

FACT SHEET

# Enabling the shore-to-ship power connection

## ABB Static Frequency Converters



ABB static frequency converters are an economic and efficient solution to convert the grid electricity to the appropriate load frequency.

### Enabling the connection

ABB medium voltage and low voltage static frequency converters utilize ABB's modular converter design providing highly reliable, clean and efficient power conversion.

ABB static frequency converters are internally configured as an arrangement of modular rectifiers and inverters controlled by a power electronic controller. The converters produce sine wave voltage to supply the output load.

### Shore-to-ship power

Shore-to-ship power helps to reduce polluting emissions, noise and vibration in ports by connecting vessels to the port electricity grid and allowing them to shut down the onboard power generation units while at berth.

Since most ships operate with 60 Hz electricity whereas local grid in most parts of the world is 50 Hz, ABB static frequency converters help to adjust the grid electricity to the appropriate ship frequency and are a viable solution in replacing vintage rotating frequency converters (motor/generator set).

### Features

- Industrial design
- Two or four quadrants operation
- Selectable frequency setting (50Hz to 60 Hz or viceversa)
- Scalable solutions ranging from 0.1 up to 40 MVA
- High efficiency also under partial-load conditions
- Optimized foot print (high power density permits compact design)
- High availability (high reliability, low maintenance, proven service concept with 24/365 support, remote diagnosis)

### User benefits

- Full range of solution spanning from Low Voltage to Medium Voltage frequency converter to cover all application segments and customer needs
- Flexibility of choice between one-to-one connection or centralized frequency conversion serving multiple vessels
- Optimized CAPEX (lower cost/MVA)
- Optimized cost of ownership and maintenance
- Full integration in ABB's pre-engineered solutions minimizes overall project risks and costs.

## ACS6080 SFC [5-27 MVA]

ACS6080 converters utilize the proven high performance IGCT (Integrated Gate Commutated Thyristor) power switching devices.

ACS6080 SFC converters are highly efficient even at partial load. Highest safety levels for personnel as well as high reliability through well proven design ensure best operations and easy maintenance.

Input	
Typical input voltage	6 .. 132 kV a)
Frequency	50 / 60 Hz
Input section	12/24 pulse diode bridge /active rectifier
Total harmonics distortion	According to IEC61000-2-4
Output	
Typical ship voltage	6.6 kV / 11 kV
Frequency	60 / 50 Hz
Output section	IGCT voltage source converter
Converter voltage	2,7-3 kVac b)
Total harmonics distortion	According to IEC/ISO/IEEE 80005-1
Conversion efficiency	>98%
Short circuit limit	depending on nominal power and model

01 ACS6080 SFC indoor cabinet



## Model ratings and dimensions

Model		Nominal Rating (c)			Interface		Maximum Heat Loss	Dimension	Weight
ID Type	Configuration Name	Max continuous output power [MVA]	Overload capability [10 sec]	Short circuit limit [1 sec]	GRID SIDE	LOAD SIDE	Into WATER [kW]	WxDxH [mm]	kg
Double-A	Double-ACS6109_L12_2a05	7,5	114%	162%	DIODE (12p)	2 UNITS (12p)	93	8830x1069x2162	7645
	Double-ACS6107_A06_2a05	7,5	108%	180%	ACTIVE (6p)	2 UNITS (12p)	134	9130x1069x2479	8395
	Double-ACS6109_L12_2a7	7,5	188%	226%	DIODE (12p)	2 UNITS (12p)	85	8830x1069x2162	7885
Double-B	Double-ACS6114_L12_2a7	13	108%	130%	DIODE (12p)	2 UNITS (12p)	149	9030x1069x2162	8015
	Double-ACS6207_A12_2a7	14	107%	134%	ACTIVE (2*6p)	2 UNITS (12p)	231	11830x1069x2479	10780
	Double-ACS6114_L12_2a9	14	108%	135%	DIODE (12p)	2 UNITS (12p)	163	9030x1069x2479	8195
	Double-ACS6209_A12_2a9	15	108%	151%	ACTIVE (2*6p)	2 UNITS (12p)	250	11830x1069x2479	10960
Triple-A	Triple-ACS6209_L24_3a7	18	141%	141%	DIODE (24p)	3 UNITS (18p)	201	13530x1069x2162	11940
	Triple-ACS6209_A12_3a7	18	157%	157%	ACTIVE (2*6p)	3 UNITS (18p)	307	14530x1069x2479	13575
	Triple-ACS6214_L24_3a7	21	121%	121%	DIODE (24p)	3 UNITS (18p)	242	14930x1069x2479	13185
Triple-B	Triple-ACS6214_L24_3a9	26	113%	125%	DIODE (24p)	3 UNITS (18p)	314	14930x1069x2479	13185
	Triple-ACS6309_A18_3a9	27	114%	134%	ACTIVE (3*6p)	3 UNITS (18p)	469	17030x1069x2479	15970

Parallel load sharing allows operation of multiple ACS6080 SFC.

