2UCD074000E002 rev A

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

Power and productivity for a better world™

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.

Power Conditioning Product Portfolio

Product Line	Typical Problems	Product
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

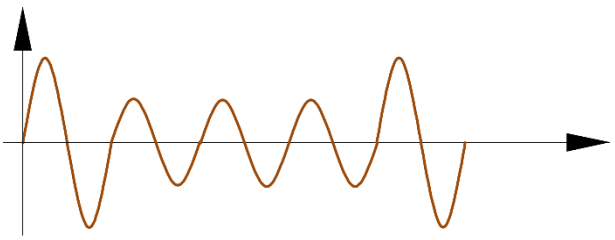
Contents

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 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 flash overs 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.

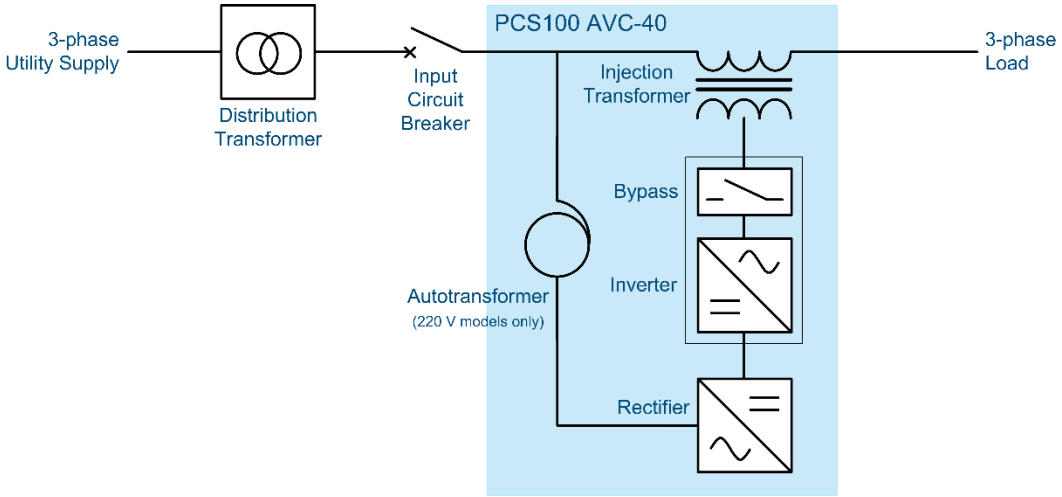
Providing fast, accurate voltage sag and surge correction as well as continuous voltage regulation and load voltage compensation, the PCS100 AVC-40 has been optimally designed to provide equipment immunity from power quality events on the supply network.

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

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

Sophisticated control software
Based on 20 years voltage conditioning industry experience

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 miliseconds

Internal bypass
Redundant internal bypass design enabling continuality 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

Functional Description

PCS100 AVC-40 Correction Capabilities

The PCS100 AVC-40 responds to voltage sags or swells within several milliseconds and can inject up to 40 percent voltage correction. If a facility was faced with a voltage sag to 60 percent of nominal voltage the PCS100 AVC-40 would boost the voltage back to 100 percent. Voltage sags with 50 percent of nominal voltage are corrected back to 90 percent. No process interruption, no equipment would trip, just business as usual.

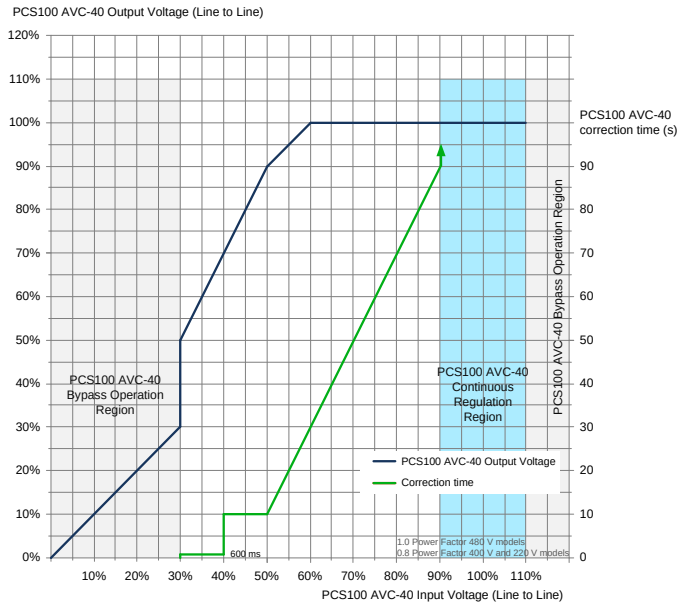
Performance is even better for single phase sags (the most common type), voltage sags down to 45 percent of the nominal voltage are fully corrected.
In case of deeper voltage sags, The PCS100 AVC-40 undertakes a partial correction, which will often prevent loads tripping. In addition, it is able to continuously correct voltage fluctuations of ±10 percent of nominal, remove imbalances and mitigate flicker from the supply voltage.

