, sound and heat wave

➢ Harmful gases and particles represent a secondary danger

**Arc fault safety: ABB’s approach – the 4 safety classes**

Class I: Protection based on arc prevention
Equipment damage in case of an arc: severe

Class II: Protection based on arc resistant cabinet structure
Equipment damage in case of an arc: severe

Class III: Protection based on external arc fault limitation and elimination
Equipment damage in case of an arc: moderate

Class IV: Fast arc elimination
Equipment damage in case of an arc: negligible
# High personnel safety

ABB offers IAC certified **arc resistant design with arc elimination** as an option.

## Class I
- Design of insulation systems in accordance with relevant IEC and NEMA standards to prevent arcs and provide personnel safety
- **Standard** for MV drives
- Class I is not a certified arc resistant design, it is mainly focusing of arc fault prevention

Based on design according to:
- IEC 60146-1-1
- IEC 61800-4

## Class II
- **The cabinet is designed** to withstand the pressure of an arc flash
- Arc fault is contained in the cabinet or guided through pressure relief vents

## Class III
- **HV Fuses** are applied externally to the drive in order to limit the arc fault current to less than half cycle of the fundamental AC frequency (<10ms in case of 50Hz supply)
- This method is only used to reach arc resistant designs for MV drives connected without external drive transformer to the mains (integrated transformer solutions and DTL solutions)
- ABB applies this solution in combination with Class I and II

## Class IV
- This is an ABB patented method, ABB MV drives “protection firing” system. The arc fault is detected and converted into a non severe bolted short circuit
- For an even faster detection and elimination (4-8 ms), an optical ABB **arc fault detection system** is available
- Provides highest level of personnel safety and the equipment remains undamaged and can be immediately restarted after inspection and elimination of the arc ignition cause

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**Arc resistant design IAC Certified according to IEC62271-200**
### High personnel safety – Comparison between a Class II and a Class IV MV drive

ABB offers IAC certified **arc resistant design with arc elimination** as an option.

<table>
<thead>
<tr>
<th>Class II product</th>
<th>Class IV product</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Class II product" /></td>
<td><img src="image2" alt="Class IV product" /></td>
</tr>
<tr>
<td>Classification 23kA, 0.5s</td>
<td>Classification 28kA, 0.5s</td>
</tr>
<tr>
<td>IP54</td>
<td>IP42</td>
</tr>
</tbody>
</table>

**No damages after an arc with Class IV**
High personnel safety
Functional safety options

Modulation immediately stopped while MCB is being opened.

Emergency Off (EOFF)
The EOFF command is initiated by internal or external means (internal control, safety pushbutton, or user-controlled relays). When the EOFF command is detected by the safety logic, the MCB opens and the motor is coasted to a stop.

A controlled stop with power available to the machine actuators to achieve the stop and then removal of power when the stop is achieved.

Emergency Stop (ESTOP)
The ESTOP is simply a redundant time delay to trigger the EOFF function. This time delay (30s maximum) allows the software to ramp the motor down with its software functionality which cannot be certified. At the end of this time duration, the timer will initiate the EOFF function independently of the software.

The STO command energizes the same circuitry as the EOFF function. The MCB opens so that there is no energy flowing into the drive and the motor is left to coast down to a stop.

Advantages:
Reuse of existing system component
Lowest system costs
Increase productivity due to precise process control

The ACS2000 drive control platform uses ABB’s **direct torque control (DTC)** for **increased process efficiency.**

**Benefits**

- Uniform product quality of your process
- Precise control of motor condition
- Accurate torque and speed control, also at low speed, as well as full starting torque
- No pre-defined switching frequency, for each control cycle the optimum switching parameter is used
- Reduces energy consumption
- Limitation of produced harmonics
Reliable performance of constant torque loads

In addition to square torque loads, the ACS2000 permits operation of constant torque loads enabling accurate performance of conveyors, compressors, mixers, mills, extruders, hoists, crushers and positive displacement pumps.

