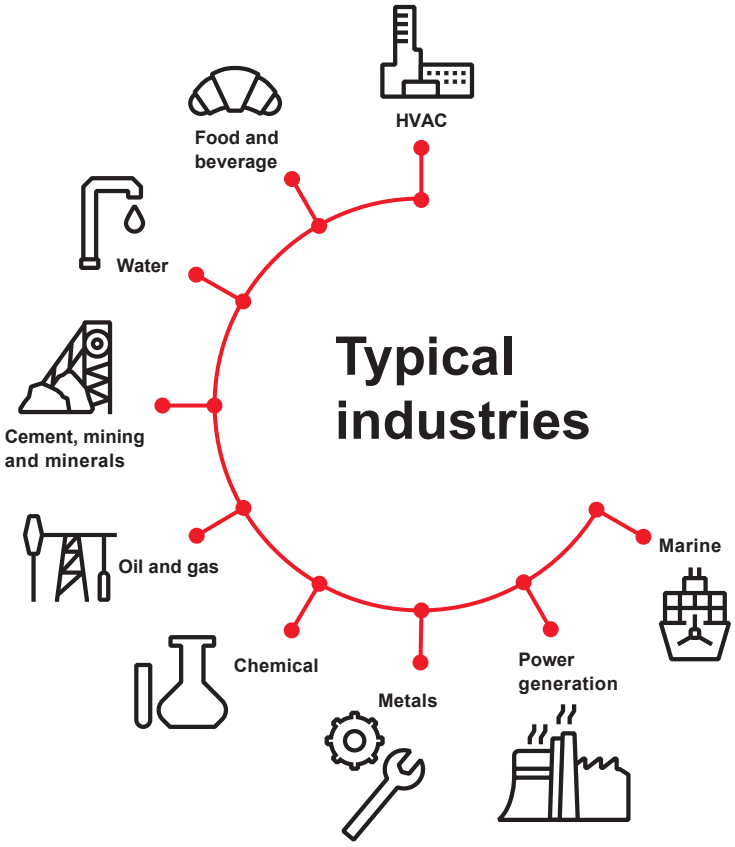
ПРИВОДЫ ПЕРЕМЕННОГО ТОКА ВЫСОКОВОЛЬТНЫЕ

Техническое описание на преобразователи частоты ACS1000

The ACS1000 industrial drive
The solution for everyday process control

The industrial all-rounder for a wide variety of applications provides reliable motor control. The well-proven ACS1000 medium voltage drive ensures high productivity, availability and efficiency of your operations.



As part of ABB's industrial drives family ACS1000 medium voltage drives meets the needs of various industrial applications,
such as those found in mining, cement, power, chemical, oil and gas, water and wastewater, marine and food and beverage.

At the core of the drives is ABB's direct torque control (DTC) that enables highly accurate process control. Reliable control ensures high productivity, availability and efficiency of
your operations.

Reliability and flexibility

Flexible and reliable
With its flexible network connections, its motor-friendly output sine filter and a constant power factor, the ACS1000 can be easily integrated into your existing or new systems.

Tailor the drive to your specific application by selecting from an extended choice of pre-engineered options. The ACS1000 is available with air or liquid cooling. The air-cooled drive can be supplied with an external input transformer or with an integrated input transformer.

Great versatility makes the ACS1000 suitable for operation in different conditions and environments.

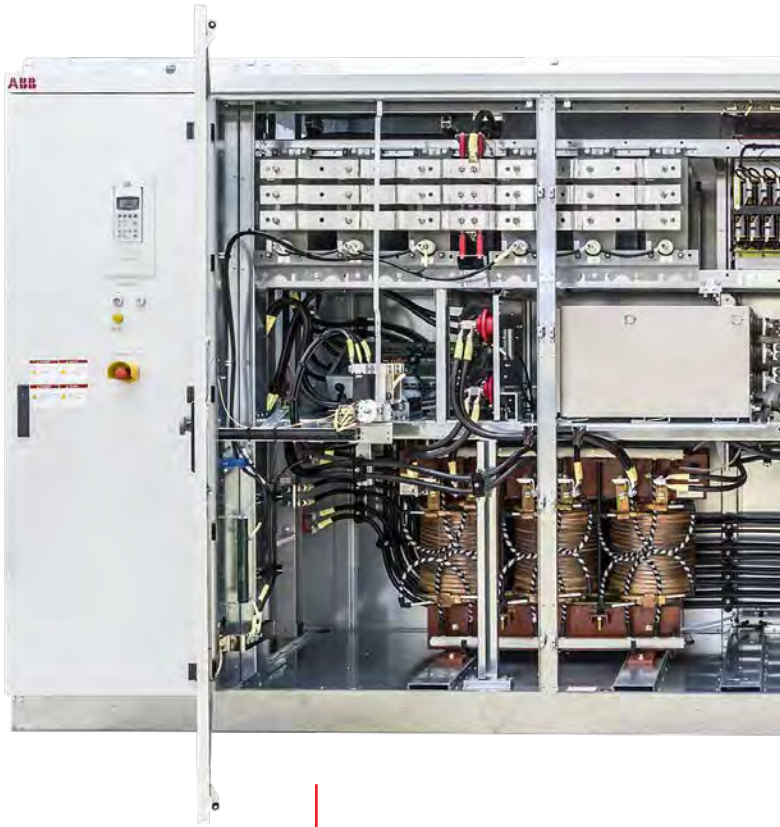
High reliability in your daily business is ensured by the drive's simple design and robust control platform that has proven itself over many years.

