PCS100 AVC-40
Active Voltage Conditioner for sag correction
Technical Catalogue
ABB Power Conditioning

Leading the industry in innovation and technology, ABB provides power conditioning for many of the world’s foremost organizations, ensuring the continuous operation of small, medium to large businesses are protected on a global scale.

ABB’s Power Conditioning portfolio is a unique line up of low and medium voltage power conversion technology that is part of the product group, Power Protection.

The portfolio consists of static frequency converters, UPSs, voltage and power conditioners that demonstrate highly reliable and cost-effective performance. With this product portfolio, ABB offer efficient power conditioning solutions that are specifically designed to solve power quality problems and stabilize networks.

Covering applications from data centers through to complete industrial plant protection, micro grid systems and shore-to-ship supply, ABB have the power conversion technology for every need. Starting from a few kVA to many MVA and a wide range of supply voltages.

It’s business as usual with power conditioning technologies in place.

<table>
<thead>
<tr>
<th>Power Conditioning Product Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Line</strong></td>
</tr>
</tbody>
</table>
| Industrial UPS | Utility deep sag and surge correction  
Utility outage protection | PCS100 UPS-I Industrial UPS  
PCS100 MV UPS Medium Voltage UPS |
| Voltage Conditioning | Utility sag and surge correction  
Load voltage regulation | PCS100 AVC-40 Active Voltage Conditioner for sag correction  
PCS100 AVC-40 Active Voltage Conditioner for voltage regulation |
| Reactive Power Conditioning | Load created sag correction  
Power Factor correction  
Harmonic mitigation  
Imbalance correction | PCS100 RPC Reactive Power Conditioner |
| Frequency Conversion | 50/60 Hz conversion  
Frequency fluctuation | PCS100 SFC Static Frequency Converter |
Contents

ABB Power Conditioning.................................................................2
Contents................................................................................................3
Voltage Sags - The Problem..............................................................4
PCS100 AVC-40 Active Voltage Conditioner........................................5
PCS100 AVC-40 Benefits.......................................................................6
Industries and Applications...............................................................7
Features.............................................................................................8
Functional Description......................................................................10
Technical Specification....................................................................12
How to Select a PCS100 AVC-40 ......................................................14
PCS100 AVC-40 Model Range............................................................15
Layout Plans and Dimensions..........................................................16
Options.............................................................................................20
User Interface....................................................................................22
User Connections..............................................................................23
Installation Requirements...............................................................24
Service.............................................................................................25
Related Documentation....................................................................26
Voltage Sags - The Problem

Industries in developed countries, with modern power networks, are not immune to voltage problems. Although utilities endeavor to supply reliable, high-quality power, voltage sags and surges will continue to be a fact of life. Modern industry is becoming more automated and the sensitivity of processes to power quality events is increasing. Even a short event of less than one cycle can cause processes to unexpectedly stop, potentially resulting in product damage, wastage and production shortages.

What Are Voltage Sags?
A voltage sag is not a complete interruption of power; it is a temporary drop below 90 percent of the nominal voltage level. Most voltage sags do not go below 50 percent of the nominal voltage, and they normally last from 2 to 10 cycles - or from 32 to 200 milliseconds.

![Voltage Sag Graph]

Voltage sags are the most significant power quality problem facing industrial customers today, and they can be a significant problem for large commercial customers as well. There are two sources of voltage sags: external, on the utility’s transmission and distribution lines, and internal within the customer’s facility. Utilities continuously strive to provide the most reliable and consistent electric power possible. In the course of normal utility operations, however, many things can cause voltage sags.

Weather is the most common cause of external sags and momentary interruptions all around the world. Thunderstorms and lightning strikes on power lines create line to ground faults causing voltage sags in a wide area.

High winds can blow tree branches into power lines, connecting the line with the ground and shorting between phases. A series of sags will occur as the branches repeatedly touch the power lines.

Snow and ice buildup on power lines can cause flashovers on the insulators.

Other external causes are traffic accidents, construction works and animals impacting the power lines. Internal causes of voltage sags can include starting major loads and grounding or wiring problems.

Whether or not a voltage sag causes a problem will depend on the magnitude and duration of the sag and on the sensitivity of your equipment. Many types of electronic equipment are sensitive to voltage sags, including variable speed drive controls, motor starter contactors, robotics, programmable logic controllers, controller power supplies, and control relays. Much of this equipment is used in applications that are critical to an overall process, which can lead to very expensive downtime when voltage sags occur.
PCS100 AVC-40 Active Voltage Conditioner

The ABB PCS100 AVC-40 is an inverter based system that protects sensitive industrial and commercial loads from voltage disturbances.

Providing fast, accurate voltage sag and surge correction as well as continuous voltage regulation and load voltage compensation, the PCS100 AVC-40 has been optimally designed to provide equipment immunity from power quality events on the supply network.

How it works

The PCS100 AVC-40 consists of two converters that are not on the current path between the load and the utility. Instead, the corrective voltage injection is achieved by means of a transformer winding between the utility and the sensitive load. This configuration results in a very efficient and effective method to provide voltage correction with reduced risk of negative impacts on the load.