Benefits

- Applications where the torque loading is not a function of speed
- Setting default points for minimum and maximum speed in between which constant torque is requested
- Due to high dynamic response to torque changes, uniform product quality
- Thickness, flatness and tension control

Example reversing cold mill
Made in EU

We are producing the ACS2000 IEC in our factory in Poland, giving origin guarantee.
The ACS2000 industrial drive
The configuration you need.
## ACS2000 – Hardware overview

### Frames, voltages and power

<table>
<thead>
<tr>
<th>Configuration</th>
<th>IEC 6.0 kV</th>
<th>IEC 6.6 kV</th>
<th>IEC 6.9 kV</th>
<th>NEMA 4.16 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DTL / AFE</td>
<td>DFEe / DFEi</td>
<td>DTL / AFE</td>
<td>DFEe / DFEi</td>
</tr>
<tr>
<td>Frame 1</td>
<td>250 – 800 kW</td>
<td>250 – 800 kW</td>
<td>275 – 880 kW</td>
<td>275 – 880 kW</td>
</tr>
<tr>
<td>Frame 2</td>
<td>900 – 1600 kW</td>
<td>900 – 1600 kW</td>
<td>990 – 1760 kW</td>
<td>990 – 1760 kW</td>
</tr>
<tr>
<td>Frame 4</td>
<td>2500 – 3200 kW</td>
<td>2750 – 3520 kW</td>
<td>2875 – 3680 kW</td>
<td></td>
</tr>
</tbody>
</table>

**DTL**: direct-to-line  
**AFE**: active front end with external transformer  
**DFEe**: diode front end with external transformer  
**DFEI**: diode front end with integrated transformer
ACS2000 – NEMA 4 kV DTL

Small footprint, light weight

- 4.0 – 4.16 kV system voltage
- Integrated fans
- UL/cUL certified
- Cabinet dimensions
  - Length: 1'940 mm (Frame 1)
    2'915 mm (Frame 2)
    3'485 mm (Frame 3)
  - Height: 2'106 mm (converter only)
    2'500 mm (incl. cooling fan)
  - Depth: 1'140 mm
  - Weight: 2'100 – 4’100 kg
ACS2000 – IEC 6 kV DTL
Small footprint, light weight

- 6.0 – 6.9 kV system voltage
- Integrated fans
- Cabinet dimensions
  - Length: 2'205 mm (Frame 1)
    3'800 mm (Frame 2)
  - Height: 2'100 mm (converter only)
    2'490 mm (incl. cooling fan)
  - Depth: 1'140 mm
  - Weight: 2'500 – 4'260 kg
ACS2000 – IEC 6 kV DFEe

Lowest cooling demand, perfect voltage matching

- 6.0 – 6.9 kV system voltage
- Integrated fans
- Cabinet dimensions
  - Length: 1’730 mm (Frame 1)
    2’180 mm (Frame 2)
    2’530 mm (Frame 3)
    2’530 mm (Frame 4)
  - Height: 2’100 mm (converter only)
    2’490 mm (incl. cooling fan)
  - Depth: 1’140 mm
  - Weight: 1’500 – 2’100 kg

Diode front end, external transformer (DFE)
ACS2000 – IEC 6 kV DFEi
Simple installation, perfect voltage matching

- 6.0 – 6.9 kV system voltage
- Integrated fans
- Cabinet dimensions
  - Length: 3’330 mm (Frame 1)
    4’380 mm (Frame 2)
    4’930 mm (Frame 3)
    5’130 mm (Frame 4)
  - Height: 2’100 mm (converter only)
    2’490 mm (incl. cooling fan)
  - Depth: 1’140 mm
  - Weight: 3’120 – 8’200 kg

Diode front end, integrated transformer (DFEi)
ACS2000 – IEC 6 kV AFE
Regenerative, low harmonic

- 6.0 – 6.9 kV system voltage
- Integrated fans
- Cabinet dimensions
  - Length: 1’705 mm (Frame 1)
    3’000 mm (Frame 2)
  - Height: 2’100 mm (converter only)
    2’490 mm (incl. cooling fan)
  - Depth: 1’140 mm
  - Weight: 1’550 – 2’550 kg
Service and support
Services to match your needs.