Benefits that add value

Our strong industrial drives family includes the features and functions you require, and make it easy for your business opportunities to work. They support you in improving your processes by integrating your variable speed process control needs into a flexible and comprehensive drive solution.

Energy efficiency
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. In this way you can save energy
and reduce CO_2 emissions.

Best fit for your application
The ACS1000 is the perfect fit for your standard applications in any industry. It features a range of pre-engineered solutions to control applications such as pumps, fans, conveyors, extruders and compressors, even in harsh environments.

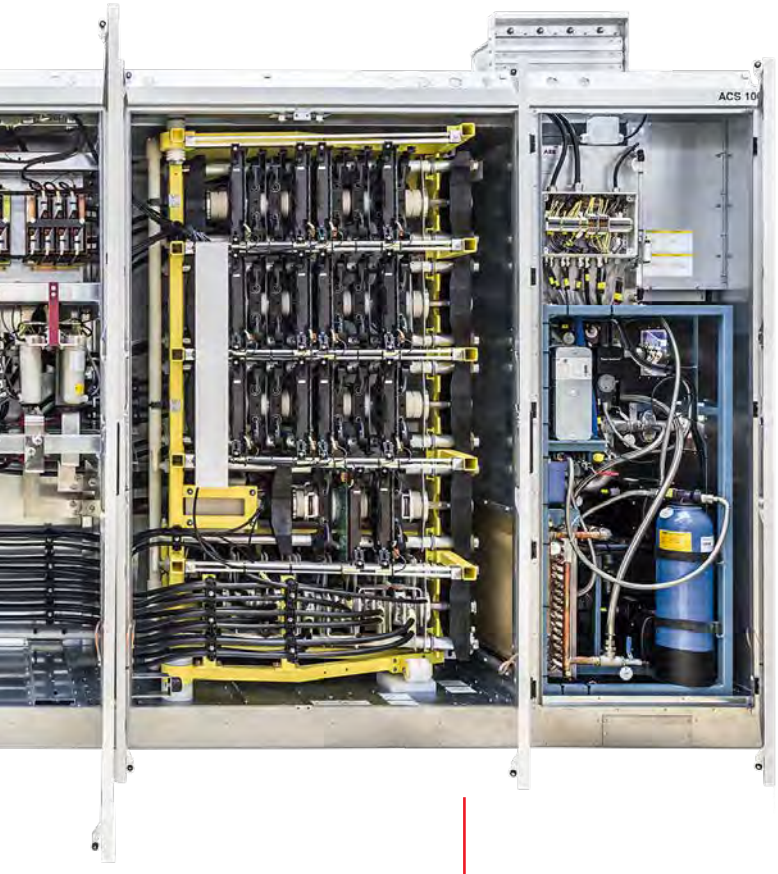


Design flexibility

Design flexibility for smooth integration
Integrating the ACS1000 into your systems is easy and effortless. The drive can be configured with an integrated or external transformer.
The flexible design concept eliminates the need for costly harmonic analyses or the installation of network filters.

Maximum motor compatibility
Thanks to the integrated output sine filter, you can drive standard induction motors, retrofit older motors and use long motor cables.

Personal safety



High reliability through well-proven design
Availability of your operations is ensured thanks to the simple, fuseless design. A low parts count and proven components contribute to high uptime and a long lifetime of your drive. Reliability is further increased with the drive's power loss ride-through function.

Increased productivity due to precise process control
Reduce your energy consumption and increase process efficiency with ABB's direct torque control (DTC) method. The drive control is immediate and smooth in any conditions, ensuring optimum output and productivity.