The PCS100 AVC-40 requires no batteries as it draws the additional energy required during sag to make up the correction voltage from the utility supply. With no ongoing maintenance costs typically associated with batteries the cost of ownership for PCS100 AVC-40 systems is very small.

Furthermore, the PCS100 AVC-40 contains a redundant internal bypass system that, in the event overload or internal fault condition, ensures that the load is continually supplied from the utility.
PCS100 AVC-40 Benefits

Continuous protection from the most common utility voltage problems found in modern power networks

Even the most modern power networks are not perfect and voltage sags are the most common cause of equipment malfunction in today’s automated industry. The PCS100 AVC-40, built on a proven and dependable converter platform, provides instant voltage sag and surge correction, ensuring maximum productivity.

Failsafe worry free operation even in harsh electrical environments

The PCS100 AVC-40 is specifically designed for industrial and large commercial applications. Its industrial design and rugged overload capability means it can handle conditions that others cannot. Furthermore, it contains a redundant internal bypass system that ensures that the load continues to be supplied from the utility.

Faster return on investment due to low operation costs

With industry leading efficiency exceeding 98 percent the PCS100 AVC-40 has minimal heat injection, resulting with minimal costs for electricity and cooling. The PCS100 AVC-40 requires no batteries, as it draws the additional energy required to make up the correction voltage from the utility supply. With no ongoing maintenance costs typically associated with batteries the cost of ownership for a PCS100 AVC-40 system is very low. As the system has a small footprint, it can be easily fitted into equipment rooms or confined spaces, eliminating the need to design and build added floor space.
Industries and Applications

Industrial automation has reached very high levels of sophistication. Industrial plants and commercial equipment now house some very advanced technology, and this technology relies on a robust and continuous power supply. However, the public utility grid is susceptible to unpredictable events, such as lightning strikes and faults.

In the modern industrial world, voltage sags cause machine disturbances or product defects, resulting in wasted material, long restart times, extensive repair or maintenance activities, revenue losses or contractual penalties.

The costs of such events can quickly amount to hundreds of thousands of dollars.

Nowadays, almost all continuous production lines and process industries or sensitive medical equipment must perform faultlessly on a continuous basis. Ensuring that equipment receives a rock-solid, clean, continuous flow of power, even during major grid disturbances, is where PCS100 AVC-40 product range comes in.

PCS100 AVC-40 can be found in …

Electronics industry
Sensitive machinery
Clean room control

Food and beverage
High speed bottling
Packaging lines
Dairy processing

Automotive
Welding process
Coating process
Painting process

Continuous process
Fibre production lines
Film production lines
Extrusion process

Pharmaceutical
Batch process
Climate control

Medical
Sensitive medical imaging equipment

… and many more.
Features

**Sophisticated control software**
Based on 20 years voltage conditioning industry experience

**Modular construction**
Proven PCS100 power converter platform, with more than 950 MVA installed base, enabling fast and easy maintenance

**No energy storage**
Increased system reliability with minimized maintenance

**Connectivity**
Ethernet
Modbus TCP
Integrated web server
E-mail notifications

**Multilingual graphical touch screen interface**
Simple user controls, easy to understand event log and voltage event data logging
**Very high efficiency**
Typically >98% even on partial loading

**Industrial design**
Rugged overload capability, industrial grade fault capacity and design for standard industrial loads

**Small footprint**
Industry leading power density

**Sag and swell correction with continuous ±10% online regulation**
Response in 250 microseconds and correction in less than 5 milliseconds

**Internal bypass**
Redundant internal bypass design enabling continuity of load supply in case of PCS100 AVC-40 fault

**Regenerative load support**
Bidirectional power module design enables support for regenerative loads such as lifts and cranes
Vacuum Circuit Breaker

The VB-150-3000 circuit breaker is designed for high voltage applications, providing reliable and efficient performance. It is suitable for use in substations, power plants, and industrial facilities. The breaker features a compact design, which facilitates easy installation and maintenance.

Performance

The VB-150-3000 circuit breaker is capable of handling significant currents and voltages. It can withstand heavy loads, ensuring stable operation under various conditions. The unit has a fast tripping mechanism, ensuring quick response to faults, thus minimizing downtime.

Reliability

The VB-150-3000 circuit breaker is built to meet stringent safety and performance standards. It undergoes rigorous testing to ensure durability and reliability. The breaker is designed to operate effectively in diverse environments, including harsh weather conditions and high-impact situations.

Technical Specifications

- **Rated Voltage:** 3000 V
- **Rated Current:** 150 A
- **Maximum Continuous Current:** 1000 A
- **Rated Short-Circuit Current:** 200 kA
- **Trip Time:** 40 ms
- **Insulation System:** High Voltage Class
- **Protection Features:** Overcurrent, Short-Circuit, Under-voltage

Conclusion

The VB-150-3000 circuit breaker is an excellent choice for applications requiring a high level of reliability and performance. Its robust construction and advanced features make it a trusted solution for industries依赖于高电压传输的稳定性和可靠性。
**Operation Detail**

The following diagrams show the PCS100 AVC-40 operation when a utility disturbance occurs, and what happens if the internal bypass operates.

**Utility Voltage Close to Nominal Level**

When the utility voltage is close to nominal level, i.e. typical utility supply conditions without sags or surges, the PCS100 AVC-40 is only adding small corrections for utility voltage unbalance or load induced voltage variations.

