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. Higtest 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
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

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, Human Machine Interface

Environental
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

Service
24/365 (optional) service support expert, remote access and diagnosis and worldwide service and spare parts network

ACS6080 SFC indoor cabinet

Model ratings and dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>Nominal Rating (c)</th>
<th>Interface</th>
<th>Maximum Heat Loss</th>
<th>Dimension</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID Type</td>
<td>Configuration Name</td>
<td>Max continuous output power [MVA]</td>
<td>Overload capability [10 sec]</td>
<td>Short circuit limit [1 sec]</td>
<td>GRID SIDE</td>
</tr>
<tr>
<td>Double-A</td>
<td>Double-ACS6109_L12_2a05</td>
<td>7.5</td>
<td>108%</td>
<td>122%</td>
<td>DIODE (12p) 2 UNITS (12p)</td>
</tr>
<tr>
<td></td>
<td>Double-ACS6107_A06_2a05</td>
<td>7.5</td>
<td>108%</td>
<td>180%</td>
<td>ACTIVE (6p) 2 UNITS (12p)</td>
</tr>
<tr>
<td></td>
<td>Double-ACS6109_L12_2a7</td>
<td>7.5</td>
<td>188%</td>
<td>226%</td>
<td>DIODE (12p) 2 UNITS (12p)</td>
</tr>
<tr>
<td>Double-B</td>
<td>Double-ACS6114_L12_2a7</td>
<td>13</td>
<td>108%</td>
<td>130%</td>
<td>DIODE (12p) 2 UNITS (12p)</td>
</tr>
<tr>
<td></td>
<td>Double-ACS6207_A12_2a7</td>
<td>14</td>
<td>107%</td>
<td>134%</td>
<td>ACTIVE (2*6p) 2 UNITS (12p)</td>
</tr>
<tr>
<td></td>
<td>Double-ACS6114_L12_2a9</td>
<td>14</td>
<td>108%</td>
<td>135%</td>
<td>DIODE (12p) 2 UNITS (12p)</td>
</tr>
<tr>
<td></td>
<td>Double-ACS6209_A12_2a9</td>
<td>15</td>
<td>108%</td>
<td>151%</td>
<td>ACTIVE (2*6p) 2 UNITS (12p)</td>
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<tr>
<td>Triple-A</td>
<td>Triple-ACS6209_L24_3a7</td>
<td>18</td>
<td>141%</td>
<td>141%</td>
<td>DIODE (24p) 3 UNITS (18p)</td>
</tr>
<tr>
<td></td>
<td>Triple-ACS6209_A12_3a7</td>
<td>18</td>
<td>157%</td>
<td>157%</td>
<td>ACTIVE (2*6p) 3 UNITS (18p)</td>
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<tr>
<td></td>
<td>Triple-ACS6214_L24_3a7</td>
<td>21</td>
<td>121%</td>
<td>121%</td>
<td>DIODE (24p) 3 UNITS (18p)</td>
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<td></td>
<td>Triple-ACS6214_L24_3a9</td>
<td>26</td>
<td>113%</td>
<td>125%</td>
<td>DIODE (24p) 3 UNITS (18p)</td>
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<td>Triple-ACS6309_A18_3a9</td>
<td>27</td>
<td>114%</td>
<td>134%</td>
<td>ACTIVE (3*6p) 3 UNITS (18p)</td>
</tr>
</tbody>
</table>

Parallel load sharing allows operation of multiple ACS6080 SFC.

* Input transformer is required for grid voltage adaptation
* Depending on the model
* Standard environmental conditions and maximum preload equal to 70% apply. Use of chiller can reduce derating at higher temperatures.
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...690 Vac, +/-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:** PROFINET®, DeviceNet™, EtherCAT®, CANopen, Modbus TCP/RTU, PROFINET IO, PROFIsafe, EtherCAT®, POWERLINK, ControlNet™

### Environmental
- **Operation temperature:** 0 to +60°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
- Designed to CE requirements. UL, EAC, CAN 508A/C, CSA, RCM as option

### Service
- 24/365 service support with expert remote access (optional)
- Worldwide service and spare parts network

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**Model ratings and dimensions**