Every ACS2000 is equipped with ABB Ability™ to enable remote condition monitoring.

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.
Services to match your needs

- If your drives require immediate action, our global network is at your service.
- Maximize your drive’s lifetime with our services.

- Keep your drives running with precisely planned and executed maintenance.
- Get optimal performance out of your machinery and systems.

- Operational efficiency
- Rapid response
- Life cycle management
- Performance improvement
Reveal your drive’s true potential

ABB Ability™ Condition Monitoring for drives is a service that delivers you accurate, real-time information about drive events to ensure your equipment is available, reliable and maintainable. The data can be stored in the cloud or in your local storage.

When you have all the facts, you can make the right decisions.
Providing the right blend of technology, expertise and information
According to your needs

### Make the best decisions

You know your process, we know the drives.

Our monitoring system provides you with data and information from the drives for your best decisions.

### Reduce the risks

You have the information when needed most.

Our monitoring system is continuously collecting data for you to set warning limits and to trouble-shoot potential problems.

### Available on your need

You can combine Remote Assistance Service Product with Condition Monitoring Service.

Our experts will always be on hand to consult with you.
Customize your own remote service plan for drives

1. Select your drives
2. Install the connectivity device
3. Activate your access to the Condition Monitoring basic feature
4. Pick your optional features and customize
5. Start monitoring
6. Enjoy the customized service

- Remote Assistance
- Backup Management
- Alarm Management
- Offline Data Collection
- Asset Health
- Condition-Based Maintenance

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Delivery concept: Remote Services for drives
Remote Condition Monitoring: End User Solution, permanent connection

Condition Monitoring

- Data storage
  - Connected drives
  - RCM data monitoring + optional features
  - Data & alerts
  - Expert reports

Remote Assistance

- ABB
  - Follow the Sun
  - Country Expert
  - RCM full features
  - Ad hoc expert support
Delivery concept: Remote Services for drives
Remote Condition Monitoring: End User Solution, bulk upload / manual data injection
Delivery concept: Remote Services for drives
Remote Condition Monitoring: Partners/Integrators Solution

Site
Connected drives

Data storage
RCM data monitoring + optional features

End User
RCM data monitoring + optional features

Condition Monitoring

ABB

Remote Assistance

Country Expert
Follow the Sun

3rd party
RCM data monitoring + optional features

Integrators/Partners
Ad hoc customer support

Ad hoc expert support
Delivery concept: Remote Services for drives
On-premise Condition Monitoring: End User Solution

On-premise Condition Monitoring

Site

Customer drives

Local SD card or .ftp storage

End User

OCM data monitoring

ABB

Follow the Sun

OCM support

Warranty support

Warranty support on the tool

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December 7, 2020 | Slide 40
Minimizing your downtime by easy maintainability

Service and maintenance for the ACS2000 is simple and smooth as you have easy front access to all components. In addition to various diagnostic tools, you will profit by convenient remote monitoring.

Fast commissioning by “DriveStartup™” software (step-by-step guidance)

Withdrawable phase modules allow quick replacement of components

Fast maintenance due to easy front access to the drive
Total cost of ownership
Choose the most economical solution.
Consider total cost of ownership (TCO) instead of VSD purchase price only

Purchase of VSDs is often based on initial / first hand cost only

Consider TCO (CAPEX & OPEX)

❖ CAPEX main items:
  • VSD
  • VSD heat loss cooling system

❖ OPEX main items:
  • MAINTENANCE cost of VSD and heat loss cooling system
  • ENERGY cost of VSD and heat loss cooling system

ABB's drive experts support you in selecting the most economical solution for your specific project.