**Utility Disturbance Occurs**

When the utility voltage deviates from nominal or the set point, due to voltage sags, surges, undervoltages, overvoltages or unbalance, the inverter will inject a correcting voltage via the Injection Transformer. The correcting voltage level is based on the disturbance level and the energy needed for correction is derived from the utility via the PCS100 AVC-40 rectifier.

Diagrams on the left show cases with utility voltage below and above nominal level.

**Internal Bypass Operation**

In the case of an overload or internal fault condition the internal bypass circuit will shunt the inverter side of the Injection Transformer, bypassing the inverter and effectively providing a direct connection from the utility supply to the output, without interruption to the load.
## Technical Specification

### Utility - Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power range</strong></td>
<td>150 – 1800 kVA (220 V model)</td>
</tr>
<tr>
<td></td>
<td>150 – 3600 kVA (400 and 480 V model)</td>
</tr>
<tr>
<td><strong>Rated voltage (model specific)</strong></td>
<td>220 V – application range 208 V – 220 V</td>
</tr>
<tr>
<td></td>
<td>400 V – application range 380 V – 415 V</td>
</tr>
<tr>
<td></td>
<td>480 V – application range 440 V – 480 V</td>
</tr>
<tr>
<td><strong>Application voltage</strong></td>
<td>(model specific)</td>
</tr>
<tr>
<td></td>
<td>220 V – application range 208 V – 220 V</td>
</tr>
<tr>
<td></td>
<td>400 V – application range 380 V – 415 V</td>
</tr>
<tr>
<td></td>
<td>480 V – application range 440 V – 480 V</td>
</tr>
<tr>
<td><strong>Application range</strong></td>
<td>220 V – application range 208 V – 220 V</td>
</tr>
<tr>
<td></td>
<td>400 V – application range 380 V – 415 V</td>
</tr>
<tr>
<td></td>
<td>480 V – application range 440 V – 480 V</td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>Application voltage less than the rated voltage results in power derating. Consult the rating tables for more information.</td>
</tr>
</tbody>
</table>

### Load - Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum supply voltage</strong></td>
<td>110%</td>
</tr>
<tr>
<td><strong>Nominal supply frequency</strong></td>
<td>50 Hz or 60 Hz</td>
</tr>
<tr>
<td><strong>Frequency tolerance</strong></td>
<td>± 5 Hz</td>
</tr>
<tr>
<td><strong>Power system</strong></td>
<td>3 phase + Neutral (4-Wire) Centre ground referenced (TN-S)</td>
</tr>
<tr>
<td><strong>Overvoltage category</strong></td>
<td>III</td>
</tr>
<tr>
<td><strong>Fault capacity</strong></td>
<td>Refer to the model tables shown in this document.</td>
</tr>
<tr>
<td><strong>Outage – control ride through</strong></td>
<td>&gt; 600 ms</td>
</tr>
</tbody>
</table>

### Performance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Efficiency</strong></td>
<td>Typically &gt; 98%</td>
</tr>
<tr>
<td><strong>Sag correction response</strong></td>
<td>Initial &lt; 250 µs Complete &lt; ½ cycle</td>
</tr>
<tr>
<td><strong>Voltage regulation accuracy</strong></td>
<td>±1% typical, ±2% max.</td>
</tr>
<tr>
<td><strong>Sag correction accuracy</strong></td>
<td>±4%</td>
</tr>
<tr>
<td><strong>Continuous regulation range</strong></td>
<td>±10%</td>
</tr>
<tr>
<td><strong>Sag correction capability</strong></td>
<td>40%</td>
</tr>
<tr>
<td><strong>Sag correction performance</strong></td>
<td>60% to 100% for 30 seconds, 50% to 90% for 10 seconds 45% to 100% for 30 seconds</td>
</tr>
<tr>
<td><strong>Partial correction derating conditions</strong></td>
<td>1.0 PF at 80% load 0.8 PF at 100% load</td>
</tr>
<tr>
<td><strong>Note:</strong></td>
<td>Refer to performance curves in this document for more details.</td>
</tr>
</tbody>
</table>

### Internal Bypass

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td>100% of model rating (kVA)</td>
</tr>
<tr>
<td><strong>Maximum overload capacity</strong></td>
<td>125% for 10 minutes 150% for 1 minute 500% for 1 s 2000% for 200 ms</td>
</tr>
<tr>
<td><strong>Transfer time</strong></td>
<td>To Bypass &lt; 0.5 ms To Inverter &lt; 250 ms</td>
</tr>
<tr>
<td><strong>Equivalent series impedance</strong></td>
<td>bypass &lt; 2.5% typical</td>
</tr>
</tbody>
</table>

### Injection Transformer

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transformer type</strong></td>
<td>Dry</td>
</tr>
<tr>
<td><strong>Insulation</strong></td>
<td>IEC 60085 Thermal class 200</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>50 Hz and 60 Hz</td>
</tr>
<tr>
<td><strong>Vector group</strong></td>
<td>Diii (delta + 3 independent windings)</td>
</tr>
</tbody>
</table>
### Environmental
- **Operating temperature range**: 0° C to 50° C (32° F to 122° F)
- **Temperature derating**: Above 40° C, derate at 2% load per °C to a maximum of 50° C
- **Operating altitude**: < 1000 m without derating
- **Capacity derating with altitude**: 1% every 100 m above 1000 m, 2000 m maximum
- **Inverter cooling**: Forced ventilation
- **Transformer cooling**: Natural convection
- **Humidity**: < 95%, non-condensing
- **Pollution degree rating**: 2
- **Noise**: < 75dBA @ 2 m