Utility Supply Problem	Input	Output	Correction Time
Three-phase utility sags correction from	60% remaining supply voltage	100%	30 seconds
	50% remaining supply voltage	90%	10 seconds
	40% remaining supply voltage	70%	600 milliseconds
Single-phase utility sags correction from	45% remaining voltage	100%	30 seconds
	0% remaining voltage	57%	600 milliseconds
Single-phase utility swells correction from	115% voltage	100%	continuous
Three-phase utility undervoltages to 90% of the nominal supply voltage		100%	continuous
Three-phase utility overvoltages up to 110% of the nominal supply voltage		100%	continuous
Correction of phase angle errors created by faults in the supply system		Yes	
Correction of voltage imbalance from utility supply		Yes	
Attenuation of flicker voltages in the utility supply		Yes	

PCS100 AVC-40 Performance Curves

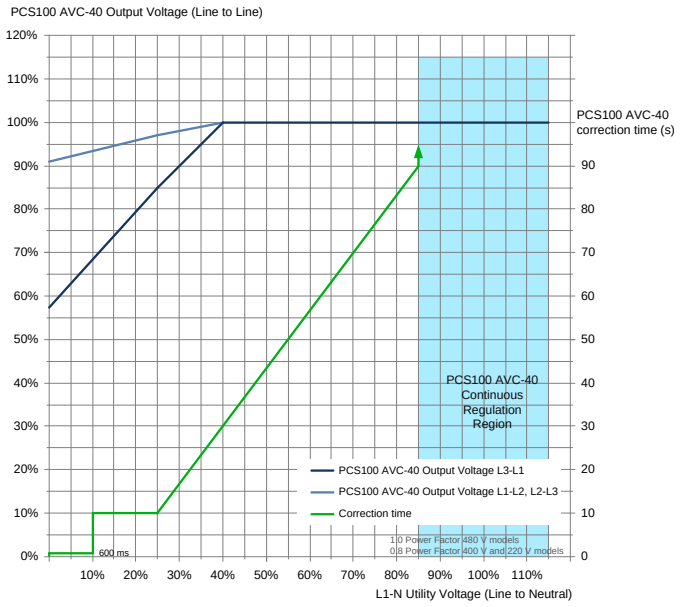
Three Phase Balanced Events

The performance curves below apply to three phase balanced supply voltage disturbances upstream of the PCS100 AVC-40.



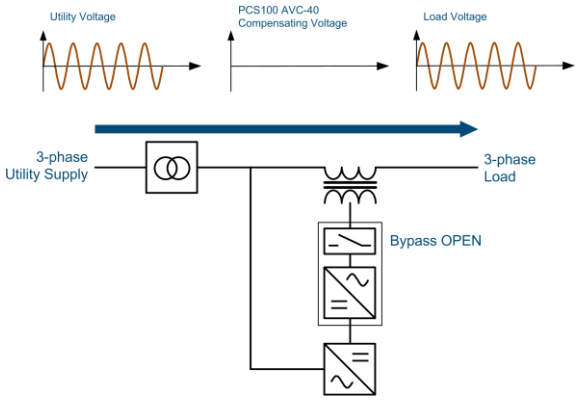
Single-Line-To-Ground Events

The performance curves below apply to single-line-to-ground supply voltage disturbances upstream of the Dyn11 distribution transformer upstream of PCS100 AVC-40.