- Consider TCO over the expected VSD lifetime > 20 years
- Specify / Select the most economical drive for your project requirements
VSD system design and selection criteria

- Power & speed dictate the motor design
- With a VSD, motor voltage can be different from the line voltage
- Power & speed dictate the motor design

VSD power supply connection point
- 3.3 - 11 (33 kV) kV

VSD transformer location
- Integrated solution
- External solution

Impact on:
- VSD system efficiency
- Power supply connection point
- VSD heat losses into E-house
- HVAC Capex and OPEX
- E-house size
- E-house HVAC

Environmental conditions
Temperature, dust, corrosive air, etc.

VSD heat loss cooling method

<table>
<thead>
<tr>
<th>Air cooling</th>
<th>Water cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventilation</td>
<td>Plant cooling water</td>
</tr>
<tr>
<td>HVAC</td>
<td>Fin-Fan cooler or Chiller</td>
</tr>
</tbody>
</table>

©ABB

- Consider TCO over the expected VSD lifetime > 20 years
- Specify / Select the most economical drive for your project requirements
## Case study: 2.5 MW air-cooled pump drive

**Maintenance during 20 years lifetime**

<table>
<thead>
<tr>
<th>ACS2000</th>
<th>Replacement required from start up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power modules</td>
<td>No replacement required</td>
</tr>
<tr>
<td>Foil DC link capacitor</td>
<td>No replacement required</td>
</tr>
<tr>
<td>EMC filter AC capacitor</td>
<td>11 years</td>
</tr>
<tr>
<td>Printed circuit boards, power supplies</td>
<td>11 years</td>
</tr>
</tbody>
</table>

**Multicell topology**

<table>
<thead>
<tr>
<th>Replacement required from start up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power cells</td>
</tr>
<tr>
<td>DC link capacitors</td>
</tr>
<tr>
<td>Printed circuit boards, power supplies</td>
</tr>
</tbody>
</table>

DC link capacitor module equipped with long lifetime self-healing foil capacitors and thyristor crowbar (fuse-less design)

Withdrawable phase modules for simple and fast removal

Low part count topology

ACS2000:
Optimized for minimum Total Cost of Ownership and equipped with long-life components requiring a low amount of maintenance during the expected life time > 20-year
Case study: 2.5 MW air-cooled pump drive

Heat losses external vs. internal transformer

**Integrated transformer**

- Typical VSD with integrated transformer efficiency: **96%**
- Converter losses into E-house: 4%
- High E-house A/C equipment cost (CAPEX)
- High A/C aux. power demand (CAPEX & OPEX)
- High cooling air flow demand

**External transformer**

- Typical VSD with external transformer efficiency: **97%**
- Converter losses into E-house: 2%
- External transformer efficiency: 99%

50% less E-house cooling (A/C) with external transformer solution compared to integrated transformer solution.
Case study: 2.5 MW air-cooled pump drive

Integrated vs. external transformer of ACS2000 vs. multicell topology

<p>|</p>
<table>
<thead>
<tr>
<th>ACS2000 External</th>
<th>ACS2000 Integrated</th>
<th>Multicell topology</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>22%</td>
<td>36% saving</td>
</tr>
<tr>
<td>20%</td>
<td>40%</td>
<td>22% saving</td>
</tr>
<tr>
<td>40%</td>
<td>60%</td>
<td></td>
</tr>
<tr>
<td>60%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>80%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ACS2000:
Optimized for minimum Total Cost of Ownership and equipped with long-life components requiring a low amount of maintenance during the expected life time > 20-year

Multicell topology:
Optimized for minimum upfront investment cost of the VSD (converter & integrated transformer)

Remark:
Energy cost savings of external transformer solution not included
Case study: VSD power supply voltage level – 33kV / 6.6 kV

Example

Integrated and external transformer solution

Benefits of solution 2

CAPEX savings:
- Needs one less transformer, saving the cost of 33kV / 6.6kV step down transformer

OPEX savings (power consumption):
- Assumed transmission losses of step down transformers: 1% (assumed 600 kW/h)
- Saving potential: 4.26 million kWh per year
The ACS2000 industrial drive
Reference cases.
ABB enables optimized pumping process in a large scale desalination plant

First time use of reverse osmosis on a large scale instead of evaporation technology to deliver fresh water to 1 million people.