### Enclosure
- **Enclosure rating**: IP20
- **Material**: Electro-galvanized steel
- **Panel thickness Side and rear Door**: 1.5 mm, 2 mm
- **Finish**: Standard epoxy-polyester powder coating textured finish. RAL7035
- **Enclosure access**: Hinged doors with key lock

### Service
- **MTTR**: 30 min typical by module exchange
- **Diagnostics**: Non-volatile event & service log
- **Remote monitoring**: E-mail

### User Interface
- **User interface**: 8.4” color touch panel, multilingual
- **Touch panel**: Full parameter control, system event log, voltage event log
- **Control inputs**: Start / Stop / Reset digital inputs
- **Control outputs**: Run, warning and fault relays
- **Communication**: Ethernet, Modbus TCP, E-mail

### Power Quality Event Monitor
- **Events recorded**: Voltage Sag (RMS)
- **Event detection**: Input Voltage
- **Sag threshold**: 90% of Utility voltage default setting (user adjustable)
- **Surge threshold**: 110% of Utility voltage default setting (user adjustable)
- **Accuracy**: Voltage: ± 2%
- **Remote monitoring**: E-mail notification
- **Duration**: 10 ms

### Standards and Certifications
- **Quality**: ISO 9001
- **Environmental**: ISO 14001
- **Marking**: CE, C-Tick
- **Safety**: IEC 62103
- **Electromagnetic compatibility**: Emissions: CISPR 11 Class A Group 1
- **Performance**: IEC 61000-4-34
How to Select a PCS100 AVC-40

To select the correct size PCS100 AVC-40 for the application the following information should be known:

- Utility voltage
- Power rating of the load (kVA and kW, or kVA and power factor)

The product tables in the following section can then be used to look up the required model for the given application. Each model has a specific type code.

Type Code
The PCS100 AVC-40 type code is given in the product tables. The type code is a unique code for the specific PCS100 AVC-40 model and specifies all the components that are used to construct the model. From the base code given in the product tables options can be added to the type code. These options are called plus (+) codes.

The following diagram outlines the structure of the type code:

```
PCS100-07 - 400 - 02B - 40 - L + SA
```

Type Code Parameters
Rated Voltage
This is the rated voltage of the PCS100 AVC-40. Options are 480 V, 400 V and 220 V. Other operating voltages (i.e. 380V) are achieved by software settings and setting of an auxiliary transformer tapping.

Power Rating
Rated power of the system based on the number of power module pairs. Each power module pair operating on rated voltage provides 300 kVA of power.

Note: Operation at lower than the rated voltage results in less kVA per module pair. Consult the rating tables for more information.

Correction Performance
Defines sag correction performance. Correction performance of the PCS100 AVC-40 is 40%.

Termination Side
The location of the power terminals (input and output) when viewed from the front of the Transformer Enclosure.

Note: Frame size 1B without additional termination related options termination side can be from left, right or bottom as the transformer terminals are facing front.

Options
Options as described in this catalogue are then added as plus codes to the main type code

PCS100 AVC Sizing Tool
In addition ABB provides a Windows PC application PCS100 AVC Sizing Tool that can be used to dimension the correct PCS100 AVC-40 model required for the application.

For further information and tool availability please contact your local ABB sales office.
## PCS100 AVC-40 Model Range

### 220 V Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Rated Input Current A (at 90% utility voltage)</th>
<th>Rated Output Current A</th>
<th>Fault Capacity kA</th>
<th>Losses kW (Typical)</th>
<th>Efficiency % (Typical)</th>
<th>Airflow m³/min</th>
<th>Frame Size</th>
<th>Type Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>220 V</td>
<td>150: 142 459 394 31.5 5.0 96.7 18 1B PCS100-07-222-0B5-40-x</td>
<td>208 V</td>
<td>150: 142 459 394 31.5 5.0 96.7 18 1B PCS100-07-222-0B5-40-x</td>
<td>225: 213 686 591 31.5 6.5 97.2 18 1B PCS100-07-222-0B75-40-x</td>
<td>300: 284 905 788 31.5 7.1 97.7 18 1B PCS100-07-222-01B-40-x</td>
<td>450: 425 1350 1181 40 9.7 97.9 36 2B PCS100-07-222-01BS-40-x</td>
<td>600: 567 1791 1575 40 11.8 98.1 36 2B PCS100-07-222-02B-40-x</td>
<td>750: 709 2239 1969 50 14.5 98.1 54 3B PCS100-07-222-02B5-40-x</td>
</tr>
</tbody>
</table>