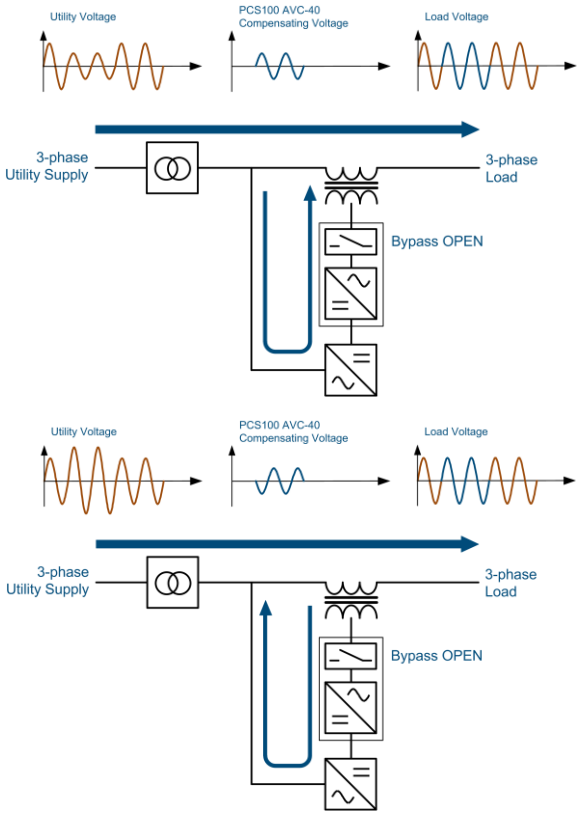
Operation Detail

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.



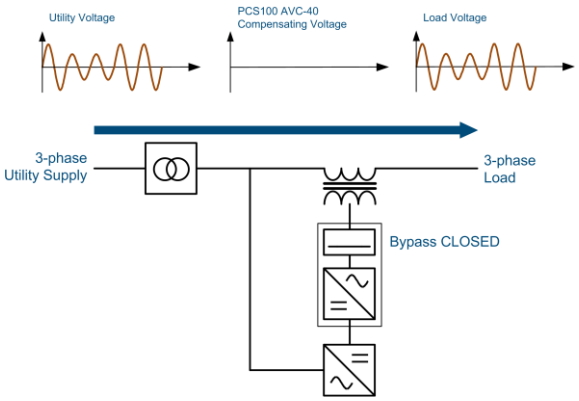
Utility Disturbance Occurs

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	
Power range	150 – 1800 kVA (220 V model) 150 – 3600 kVA (400 and 480 V model)
Rated voltage (model specific)	220 V – application range 208 V – 220 V 400 V – application range 380 V – 415 V 480 V – application range 440 V – 480 V Note: Application voltage less than the rated voltage results in power derating. Consult the rating tables for more information.
Maximum supply voltage	110%
Nominal supply frequency	50 Hz or 60 Hz
Frequency tolerance	± 5 Hz
Power system	3 phase + Neutral (4-Wire) Centre ground referenced (TN-S)
Overvoltage category	III
Fault capacity	Refer to the model tables shown in this document.
Outage – control ride through	> 600 ms
Load - Output	
Voltage	To match nominal input voltage Note: output voltage can be adjusted by ± 10% with 0.1% steps
Equivalent series impedance	< 4% (model specific)
Displacement power factor	0 lagging to 0.9 leading
Crest factor	3.0
Overload capability from 100% supply voltage	150% for 30 seconds, once every 500 s
Performance	
Efficiency	Typically > 98%
Sag correction response	Initial < 250 µs Complete < ½ cycle
Voltage regulation accuracy	±1% typical, ±2% max.
Sag correction accuracy	±4%
Continuous regulation range	±10%
Sag correction capability	40%
Sag correction performance Three phase sags Single phase	60% to 100% for 30 seconds, 50% to 90% for 10 seconds 45% to 100% for 30 seconds Note: Refer to performance curves in this document for more details.
Partial correction derating conditions	1.0 PF at 80% load 0.8 PF at 100% load Note: Refer to document 2UCD070000E020 PCS100 AVC Detailed Performance Curves
Internal Bypass	
Capacity	100% of model rating (kVA)
Maximum overload capacity (in bypass)	125% for 10 minutes 150% for 1 minute 500% for 1 s 2000% for 200 ms
Transfer time	To Bypass < 0.5 ms To Inverter < 250 ms
Equivalent series impedance	bypass < 2.5% typical
Injection Transformer	
Transformer type	Dry
Insulation	IEC 60085 Thermal class 200
Frequency	50 Hz and 60 Hz
Vector group	Diii (delta + 3 independent windings)

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.
Color	RAL7035
Enclosure cccess	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) Voltage Surge (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% Duration: 10 ms
Remote monitoring	E-mail notification
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 Immunity: IEC 61000-6-2
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:

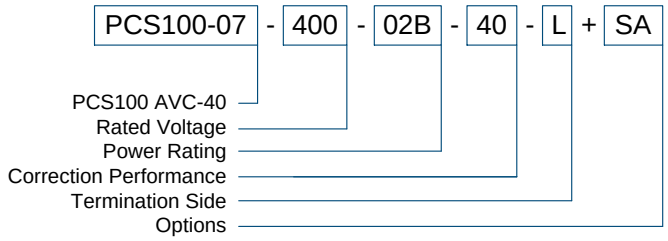
- Utility voltage
- Power rating of the load (kVA and kW, or kVA and power factor)

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:



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.