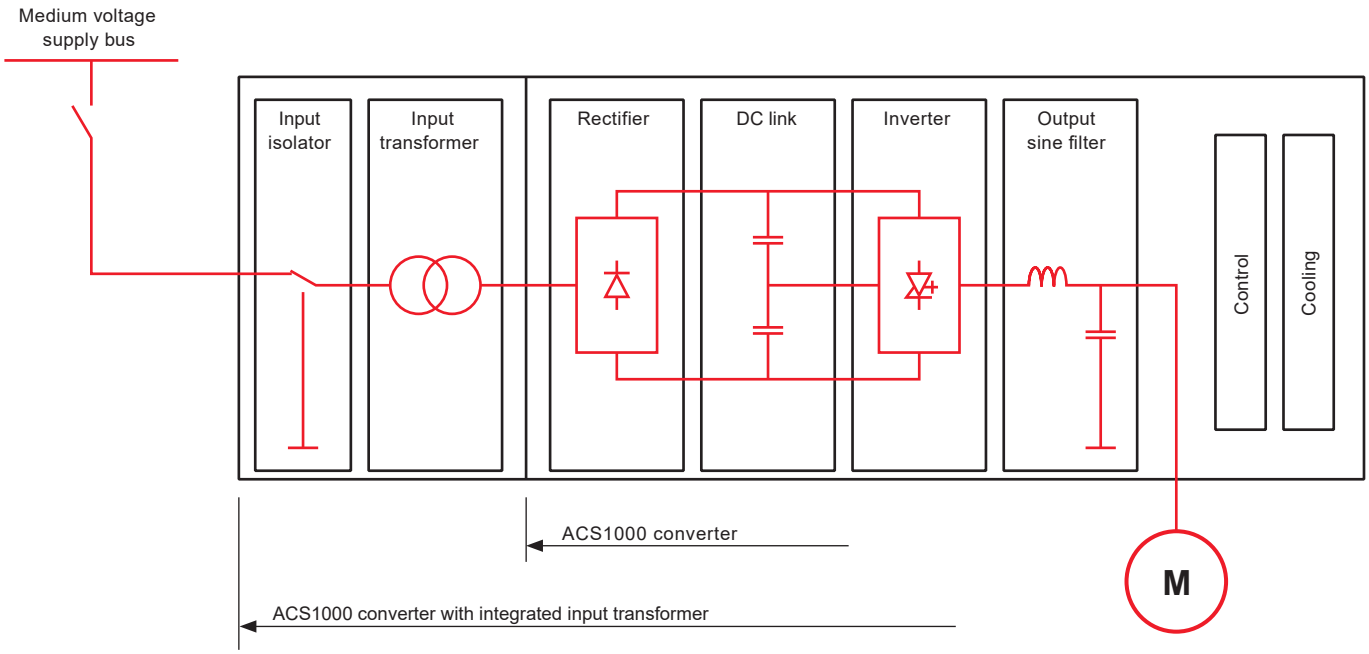
ABB Ability™ Condition Monitoring
You can greatly benefit from ABB's Ability™ Remote Condition Monitoring (RCM) service that ensures you are always one step ahead with accurate, real-time information on the condition of your drive, even when it is installed in remote locations.

High personnel safety
Your workforce and goods are protected from dangerous electric arcs due to the arc-resistant design of the ACS1000. Certified functional safety features and an integrated DC grounding switch make your systems safe and reliable.

Serviceability
Easy front access to all components ensures that maintenance of the ACS1000 is simple and smooth. In addition to powerful diagnostic tools, you will profit from convenient remote monitoring.

Standard solution with versatile features

The ACS1000 drives family's well proven three-level inverter, without series or parallel connected power semiconductors, is one of the least complex, most robust and efficient drive topologies.



System design flexibility

The ACS1000 can be operated with an external or integrated input transformer, each configuration offering unique benefits.

External transformer
An ACS1000 configuration with an external transformer offers a flexible design that enables the use of dry-type transformers as well as oil-filled transformers.

Integrated transformer
Alternatively, the ACS1000 can be operated with an integrated dry-type transformer and, optionally, an input contactor for easy installation and commissioning.

Cooling systems
The ACS1000 is available with air and liquid cooling, the latter increasing overall efficiency and minimizing the heat dissipation into the electrical room, eliminating your need for additional ventilation systems.

Reliable, efficient components

The simple and well-proven design of the ACS1000 ensures high reliability for your operations.

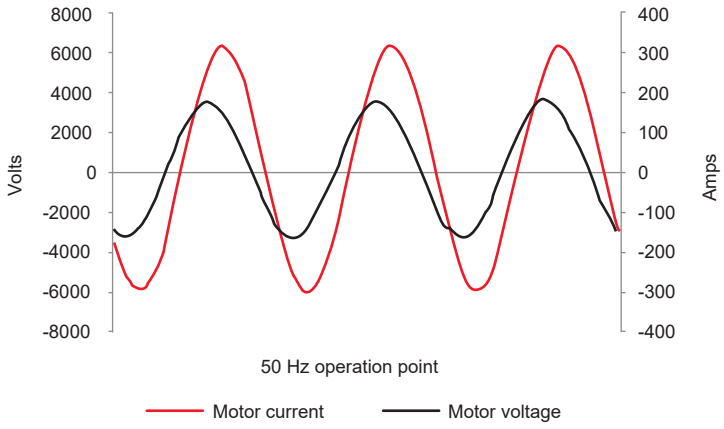
Efficient topology
The three-level inverter, without series or parallel connected power semiconductors, is one of the least complex and most robust drive topologies.

IGCT semiconductors
The ACS1000 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 a low components count, providing a reliable drive.

Fuseless design
The converter design does not require any medium voltage power fuses which are known to be unreliable, costly and subject to aging.
The ACS1000 use dedicated IGCTs, instead, which provide faster and more reliable protection of the drive.