### 400 V Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Rated Input Current A (at 90% utility voltage)</th>
<th>Rated Output Current A</th>
<th>Fault Capacity kA</th>
<th>Losses kW (Typical)</th>
<th>Efficiency % (Typical)</th>
<th>Airflow m³/min</th>
<th>Frame Size</th>
<th>Type Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 V</td>
<td>150: 142 253 217 15 4.7 96.9 18 1B PCS100-07-400-0B5-40-x</td>
<td>380 V</td>
<td>150: 142 253 217 15 4.7 96.9 18 1B PCS100-07-400-0B5-40-x</td>
<td>225: 213 377 325 15 6.1 97.3 18 1B PCS100-07-400-0B75-40-x</td>
<td>300: 285 498 431 15 6.6 97.8 18 1B PCS100-07-400-01B-40-x</td>
<td>450: 427 742 650 31.5 8.9 98.1 36 2B PCS100-07-400-01BS-40-x</td>
<td>600: 570 985 867 31.5 10.8 98.2 36 2B PCS100-07-400-02B-40-x</td>
<td>750: 712 1232 1083 31.5 15.5 98.4 54 3B PCS100-07-400-02BS-40-x</td>
</tr>
<tr>
<td>415 V</td>
<td>3000: 2850 4811 4331 65 47.7 98.4 180 10B PCS100-07-400-10B-40-x+BB</td>
<td>400 V</td>
<td>3000: 2850 4811 4331 65 47.7 98.4 180 10B PCS100-07-400-10B-40-x+BB</td>
<td>3600: 3420 5774 5197 65 60.3 98.3 216 12B PCS100-07-400-12B-40-x+BB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 480 V Models

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Rated Input Current A (at 90% utility voltage)</th>
<th>Rated Output Current A</th>
<th>Fault Capacity kA</th>
<th>Losses kW (Typical)</th>
<th>Efficiency % (Typical)</th>
<th>Airflow m³/min</th>
<th>Fram Size</th>
<th>Type Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>480 V</td>
<td>150: 138 211 177 20 4.7 96.9 18 1B PCS100-07-480-0B5-40-x</td>
<td>440 V</td>
<td>150: 138 211 177 20 4.7 96.9 18 1B PCS100-07-480-0B5-40-x</td>
<td>225: 206 315 271 20 6.1 97.3 18 1B PCS100-07-480-0B75-40-x</td>
<td>300: 275 415 361 20 6.6 97.8 18 1B PCS100-07-480-01B-40-x</td>
<td>450: 413 619 542 25 8.9 98.1 36 2B PCS100-07-480-01BS-40-x</td>
<td>600: 550 821 722 25 10.8 98.2 36 2B PCS100-07-480-02B-40-x</td>
<td>750: 688 1026 903 25 13.5 98.2 54 3B PCS100-07-480-02BS-40-x</td>
</tr>
<tr>
<td>480 V</td>
<td>3000: 2750 4009 3509 65 44.3 98.5 180 10B PCS100-07-480-10B-40-x+BB</td>
<td>480 V</td>
<td>3000: 2750 4009 3509 65 44.3 98.5 180 10B PCS100-07-480-10B-40-x+BB</td>
<td>3000: 2750 4009 3509 65 44.3 98.5 180 10B PCS100-07-480-10B-40-x+BB</td>
<td>3600: 3300 4811 4331 65 55.4 98.5 216 12B PCS100-07-480-12B-40-x+BB</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Layout Plans and Dimensions

Side-by-Side Layout Plans
The following plans relate to the standard Side-by-Side Layout of all frame sizes. Shown layouts are only for right (R) termination side. For left (L) termination side in Side-by-Side layout, the Transformer Enclosure is mounted on left side of Controller Enclosure.

1B frame size
2B frame size Right termination side
3B frame size Right termination side

4B, 5B and 6B frame size Right termination side

Note:
In frame size 1B without optional Termination Enclosure, Cable Ducts or Side Aperture termination side can be from left, right or bottom as the Injection Transformer terminals (customer’s connection terminals) are facing front.

Note:
For frame sizes 2B and 3B, due to position of Injection Transformer terminals, optional Termination Enclosure or Side Aperture MUST be selected. Please see Options chapter of this document for option description.
Back-to-Back Layout Plans

The following plans relate to the optional Back-to-Back layout with left (L) or right (R) termination side options shown. Exact termination side needs to be defined with L or R in the product type code.

2B frame size

3B frame size

4B, 5B and 6B frame size

Note:
For frame sizes 2B and 3B, due to position of Injection Transformer terminals, optional Termination Enclosure or Side Aperture MUST be selected. Please see Options chapter of this document for option description.
8B, 10B and 12B frame size

Controler Enclosure
Transformer Enclosure
Left termination side
Right termination side
Clearances

The following clearances are required for all enclosures:

- Allow 200 mm (minimum) above
- Allow 1500 mm (recommended) clearance in front
- Allow 200 mm (minimum) clearance at the rear of Controller Enclosure for air flow. (Exception: The Transformer Enclosure can be placed back to back without any clearance.)
- No side clearance required
- Side clearance to the wall at the side where the cabinet outmost hinges of minimum 400 mm is recommended to allow the doors to open sufficiently. The doors must open 120° to allow normal cabinet access the PCS100 AVC-40 module replacement.

Weights

The following tables show the dimensions and weights of Controller Enclosure and Injection Transformer Enclosure in different frame sizes.