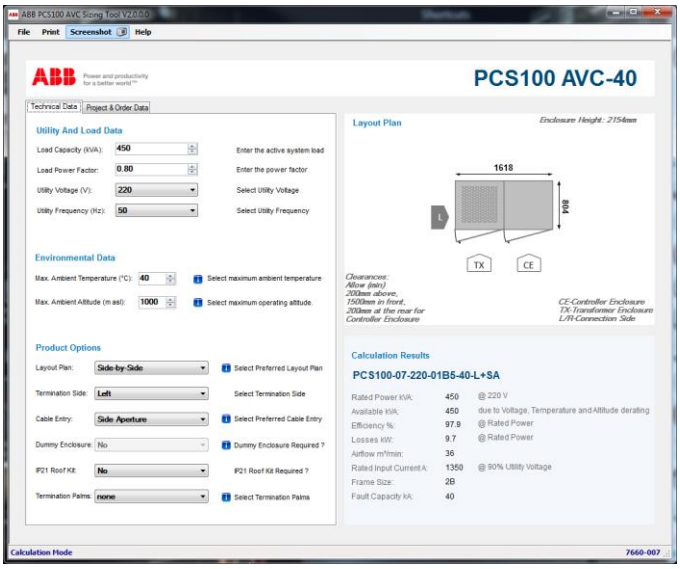
Note: Frame size 1B without additional termination related options termination side can be from left, right or bottom as the transformer terminals are facing front.

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

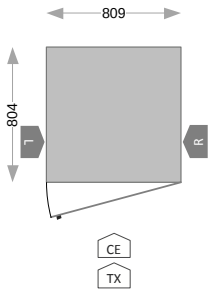
Rated power kVA		Rated Input Current A (at 90% utility voltage)	Rated Output Current A	Fault Capacity kA	Losses kW (Typical)	Efficiency % (Typical)	Airflow m3/min	Frame Size	Type Code To complete the Type Code: Place R for right termination side or L for left termination side instead of x
220 V Models									
220 V Utility Voltage	**208 V** Utility Voltage								
150	142	459	394	31.5	5.0	96.7	18	1B	PCS100-07-220-0B5-40-x
225	213	686	591	31.5	6.5	97.2	18	1B	PCS100-07-220-0B75-40-x
300	284	905	788	31.5	7.1	97.7	18	1B	PCS100-07-220-01B-40-x
450	425	1350	1181	40	9.7	97.9	36	2B	PCS100-07-220-01B5-40-x
600	567	1791	1575	40	11.8	98.1	36	2B	PCS100-07-220-02B-40-x
750	709	2239	1969	50	14.5	98.1	54	3B	PCS100-07-220-02B5-40-x
900	851	2679	2362	50	16.4	98.2	54	3B	PCS100-07-220-03B-40-x
1200	1135	3567	3150	80	20.7	98.3	72	4B	PCS100-07-220-04B-40-x
1500	1418	4450	3937	100	25.2	98.4	90	5B	PCS100-07-220-05B-40-x
1800	1702	5331	4724	100	29.1	98.4	108	6B	PCS100-07-220-06B-40-x
400 V Models									
400 V, 415 V Utility Voltage	**380 V** Utility Voltage								
150	142	253	217	15	4.7	96.9	18	1B	PCS100-07-400-0B5-40-x
225	213	377	325	15	6.1	97.3	18	1B	PCS100-07-400-0B75-40-x
300	285	498	431	15	6.6	97.8	18	1B	PCS100-07-400-01B-40-x
450	427	742	650	31.5	8.9	98.1	36	2B	PCS100-07-400-01B5-40-x
600	570	985	867	31.5	10.8	98.2	36	2B	PCS100-07-400-02B-40-x
750	712	1232	1083	31.5	13.5	98.2	54	3B	PCS100-07-400-02B5-40-x
900	855	1474	1300	31.5	15.2	98.4	54	3B	PCS100-07-400-03B-40-x
1200	1140	1962	1733	40	19.1	98.5	72	4B	PCS100-07-400-04B-40-x
1500	1425	2448	2166	50	23.3	98.5	90	5B	PCS100-07-400-05B-40-x
1800	1710	2932	2599	63	26.8	98.6	108	6B	PCS100-07-400-06B-40-x
2400	2280	3849	3465	65	36.3	98.5	144	8B	PCS100-07-400-08B-40-x+BB
3000	2850	4811	4331	65	47.7	98.4	180	10B	PCS100-07-400-10B-40-x+BB
3600	3420	5774	5197	65	60.3	98.3	216	12B	PCS100-07-400-12B-40-x+BB
480 V Models									
480 V Utility Voltage	**440 V** Utility Voltage								
150	138	211	177	20	4.7	96.9	18	1B	PCS100-07-480-0B5-40-x
225	206	315	271	20	6.1	97.3	18	1B	PCS100-07-480-0B75-40-x
300	275	415	361	20	6.6	97.8	18	1B	PCS100-07-480-01B-40-x
450	413	619	542	25	8.9	98.1	36	2B	PCS100-07-480-01B5-40-x
600	550	821	722	25	10.8	98.2	36	2B	PCS100-07-480-02B-40-x
750	688	1026	903	25	13.5	98.2	54	3B	PCS100-07-480-02B5-40-x
900	825	1228	1083	25	15.2	98.4	54	3B	PCS100-07-480-03B-40-x
1200	1100	1635	1444	40	19.1	98.5	72	4B	PCS100-07-480-04B-40-x
1500	1375	2040	1805	40	23.3	98.5	90	5B	PCS100-07-480-05B-40-x
1800	1650	2444	2166	50	26.8	98.6	108	6B	PCS100-07-480-06B-40-x
2400	2200	3208	2887	65	34.1	98.6	144	8B	PCS100-07-480-08B-40-x+BB
3000	2750	4009	3609	65	44.3	98.5	180	10B	PCS100-07-480-10B-40-x+BB
3600	3300	4811	4331	65	55.4	98.5	216	12B	PCS100-07-480-12B-40-x+BB