**Application**
- Water & Wastewater
- Pumps

**Customer need**
- Stringent harmonic requirements
- High process pressures
- Operation under harsh environmental conditions

**Solution**
ABB offered a drive and motor package:
- ACS2000, 24 pieces
- ACS800, 32 pieces
- ABB motors

**Values**
- Process optimization
- Smooth process integration
- Application specific product
Mining in a harsh environment with an ACS2000

The strong performance of the ACS2000 convinced the end-user to invest in further ACS2000 drives for an extension project.

**Application**
- Mining
- Conveyors

**Customer need**
- Operation in remote location
- Robust and compact design with regenerative capacity and full starting torque
- Operation under harsh environmental conditions

**Solution**
ACS2000, 42 pieces equipped with:
- AFE
- DTL

**Values**
- Cost savings – lower transportation costs due to compact footprint
- Reduced floor space
- Clear and transparent communication between ABB and the end user
- Application specific product
ABB offers reliable solutions with the ACS2000

The customer’s high satisfaction with the ACS2000’s performance and reliability lead to a further customer order of ACS2000 drives for an extension project.

Application

- Oil & Gas
- Combustion air blower

Customer need

- Trustworthy and reliable drive
  The customer insisted that the ACS2000 is included in the OEM offering.

Solution

- ACS2000, 2 pieces
  Previous order: ACS2000, 14 pieces for pump application

Values

- Positive past experience
- Reliable product
- Good relationship of ABB with end user and OEM
ACS2000 allows tailored solution

ACS2000 performing in a subsea multiphase pump application for an offshore oil and gas field, which accounts for a total production of 150'000 barrels of oil equivalent per day.

<table>
<thead>
<tr>
<th>Application</th>
<th>Customer need</th>
<th>Solution</th>
<th>Values</th>
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</thead>
</table>
| Oil & Gas       | • Highest personnel safety  
|                 | • Suitable and certified for installation on an offshore platform  
|                 | • Permanent magnet motor  
|                 | • 1.5 km cable length                                                                                 | ACS2000, 2 pieces equipped with:  
|                 |                                                                                                     | • Arc resistant design with active arc elimination  
|                 |                                                                                                     | • Output sine filter suitable for output voltage boosting up to 7 kV  
|                 |                                                                                                     | • Permanent magnet motor control  
|                 |                                                                                                     | • Marine design with ABS spot approval |
| Subsea MPP      |                                                                                                     |                                                                                              | • Marine certification  
|                 |                                                                                                     |                                                                                              | • High personnel safety  
|                 |                                                                                                     |                                                                                              | • Application specific product |
ACS2000 in action on a large oilfield

The end user is a major energy player, which produces and markets fuels, natural gas and low-carbon electricity.

Application
- Oil & Gas
- ESP

Customer need
- Long motor cables (>4 km)
- Highest personnel safety

Solution
- ACS2000, 12 pieces equipped with:
  - Arc resistant design with active arc elimination
  - 6.6 kV output voltage to compensate the voltage drop along the long motor cables

Values
- ABB's extensive expertise enabled valued support
- High personnel safety
- Application specific product

ABB also provided the switchgear, which was tested together with the drive at ABB.
ACS2000

Key values

- High personnel safety
- Maximum motor compatibility
- Design flexibility for smooth integration
- Customer specific solution for demanding applications

ACS2000 by ABB