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>Controller Enclosure Dimensions (HxWxD)</th>
<th>Transformer Enclosure Dimensions (HxWxD)</th>
<th>220 V Models</th>
<th>400 V and 480 V Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Controller Enclosure Weight</td>
<td>Transformer Enclosure Weight</td>
<td>Controller Enclosure Weight</td>
<td>Transformer Enclosure Weight</td>
</tr>
<tr>
<td>mm</td>
<td>kg</td>
<td>kg</td>
<td>kg</td>
<td>kg</td>
</tr>
<tr>
<td>1B</td>
<td>2154x809x804</td>
<td>1155</td>
<td>1010</td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>2154x809x804</td>
<td>581</td>
<td>1520</td>
<td>714</td>
</tr>
<tr>
<td>3B</td>
<td>2154x809x1204</td>
<td>1162</td>
<td>3880</td>
<td>1162</td>
</tr>
<tr>
<td>4B</td>
<td>2154x1618x804</td>
<td>1294</td>
<td>3880</td>
<td>1294</td>
</tr>
<tr>
<td>6B</td>
<td>2154x1618x1204</td>
<td>1427</td>
<td>3880</td>
<td>1427</td>
</tr>
<tr>
<td>8B</td>
<td>2154x3209x804</td>
<td>NA</td>
<td>NA</td>
<td>2324</td>
</tr>
<tr>
<td>10B</td>
<td>2154x3209x1604</td>
<td>NA</td>
<td>NA</td>
<td>2590</td>
</tr>
<tr>
<td>12B</td>
<td>2154x3209x1604</td>
<td>NA</td>
<td>NA</td>
<td>2856</td>
</tr>
</tbody>
</table>

Note: The frame size 1B enclosure houses both the controller and transformer sub-assemblies.
Note: Allow ±10% tolerance for all weights shown in tables above.
Options

The following options are available for the PCS100 AVC-40 enclosures.

<table>
<thead>
<tr>
<th>Code</th>
<th>Option Description</th>
<th>1B</th>
<th>2B</th>
<th>3B</th>
<th>4B, 5B, 6B</th>
<th>8B, 10B, 12B</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>BB</td>
<td>Back-to-Back Layout Plan</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>8B-12B in BB layout only</td>
</tr>
<tr>
<td>SA</td>
<td>Side Aperture</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD</td>
<td>Top Entry Cable Duct</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RK</td>
<td>Roof Kit</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TE</td>
<td>Termination Enclosure</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DMY</td>
<td>Dummy Enclosure</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>Back-to-Back layout only</td>
</tr>
<tr>
<td>TPx</td>
<td>Termination Palms</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x = I for IEC or N for NEMA</td>
</tr>
</tbody>
</table>

BB Back-to-Back Layout

Most of the PCS100 AVC-40 models consist of a separate enclosure for the controller and the Injection Transformer. The standard layout is Side-by-Side where the Controller Enclosure and Transformer Enclosure are lined up Side-by-Side.

For Back-to-Back layout (+BB plus code) the Transformer Enclosure is installed behind Controller Enclosure.

Side Aperture (SA)

Left and Right facing transformer enclosures are supplied with the complete side panel.
The enclosure can be supplied with an aperture pre-cut as pictured.
The side aperture allows for an easier side cable or bus bar connection to a maintenance bypass.

Top Entry Cable Duct (CD)

200 mm Top Entry Cable Duct for supply and load cables (or bus bars) can be accommodated for frame sizes 1B and 2B.
The Cable Duct has the same depth as the PCS100 AVC-40 enclosure and is mounted on the side of the transformer terminals.
The Cable Duct comes complete with a top gland plate and cable support.

Note: The Gland plate is delivered as a blind plate without any holes.

Roof Kit (RK)

Roof Kits are available where small amounts of liquid may fall onto the top of the enclosures.
The roof kit option increases the units protection degree to IP21. These are only for indoor use.
There is a 200 mm clearance from the enclosure top to the roof kit to allow for ventilation of the transformer enclosure.
The kits will cover both the transformer and controller enclosures.
The roof kit is shipped separately and must be assembled on site.
Termination Enclosure (TE)

The 400 mm Termination Enclosure option allows easier power connections or to match enclosure sizes with other equipment.

The Termination Enclosure has the same depth like the PCS100 AVC-40 enclosure and is mounted on the side of the transformer terminals.

The enclosure comes complete with a plinth and door access to enable top or bottom cable (or bus bar) connection.

The Termination Enclosure option includes cable support and gland plate.

Note:
Gland plate is delivered as blind plate without any holes.

Dummy Enclosure (DMY)

400 mm Dummy enclosures are completely empty enclosures that can be ordered for cosmetic reasons, e.g. to fill a gap between other enclosures in a Back-to-Back layout.

Termination Palms (TPx)

Standard termination palms on the PCS100 AVC-40 are horizontal bars.

Termination Palms option offers vertical bars with dimensions and hole positions according to IEC or NEMA standard for all of the termination positions.

See example of standard offering and TPx option on the images on the right.

Add appropriate standard letter instead of x in TPx for correct option code:
- IEC standard: TPI
- NEMA standard: TPN

Optional Termination Palm
User Interface

Graphic Display Module
The primary user interface for configuration of the PCS100 AVC-40 is via the Graphic Display Module (GDM). The GDM is an 8.4” touchscreen user-friendly intuitive interface. The integrated navigation screen gives easy accessibility to any information on the PCS100 AVC-40, shows the system status and provides access to the operating parameters and event history. The mimic diagram gives the users a clear view of the status of the system.