Long-life capacitors
Electrolytic capacitors, which have a poor life expectancy, are not used in the ACS1000. Advanced, environmentally friendly, foil capacitors, designed for a long lifetime, are used instead.

Motor current and voltage



Network friendly
Depending on the network conditions, the ACS1000 drive can be equipped with a 12- or 24-pulse diode rectifier that meets the stringent requirements for current and voltage harmonic distortion as defined by IEC and IEEE. When applying a new drive, you do not have to conduct costly harmonic analysis or install any network filters.

Motor-friendly output waveform
Voltage reflections and common mode voltages, caused by any inverter topology, are a real concern for medium voltage motors. They cause excessive stress to a standard motor insulation and create harmful bearing currents, both with potentially disastrous consequences. Furthermore, the motor is subjected to additional harmonic heating generated by the inverter switching if no further precautions are taken.

With an ACS1000, all these harmful effects are totally eliminated by its unique output sine filter, which is a standard feature of the drive. The result is an excellent sinusoidal voltage and current waveform, supplied to the motor.

Retrofit-ready simplicity
The ACS1000 is optimized for retrofits to existing motors and is suitable for applications that require very long motor cables.

Powerful performance with DTC
Precise and reliable process control, together with low energy consumption, result in top performance. The motor control platform of the ACS1000 drives is ABB's award-winning direct torque control (DTC). It provides rapid, accurate and stepless control from zero to full speed,
and can deliver full torque with optimal speed accuracy over the whole speed range, even without encoder.

High level of personnel safety
Electric arcs represent a hazard source for people and equipment. For systems where large and dangerous arc fault currents can occur, special attention is required.

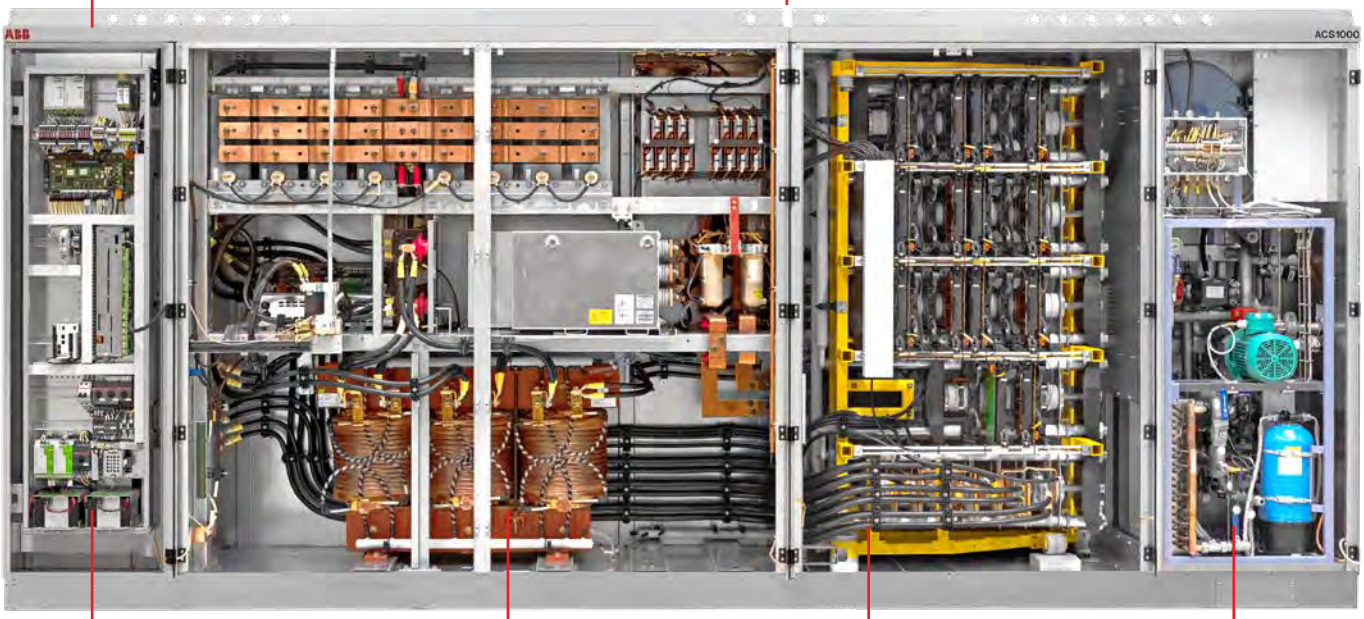
The ACS1000 medium voltage drives fulfill the IAC requirements for arc containment, assuring personnel safety. For higher currents, the drive cabinet can be equipped with a pressure relief flap. Optionally, the ACS1000 is available with ABB's Arc Guard System™ for fast arc detection.

ACS1000 liquid-cooled

Heat dissipation directly into the cooling liquid eliminates the need for additional ventilation systems which maximizes system efficiency.