<table>
<thead>
<tr>
<th>Model</th>
<th>Nominal rating (c)</th>
<th>Overload (d)</th>
<th>Cabinet</th>
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<tbody>
<tr>
<td>ACS880-207-1050A-7</td>
<td>1000</td>
<td>837</td>
<td>1171</td>
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<td>ACS880-207-1570A-7</td>
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<td>1754</td>
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<td>2000</td>
<td>1677</td>
<td>2347</td>
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<td>ACS880-207-3080A-7</td>
<td>3000</td>
<td>2509</td>
<td>3512</td>
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<td>ACS880-207-4100A-7</td>
<td>4000</td>
<td>3345</td>
<td>4683</td>
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<td>ACS880-207-5130A-7</td>
<td>5000</td>
<td>4181</td>
<td>5853</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Typical grid voltage</th>
<th>0.4 .. 30 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>50 / 60 Hz</td>
</tr>
</tbody>
</table>

- Input section: IGBT voltage source converter
- Converter voltage: 200 .. 480 VAC
- Total harmonics distortion < 3 % THDi (at rated load)

### Output

<table>
<thead>
<tr>
<th>Typical ship voltage</th>
<th>LV (up to 690), MV (6.6 kV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>60 / 50 Hz</td>
</tr>
</tbody>
</table>

- 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%

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**Model ratings and dimensions**

<table>
<thead>
<tr>
<th>Model</th>
<th>Nominal rating (c)</th>
<th>Converter continuous power kVA</th>
<th>Current rating</th>
<th>Dimensions WxDxH [m]</th>
<th>Weight [kg]</th>
<th>Heat dissipation [kW]</th>
<th>Number of module pairs</th>
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<tbody>
<tr>
<td>PCS100 SFC-0125</td>
<td>125</td>
<td>150</td>
<td>2.2 x 0.8 x 0.8</td>
<td>860</td>
<td>6.3</td>
<td>1</td>
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<tr>
<td>PCS100 SFC-0250</td>
<td>250</td>
<td>300</td>
<td>2.2 x 0.8 x 0.8</td>
<td>601</td>
<td>12.5</td>
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<tr>
<td>PCS100 SFC-0375</td>
<td>375</td>
<td>450</td>
<td>2.2 x 0.8 x 0.8</td>
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<td>PCS100 SFC-0500</td>
<td>500</td>
<td>600</td>
<td>2.3 x 1.6 x 0.8</td>
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<tr>
<td>PCS100 SFC-0625</td>
<td>625</td>
<td>750</td>
<td>2.3 x 2.0 x 0.8</td>
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<td>PCS100 SFC-0750</td>
<td>750</td>
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<td>37.5</td>
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<td>PCS100 SFC-0875</td>
<td>875</td>
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<td>43.8</td>
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<tr>
<td>PCS100 SFC-1000</td>
<td>1000</td>
<td>1200</td>
<td>2.3 x 2.4 x 0.8</td>
<td>2586</td>
<td>50</td>
<td>8</td>
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<tr>
<td>PCS100 SFC-1125</td>
<td>1125</td>
<td>1350</td>
<td>2.3 x 4.4 x 0.8</td>
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<td>56</td>
<td>9</td>
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<tr>
<td>PCS100 SFC-1250</td>
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<td>1500</td>
<td>2.3 x 4.4 x 0.8</td>
<td>3407</td>
<td>62.5</td>
<td>10</td>
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<tr>
<td>PCS100 SFC-1375</td>
<td>1375</td>
<td>1650</td>
<td>2.3 x 4.4 x 0.8</td>
<td>3700</td>
<td>69</td>
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<tr>
<td>PCS100 SFC-1500</td>
<td>1500</td>
<td>1800</td>
<td>2.3 x 4.4 x 0.8</td>
<td>3860</td>
<td>75</td>
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<tr>
<td>PCS100 SFC-1625</td>
<td>1625</td>
<td>1950</td>
<td>2.3 x 5.2 x 0.8</td>
<td>4248</td>
<td>81</td>
<td>13</td>
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<tr>
<td>PCS100 SFC-1750</td>
<td>1750</td>
<td>2100</td>
<td>2.3 x 5.2 x 0.8</td>
<td>4550</td>
<td>87.5</td>
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<tr>
<td>PCS100 SFC-1875</td>
<td>1875</td>
<td>2250</td>
<td>2.3 x 5.2 x 0.8</td>
<td>4710</td>
<td>94</td>
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<tr>
<td>PCS100 SFC-2000</td>
<td>2000</td>
<td>2400</td>
<td>2.3 x 6.0 x 0.8</td>
<td>5102</td>
<td>100</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

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**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)
- Humidity: < 95% non-condensing
- EMC emissions: IEC 61000-2-2, IEC 61000-2-4, IEC 61000-6-2

**Standards and norms compliance**

- Designed to CE mark requirements

**Service**

- 24/365 (optional) service support expert, remote access and diagnosis and worldwide service and spare parts network