<table>
<thead>
<tr>
<th>Feature</th>
<th>GDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display resolution</td>
<td>800 x 600 pixels</td>
</tr>
<tr>
<td>Display size</td>
<td>8.4”</td>
</tr>
<tr>
<td>Color graphic display</td>
<td>yes</td>
</tr>
<tr>
<td>Touch sensitive display</td>
<td>yes</td>
</tr>
<tr>
<td>Full descriptions of status and faults</td>
<td>yes</td>
</tr>
<tr>
<td>Local Start/Stop Reset Control</td>
<td>yes</td>
</tr>
<tr>
<td>Status Display</td>
<td>yes</td>
</tr>
<tr>
<td>Parameter adjustment</td>
<td>yes</td>
</tr>
<tr>
<td>Number of Event Log records stored</td>
<td>10000</td>
</tr>
<tr>
<td>Event log can be downloaded to a PC</td>
<td>yes</td>
</tr>
<tr>
<td>Remote Web Pages</td>
<td>yes</td>
</tr>
<tr>
<td>Modbus TCP connection</td>
<td>yes</td>
</tr>
<tr>
<td>Multilanguage selection</td>
<td>yes</td>
</tr>
<tr>
<td>E-mail monitoring</td>
<td>yes</td>
</tr>
</tbody>
</table>

The languages supported are:
English, French, Italian, Malaysian, Turkish, Russian, German, Vietnamese, Spanish, Simplified Chinese, Japanese, Traditional, Chinese, Swedish, Indonesian, Portuguese, Arabic and Korean.

Remote Monitoring
The GDM provides remote access for monitoring purposes. Following monitoring connections are available:

<table>
<thead>
<tr>
<th>Communication Type</th>
<th>Description</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote Web Pages</td>
<td>HTML server - Ethernet connection</td>
<td>Standard RJ45</td>
</tr>
<tr>
<td>Monitoring system</td>
<td>Modbus TCP</td>
<td>Standard RJ45</td>
</tr>
<tr>
<td>Remote notifications</td>
<td>E-mail</td>
<td>Standard RJ45</td>
</tr>
</tbody>
</table>

Remote Web Pages
The Remote Web Pages are a set of web pages that are similar in format to the standard GDM and can viewed with any standard web browser on a device connected to the same network. Through this interface the users can remotely access the status and operating parameters. Viewing and downloading of the event history and service logs is also available. The Remote Web Pages enable users to select different languages for each remote client.

Modbus TCP
A Modbus TCP connection is also provided via the Ethernet port of the GDM user interface. Read Only access is available to operating parameters such as voltages, currents and power levels.

E-mail
PCS100 AVC-40 is configurable for sending e-mail notifications in case of power quality events or systems internal event such as faults and warnings. Automatic sending of the service logs via e-mail to ABB Service can also be enabled.
User Connections

Power Connections

The PCS100 AVC-40 utility supply (input) and load (output) connections are connected directly to the Injection Transformer terminals in the Transformer Enclosure.

The following table defines connection sides:

<table>
<thead>
<tr>
<th>Transformer terminals</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top terminals</td>
<td>Utility Supply (Input)</td>
</tr>
<tr>
<td>Bottom Terminals</td>
<td>Load (Output)</td>
</tr>
</tbody>
</table>

The figure on the right shows the power connection location on a 3B frame size with L (left) termination side and +SA Side Aperture option.

Control Connections

The PCS100 AVC-40 includes control connections for local control or monitoring of the system. Control connection terminals are located on Auxiliary Master Module in the Master Controller Enclosure.

<table>
<thead>
<tr>
<th>Control Connection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Relay Outputs</td>
<td>PCS100 AVC-40 status information 250 VAC/30 VDC, 1 A</td>
</tr>
<tr>
<td>1 Isolated Thermal</td>
<td>Transformer over temperature information 24 VDC/24 VAC, 1 A Normally closed (NC) contact</td>
</tr>
<tr>
<td>2 Digital Inputs</td>
<td>PCS100 AVC-40 Remote control Start/Stop/Inhibit Dry contacts</td>
</tr>
</tbody>
</table>

The following control connections are available for wired remote control or monitoring of the PCS100 AVC-40.

Note: “No external control” link is fitted in factory as standard.
Installation Requirements

Input Circuit Protection
The PCS100 AVC-40 relies upon upstream protection for current overload and short circuit protection. Upstream protection should be provided by a circuit breaker.

Overload protection must not be set greater than the PCS100 AVC-40 rated load current. Short circuit and arc fault calculations should include allowance for the additional PCS100 AVC-40 impedance (typically < 2.5%). Circuit breakers should be set to trip without any delay on short circuit or arc fault currents.

Coarse ground fault detection is recommended for high current systems where it may be difficult to assure ground or arc fault currents of sufficient magnitude to instantaneously trip the breaker.