Cable connection section for top and bottom entry/exit

3-level voltage source inverter using IGCT power semiconductors on swing frame for easy access



Control electronics mounted on swing frame

Output filter choke

12-pulse input bridge as standard

24-pulse input bridge as option

Liquid cooling cabinet with heat exchangers and deionization unit

ACS1000 air-cooled with integrated transformer

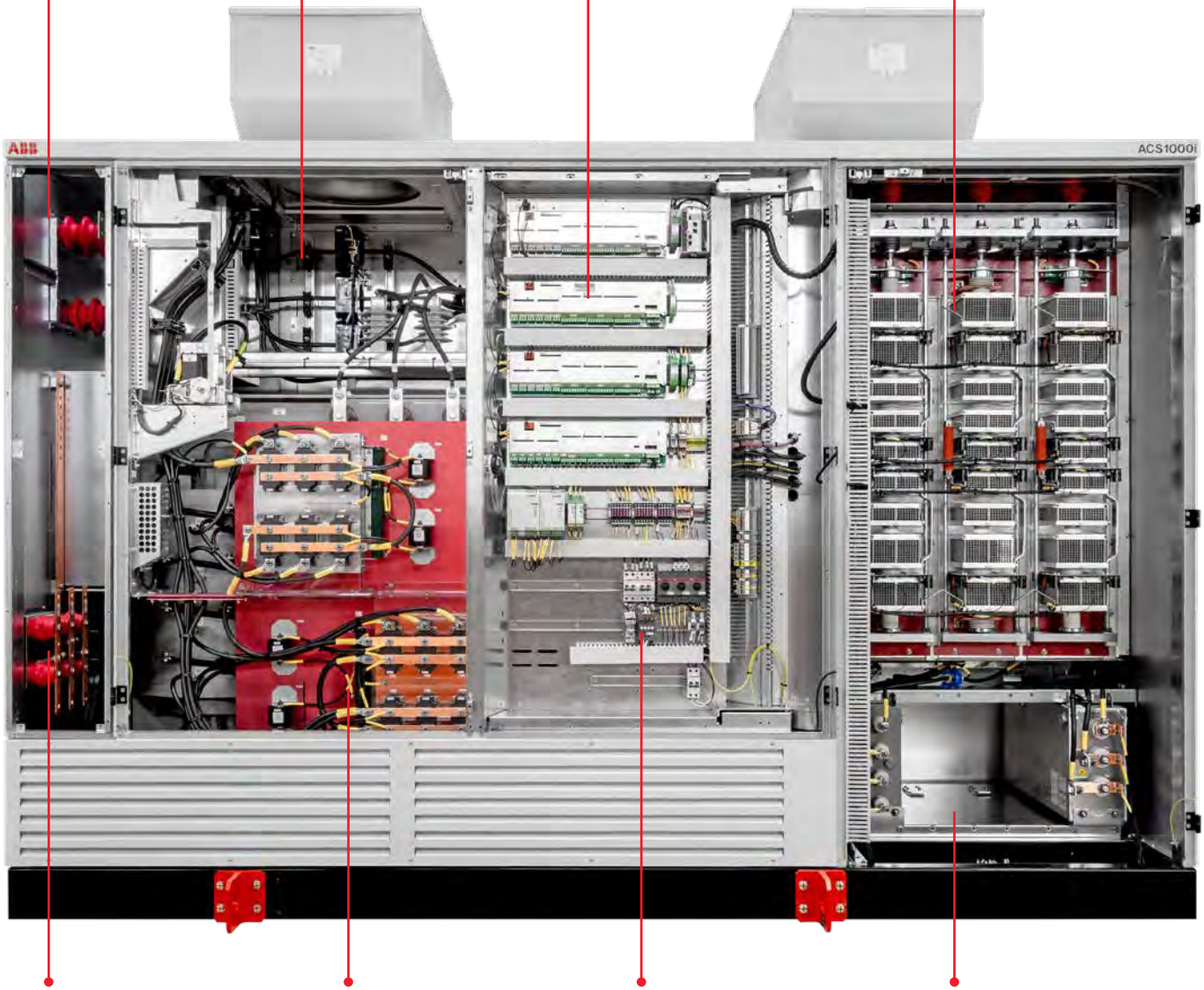
Easy installation is possible with the ACS1000 with integrated transformer, simplifying the integration of the drive into your systems.