<sup>a</sup> Input transformer is required for grid voltage adaptation

<sup>b</sup> Depending on the model

<sup>c</sup> Standard environmental conditions and maximum preload equal to 70% apply. Use of chiller can reduce derating at higher temperatures.

Mechanical	
Enclosure	IP 32/42/54 indoor cabinet or outdoor container
Cooling	Closed loop liquid cooling
Standard color	RAL 7035
Interface	
Control interface	Hardwired, Modbus-TCP, Anybus S, Human Machine Interface
Environmental	
Operation temperature	+ 5°C ... 32°C standard/no derating (c) -40°C ... 50°C with derating
Humidity	< 95% non-condensing
EMC emissions	IEC 61000-2-2, IEC 61000-2-4, IEC 61000-6-2
Standards and norms compliance	
ISO/IEEE 80005-1 & 80005-3, IEC 62103/ENSO178, IEC 60146-2, IEC 61800-3, IEC 60721-1, IEC 61071, IEC 60871-1, IEC 61439, IEC 62271-1, IEC 60071-1, IEC 60664, IEC 60529, IEEE 519, IEC 61000-2-4	
Designed to CE mark requirements	
Service	
24/365 (optional) service support expert, remote access and diagnosis and worldwide service and spare parts network	

ACS880 SFC [1..5 MVA]

ACS880 low voltage static frequency converters utilize the latest high performance Insulated Gate Bipolar Transistor (IGBT) power switching devices controlled through a specific off-grid software.

With its modular architecture, ACS880 SFC allows seamless connection of multiple low and/or high voltage low power consumption vessels.

Input	
Typical grid voltage	0,4...30 kV (a)
Frequency	50 / 60 Hz +/-5%
Input section	Grid converter, IGBT supply unit
Converter voltage	3-phase,525...690Vac,+/-10%
Total harmonics distortion	2,5%
Output	
Typical ship voltage	LV (up to 690V), MV (6,6/11 kV) a)
Frequency	60 / 50 Hz
Output section	Ship converter, IGBT supply unit
Converter output voltage	690 VAC
Total harmonics distortion	2,5 THDi
Conversion efficiency	>94%

Mechanical	
Enclosure	IP22 standard, IP42 and IP54 option
Cooling	Air cooled, Liquid cooled
Standard color	RAL9017, RAL7035
Interface	
Control protocol	PROFIBUS DP, DPV0/DPV1, CANopen®, DeviceNet™, EtherNet/IP™, Modbus TCP/RTU, PROFINET IO, PROFIsafe, EtherCAT®, POWERLINK, ControlNet™
Environmental	
Operation temperature	0 to +50°C no frost allowed, 35°C with derating of 1%/1°C
Humidity	5 to 95%, no condensation allowed
EMC emissions	EMC according to EN 61800-3:2004 + A1:2012
Standards and norms compliance	
IEC/ISO/IEEE 80005-1, IEC PAS 80005-3, IEC61800, IEC60529, IEC60146-2, IEC60721-1, Low Voltage 2014/35/EU, EMC 2004/108/EC, ISO 9001, ISO 14001, RoHS II, IEC62477-1, IEEE 519 Designed to CE requirements. UL, EAC, cUL 508A/C, CSA, RCM as option	
Service	
24/365 service support with expert remote access (optional)	
Worldwide service and spare parts network	

01 ACS880 SFC



Parallel load sharing allows operation of multiple ACS880 SFC.

a) Specific voltage levels can be achieved by means of a step-down transformer

b) Dimensions are for side-by-side configuration. Back to back configuration dimensions will vary

c) Standard temperature range 5 to 35°C. Rated values with cos phi 1..0.85

d) Short circuit current 140% nominal current for 5 s

Model ratings and dimensions

Model	Nominal rating (c) Overload (d)			Cabinet			
	Nominal Power [kVA]	Nominal current [A]	Maximum current [A]	Dimensions (b) HxWxD [mm]	Weight [kg]	Heat dissipation [kW]	Frame size for grid and ship converter
ACS880-207-1050A-7	1000	837	1171	2145x3600x636	3200	63	2pcs(2xR8i +BLCL-25-7)
ACS880-207-1570A-7	1500	1253	1754	2145x5200x636	4420	99	2 pcs (3xR8i+2xBLCL-24-7)
ACS880-207-2070A-7	2000	1677	2347	2145x5600x636	5640	125	2 pcs (3xR8i+2xBLCL-24-7)
ACS880-207-3080A-7	3000	2509	3512	2145x7200x636	7480	188	2 pcs (6xR8i+3xBLCL-25-7)
ACS880-207-4100A-7	4000	3345	4683	2145x10200x636	9720	251	2 pcs (8xR8i+4xBLCL-25-7)
ACS880-207-5130A-7	5000	4181	5853	2145x11800x636	11520	311	2 pcs (10xR8i+5xBLCL-25-7)