The PCS100 AVC-40 unit is designed to withstand significant short circuit current without damage. Typical short circuit withstand ratings are summarized in the model tables and also in the table below. The smaller systems highlighted in blue in the table rely on fault current limiting protection from upstream circuit breakers or fuses provided by the customer. For 400/480 V models 1B frame size current limiting molded case circuit breakers (MCCB) are required to provide very fast clearing of short circuit currents. ABB T5 series or equivalent are suitable.

<table>
<thead>
<tr>
<th>Frame Size</th>
<th>1B</th>
<th>2B</th>
<th>3B</th>
<th>4B</th>
<th>5B</th>
<th>6B</th>
<th>8B</th>
<th>10B</th>
<th>12B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Power</td>
<td>kVA</td>
<td>300</td>
<td>600</td>
<td>900</td>
<td>1200</td>
<td>1500</td>
<td>1800</td>
<td>2400</td>
<td>3000</td>
</tr>
<tr>
<td>220 V models</td>
<td>kA</td>
<td>31.5</td>
<td>40</td>
<td>50</td>
<td>80</td>
<td>100</td>
<td>100</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>400 V models</td>
<td>kA</td>
<td>15</td>
<td>31.5</td>
<td>31.5</td>
<td>40</td>
<td>50</td>
<td>63</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>480 V models</td>
<td>kA</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>40</td>
<td>40</td>
<td>50</td>
<td>65</td>
<td>65</td>
</tr>
</tbody>
</table>

Defines systems that need to be protected by upstream protection
Defines systems that need to be protected by MCCB (ABB T5 or equivalent)

The PCS100 AVC-40 is rated to carry short duration fault currents to 20 pu (2000%) for 200 ms, and the upstream protection for small systems must be sized within this capability.
If required the ABB factory can provide assistance with sizing appropriate protection.

The PCS100 AVC-40 can sustain the fault currents listed above without damage and can be returned immediately to service following the fault. Where higher fault currents occur, service may be required following a downstream fault.

Maintenance Bypass
ABB recommends that a maintenance bypass (not supplied with the PCS100 AVC-40) is fitted. The maintenance bypass allows maintenance to be performed on the PCS100 AVC-40 without disruption to the load.

Floor Requirements
All enclosures must be installed on a horizontal fireproof surface.
Do not exceed ± 0.2° change in slope between adjacent enclosures.
Do not exceed ± 5 mm in elevation between adjacent enclosures.

Electromagnetic Compatibility (EMC)
The PCS100 AVC-40 is designed for commercial and industrial applications. It is not suitable for connection to a low-voltage utility that is supplying residences unless additional measures are taken.

Location
The PCS100 AVC-40 is designed for location in a restricted access location only.
The PCS100 AVC-40 is designed for connection by fixed wiring.

The PCS100 AVC-40 system should be located in a clean electrical room with a controlled environment temperature and humidity according to the requirements under the Technical Specification section.
Service

PCS100 team provide global service and support of installation and commissioning of PCS100 products

Comprehensive global services portfolio

ABB services span the entire product ownership life cycle:
- Pre-purchase engineering
- Installation and commissioning
- Technical support
- Training
- Preventive and corrective maintenance and maintenance spare parts kits
- Retrofit and refurbishment
- Globally available, supported by regional service hubs and operating in more than 100 countries
- Spare part availability and stocking
- On-site repairs
- 24 x 365 local support line

Custom tailored service contracts

- ABB services can be packaged into a custom service contract
- Tailored to the specific needs of each customer
- Contracts can be made at any stage of ABB product ownership

Service contracts provide customers with improved cost controls, increased operational efficiency, lower capital expenditures, and extend ABB product life time.

Training

- Product training includes installation, commissioning, and maintenance
- Training either at ABB Universities or at a customer site
- Training can be included in an ABB services contract

Engineering and technical support

ABB’s engineering team provides the necessary electrical, protective and monitoring equipment, delivering a high level of energy continuity and superior power quality in a safe and cost effective system. The PCS100 is available in several capacities, depending on the scope of application.
- Pre-purchase engineering to help select and integrate ABB PCS100 products
- Customer assistance in sizing and modeling of systems
- Other life cycle engineering and technical support is available by phone, email, or on-site visits, or as agreed in an ABB services contract
- Redundant inverter design increases reliability and availability and is part of a proven family of global ABB products
- Scalable building block design

Life cycle management

ABB’s 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 system. Life cycle management includes:
- Spare parts and expertise throughout the life cycle
- Efficient product support and maintenance for improved reliability
- Functionality upgrades to the initial product

![PCS100 team providing global service and support](image)
## Related Documentation

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Document Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2UCD074000E001</td>
<td>PCS100 AVC-40 User Manual</td>
</tr>
<tr>
<td>2UCD074000E003</td>
<td>PCS100 AVC-40 Installation Checklist</td>
</tr>
<tr>
<td>2UCD074000E004</td>
<td>PCS100 AVC-40 Commissioning Checklist</td>
</tr>
<tr>
<td>2UCD070000E020</td>
<td>PCS100 AVC-40 Detailed Performance Curves</td>
</tr>
</tbody>
</table>
To find the contact person for your region please refer to our webpage:

www.abb.com/ups

or contact us via:

powerconditioning@abb.com

Note
We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents - in whole or in parts – is forbidden without prior written consent of ABB.

Copyright© 2017 ABB
All rights reserved