Input isolator

Fused input contactor (optional)

24-pulse input transformer

3-level voltage source inverter using IGCT power semiconductors



Power cable connection section for top and bottom entry/exit

24-pulse input bridge as standard

Control electronics mounted on swing frame

DC link and output sine filter capacitors

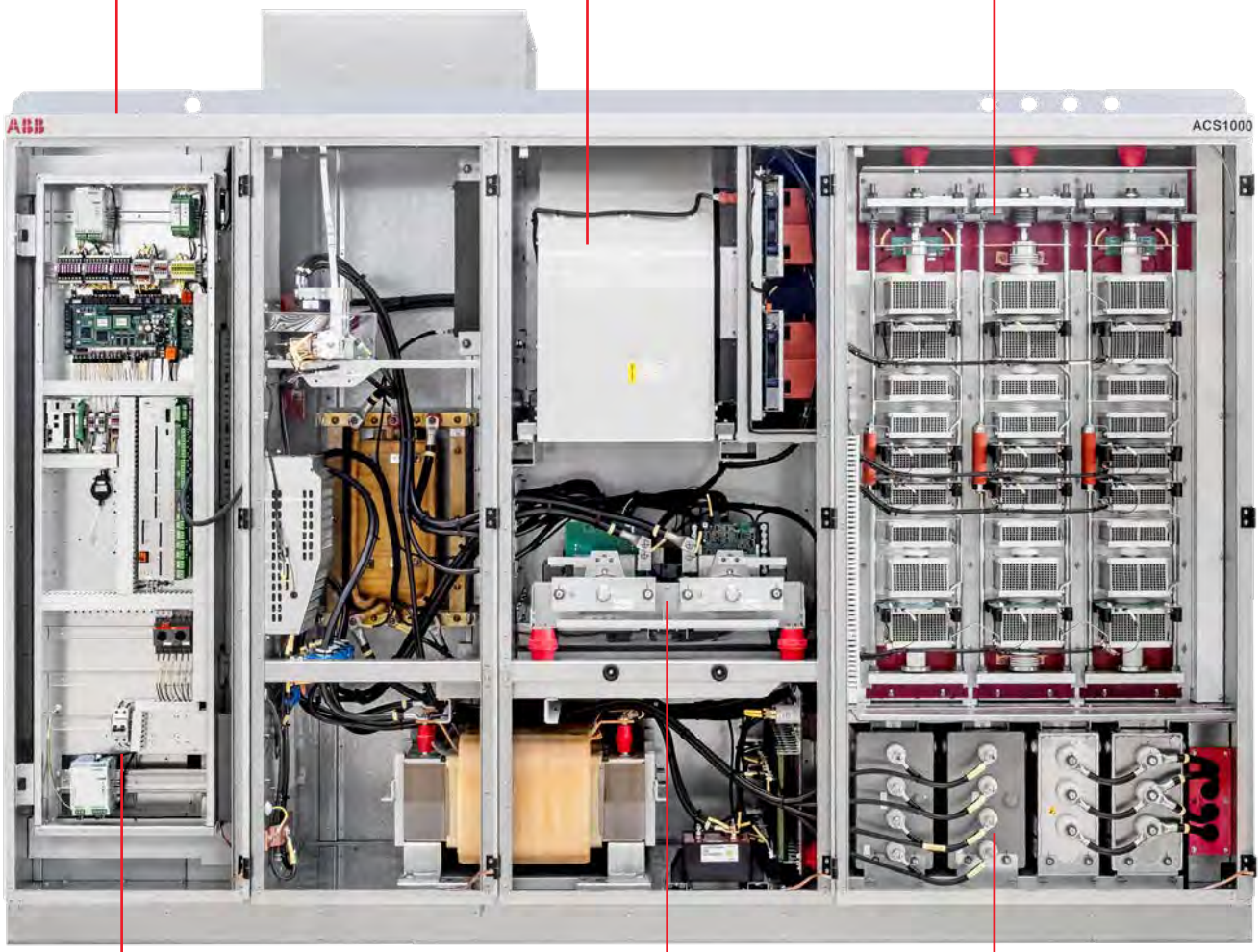
ACS1000 air-cooled with external transformer

A small footprint and lower heat losses will reduce your space and ventilation requirements.

Cable connection section for top and bottom entry/exit

Integrated fan for low noise level

3-level voltage source inverter using IGCT power semiconductors



Control electronics mounted on swing frame

12-pulse input bridge as standard

24-pulse input bridge as option

DC link and output sine filter capacitors

Technical data

Input	
Input configuration	12- or 24-pulse diode rectifier
Input voltage	External transformer: 1.3 kV, 1.9 kV and 2.3 kV (on drive input) Integrated transformer: 2.3 kV, 3.3 kV, 4.16 kV, 6 to 6.9 kV, 10 to 11 kV and 13.8 kV *)
Input voltage variation	± 10%
Input frequency	50/60 Hz
Input frequency variation	< 5%
Input power factor	> 0.95
Input harmonics	Complies with IEC 61000-2-4 and IEEE 519
Auxiliary voltage	110 V DC, 220 V DC 110 to 240 V AC 50/60 Hz 380 to 690 V AC 50/60 Hz, 3-phase
Output	
Output power	315 to 5000 kW
Output voltage	2.3 kV, 3.3 kV, 4.0 kV, 4.16 kV
Output frequency	0 to 82.5 Hz (higher on request)
Motor type	Induction
Efficiency of converter	> 98%, external transformer > 96%, integrated transformer
Motor harmonics	< 2% THDi
Mechanical	
Enclosure	Air-cooled: Standard IP21, optional IP22, IP32 and IP42 Liquid-cooled: Standard IP31, optional IP42 and IP54
Cable entry	Top/bottom
Environmental	
Altitude	5500 m.a.s.l., air-cooled 4000 m.a.s.l., liquid-cooled
Ambient air temperature	0 to +40 °C, air-cooled (lower and higher with derating) +1 to +50 °C, liquid-cooled (lower and higher with derating)
External cooling liquid temperature	+4 to +27 °C (lower and higher with derating)
Noise	< 75 dB(A), air-cooled, external transformer < 80 dB(A), air-cooled, integrated transformer < 70 dB(A), liquid-cooled
Cooling type	Air, liquid
Standards	EN, IEC, CE, optional UL and all common marine standards