PCS100 SFC [0.1 – 2 MVA]

PCS100 converters utilize the latest high performance Insulated Gate Bipolar Transistor (IGBT) power switching devices controlled by a micro controller.

PCS100 SFC comes with an advanced redundancy feature, which allows the operation at reduced power in case of single module fault.

Input	
Typical grid voltage	0.4 .. 30 kV a)
Frequency	50 / 60 Hz
Input section	IGBT voltage source converter
Converter voltage	200 .. 480 VAC
Total harmonics distortion	< 3 % THDi (at rated load)
Output	
Typical ship voltage	LV (up to 690), MV (6,6 kV)
Frequency	60 / 50 Hz
Output section	IGCT voltage source converter
Converter voltage	400 .. 480 VAC
Total harmonics distortion	2,5 THDi (linear load)
Efficiency	95% typical
Max overload capability	30 seconds 150%
Short circuit limit	2 seconds 200%

Mechanical	
Enclosure	IP 20 or IP 42
Cooling	Forced ventilation
Standard color	RAL 7035
Interface	
User interface	Graphic display module touch panel, notebook connection
Control protocol	Ethernet, Modbus-TCP, dry contacts
Environmental	
Operation temperature	5°C ...40°C standard/no derating (c) up to 50°C with derating
Humidity	< 95% non-condensing
EMC emissions	IEC 61000-2-2, IEC 61000-2-4, IEC 61000-6-2
Standards and norms compliance	
IEC/ISO/IEEE 80005-1, IEC PAS 80005-3, IEC 60146-2, IEC 61800-3, IEC 60721-1, IEC 61071, IEC 60529, IEEE 519, CISPR 11 ISM, EN 50178, IEC 62477-1	
Designed to CE mark requirements	
Service	
24/365 (optional) service support expert, remote access and diagnosis and worldwide service and spare parts network	

01 PCS100 SFC



Model ratings and dimensions

Model	Nominal rating (c)		Cabinet		Heat dissipation [kW]	Number of module pairs
	Converter output continuous power kVA	Current rating	Dimensions WxDxH [m]	Weight [kg]		
PCS100 SFC-0125	125	150	2.2 x 0.8 x 0.8	860	6.3	1
PCS100 SFC-0250	250	300	2.2 x 0.8 x 0.8	601	12.5	2
PCS100 SFC-0375	375	450	2.2 x 0.8 x 0.8	761	18.8	3
PCS100 SFC-0500	500	600	2.3 x 1.6 x 0.8	1503	25	4
PCS100 SFC-0625	625	750	2.3 x 2.0 x 0.8	1772	31.3	5
PCS100 SFC-0750	750	900	2.3 x 2.4 x 0.8	1932	37.5	6
PCS100 SFC-0875	875	1050	2.3 x 2.4 x 0.8	2308	43.8	7
PCS100 SFC-1000	1000	1200	2.3 x 2.4 x 0.8	2586	50	8
PCS100 SFC-1125	1125	1350	2.3 x 4.4 x 0.8	2746	56	9
PCS100 SFC-1250	1250	1500	2.3 x 4.4 x 0.8	3407	62.5	10
PCS100 SFC-1375	1375	1650	2.3 x 4.4 x 0.8	3700	69	11
PCS100 SFC-1500	1500	1800	2.3 x 4.4 x 0.8	3860	75	12
PCS100 SFC 1625	1625	1950	2.3 x 5.2 x 0.8	4248	81	13
PCS100 SFC-1750	1750	2100	2.3 x 5.2 x 0.8	4550	87.5	14
PCS100 SFC-1875	1875	2250	2.3 x 5.2 x 0.8	4710	94	15
PCS100 SFC-2000	2000	2400	2.3 x 6.0 x 0.8	5102	100	16

Parallel load sharing allows operation of multiple PCS100 SFC.

a Specific voltage levels can be achieved by means of a step-down transformer

b Dimensions are for side-by-side configuration. Back to back configuration dimensions will vary: i.e. 2 x 2MVA converters deliver up to 4MVA power. For IP 23 add 0.1 m depth

c Standard environmental conditions apply. Current rating refers to 480 Vac

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