*) Not all supply voltage and frequency combinations are available.

Ratings, types and voltages
With integrated transformer

Motor data			Converter data			
Nominal ratings			Type code	Power	Length	Weight
(kW)	(hp)	(A)		(kVA)	(mm)	(kg)
3300 V air-cooled						
315	420	70	ACS1000-033-A01A-J4-010	400	3300	3900
355	480	79	ACS1000-033-A01B-J4-010	450	3300	3900
400	540	87	ACS1000-033-A01C-J4-010	500	3300	3900
450	600	96	ACS1000-033-A01D-J4-010	550	3300	3900
500	670	105	ACS1000-033-A01E-J4-010	600	3300	3900
560	750	122	ACS1000-033-A01F-J4-010	700	3300	4300
630	840	131	ACS1000-033-A02A-J4-010	750	3300	4300
710	950	149	ACS1000-033-A02B-J4-010	850	3300	4300
800	1070	166	ACS1000-033-A02C-J4-010	950	3300	4300
900	1210	192	ACS1000-033-A02D-J4-010	1100	3300	4300
1000	1340	210	ACS1000-033-A02E-J4-010	1200	3300	5100
1120	1500	236	ACS1000-033-A03A-J4-010	1350	3300	5100
1250	1680	262	ACS1000-033-A03B-J4-010	1500	3300	5100
1400	1880	297	ACS1000-033-A03C-J4-010	1700	3300	5500
1500	2010	332	ACS1000-033-A03D-J4-010	1900	3300	5500
4000 V / 4160 V air-cooled						
300	400	52	ACS1000-040-A01A-J4-010	400	3300	4000
340	450	58	ACS1000-040-A01B-J4-010	400	3300	4000
370	500	65	ACS1000-040-A01C-J4-010	450	3300	4000
450	600	79	ACS1000-040-A01D-J4-010	550	3300	4000
520	700	94	ACS1000-040-A01E-J4-010	650	3300	4000
600	800	108	ACS1000-040-A01F-J4-010	750	3300	4000
670	900	115	ACS1000-040-A01G-J4-010	800	3300	4000
750	1000	130	ACS1000-040-A01H-J4-010	900	3300	4000
930	1250	166	ACS1000-040-A02A-J4-010	1150	3300	4900
1120	1500	195	ACS1000-040-A02B-J4-010	1350	3300	4900
1300	1750	224	ACS1000-040-A03A-J4-010	1550	3300	5600
1490	2000	260	ACS1000-040-A03B-J4-010	1800	3300	5600
1680	2250	289	ACS1000-040-A03C-J4-010	2000	3300	5600
2010	2700	347	ACS1000-040-A03D-J4-010	2330	3300	5600

The relation between nominal motor rating to resulting converter type code is typical value and indicative only. Please get in touch with ABB representative for validation.

Ratings, types and voltages
With external transformer

Motor data			Converter data			
Nominal ratings			Type code [1]	Power	Length	Weight
(kW)	(hp)	(A)		(kVA)	(mm)	(kg)
2300 V air-cooled						
300	400	94	ACS1000-023-A01A-Ex-010	400	3000	1600
340	450	100	ACS1000-023-A01B-Ex-010	400	3000	1600
370	500	113	ACS1000-023-A01C-Ex-010	450	3000	1600
450	600	138	ACS1000-023-A01D-Ex-010	550	3000	1600
520	700	163	ACS1000-023-A01E-Ex-010	650	3000	1600
600	800	188	ACS1000-023-A01F-Ex-010	750	3000	1600
670	900	201	ACS1000-023-A01G-Ex-010	800	3000	1600
750	1000	226	ACS1000-023-A01H-Ex-010	900	3000	1600
930	1250	289	ACS1000-023-A02A-Ex-010	1150	3000	1750
1120	1500	339	ACS1000-023-A02B-Ex-010	1350	3000	1750
1300	1750	389	ACS1000-023-A03A-Ex-010	1550	3000	2000
1490	2000	452	ACS1000-023-A03B-Ex-010	1800	3000	2000
1680	2250	502	ACS1000-023-A03C-Ex-010	2000	3000	2000
3300 V air-cooled						
315	420	70	ACS1000-033-A01A-Ex-010	400	3000	1600
355	480	79	ACS1000-033-A01B-Ex-010	450	3000	1600
400	540	87	ACS1000-033-A01C-Ex-010	500	3000	1600
450	600	96	ACS1000-033-A01D-Ex-010	550	3000	1600
500	670	105	ACS1000-033-A01E-Ex-010	600	3000	1600
560	750	122	ACS1000-033-A01F-Ex-010	700	3000	1600
630	840	131	ACS1000-033-A01G-Ex-010	750	3000	1600
710	950	149	ACS1000-033-A01H-Ex-010	850	3000	1600
800	1070	166	ACS1000-033-A02A-Ex-010	950	3000	1750
900	1210	192	ACS1000-033-A02B-Ex-010	1100	3000	1750
1000	1340	210	ACS1000-033-A02C-Ex-010	1200	3000	1750
1120	1500	236	ACS1000-033-A02D-Ex-010	1350	3000	1750
1250	1680	262	ACS1000-033-A02E-Ex-010	1500	3000	1750
1400	1880	297	ACS1000-033-A02F-Ex-010	1700	3000	1750
1600	2150	332	ACS1000-033-A03A-Ex-010	1900	3000	2000
1800	2410	376	ACS1000-033-A03B-Ex-010	2150	3000	2000
2000	2680	420	ACS1000-033-A03C-Ex-010	2400	3000	2000

The relation between nominal motor rating to resulting converter type code is typical value and indicative only. Please get in touch with ABB representative for validation.

[1] 'x' indicates the different pulse numbers
2- to 12-pulse diode front end
4- to 24-pulse diode front end

Motor data			Converter data			
Nominal ratings			Type code [1]	Power	Length	Weight
(kW)	(hp)	(A)		(kVA)	(mm)	(kg)
4000 V air-cooled						
300	400	52	ACS1000-040-A01A-Ex-010	400	3000	1600
340	450	58	ACS1000-040-A01B-Ex-010	400	3000	1600
370	500	65	ACS1000-040-A01C-Ex-010	450	3000	1600
450	600	79	ACS1000-040-A01D-Ex-010	550	3000	1600
520	700	94	ACS1000-040-A01E-Ex-010	650	3000	1600
600	800	108	ACS1000-040-A01F-Ex-010	750	3000	1600
670	900	115	ACS1000-040-A01G-Ex-010	800	3000	1600
750	1000	130	ACS1000-040-A01H-Ex-010	900	3000	1600
930	1250	166	ACS1000-040-A02A-Ex-010	1150	3000	1750
1120	1500	195	ACS1000-040-A02B-Ex-010	1350	3000	1750
1300	1750	224	ACS1000-040-A03A-Ex-010	1550	3000	2000
1490	2000	260	ACS1000-040-A03B-Ex-010	1800	3000	2000
1680	2250	289	ACS1000-040-A03C-Ex-010	2000	3000	2000
1860	2500	330	ACS1000-040-A03D-Ex-010	2300	3000	2000
3000 V liquid-cooled						
2000	2680	420	ACS1000-033-W01A-Ex-010	2400	4200	3300
2250	3020	472	ACS1000-033-W01B-Ex-010	2700	4200	3300
2500	3350	525	ACS1000-033-W01C-Ex-010	3000	4200	3300
2800	3750	586	ACS1000-033-W02A-Ex-010	3350	4700	3680
3150	4220	656	ACS1000-033-W02B-Ex-010	3750	4700	3680
3550	4760	744	ACS1000-033-W02C-Ex-010	4250	4700	3680
4000	5360	831	ACS1000-033-W03A-Ex-010	4750	4700	3680
4500	6030	936	ACS1000-033-W03B-Ex-010	5350	4700	3680
5000	6710	1041	ACS1000-033-W03C-Ex-010	5950	4700	3680
4000 V liquid-cooled						
1860	2500	332	ACS1000-040-W01A-Ex-010	2300	4200	3300
2240	3000	390	ACS1000-040-W01B-Ex-010	2700	4200	3300
2610	3500	447	ACS1000-040-W02A-Ex-010	3100	4700	3680
2980	4000	520	ACS1000-040-W02B-Ex-010	3600	4700	3680
3360	4500	577	ACS1000-040-W02C-Ex-010	4000	4700	3680
3730	5000	650	ACS1000-040-W02D-Ex-010	4500	4700	3680
4100	5500	707	ACS1000-040-W03A-Ex-010	4900	4700	3680
4470	6000	765	ACS1000-040-W03B-Ex-010	5300	4700	3680
5250	7035	879	ACS1000-040-W03C-Ex-010	6090	4700	3680

The relation between nominal motor rating to resulting converter type code is typical value and indicative only. Please get in touch with ABB representative for validation.

[1] 'x' indicates the different pulse numbers
2- to 12-pulse diode front end
4- to 24-pulse diode front end

По вопросам продаж и поддержки обращайтесь:

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Ангарск (3955)60-70-56
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Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
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