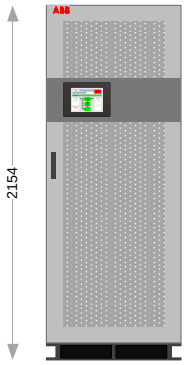
Layout Plans and Dimensions

Side-by-Side Layout Plans

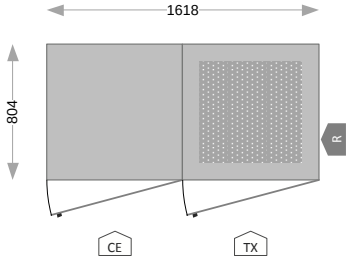
The following plans relate to the standard Side-by-Side Layout of all frame sizes. Shown layouts are only for right (R) termination side. For left (L) termination side in Side-by-Side layout, the Transformer Enclosure is mounted on left side of Controller Enclosure.

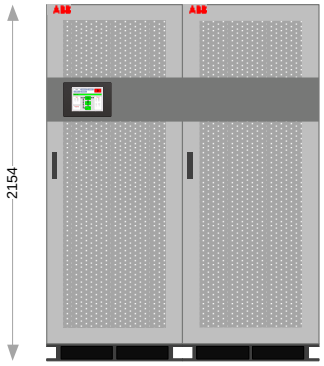
1B frame size



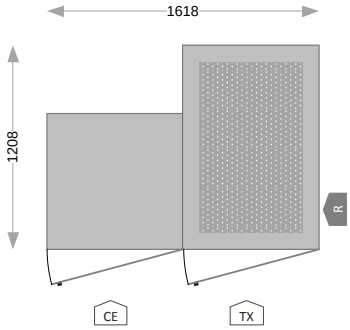


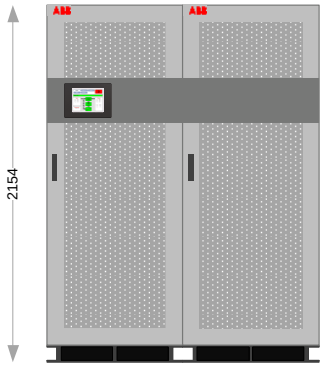
2B frame size
Right termination side



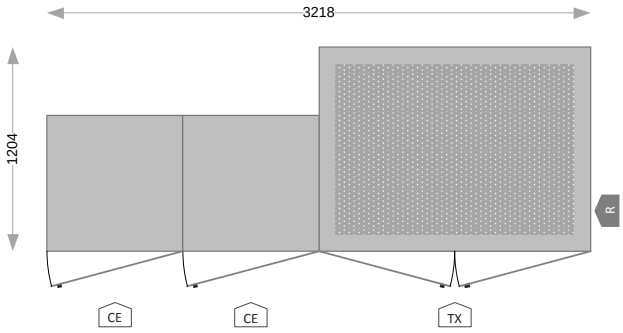


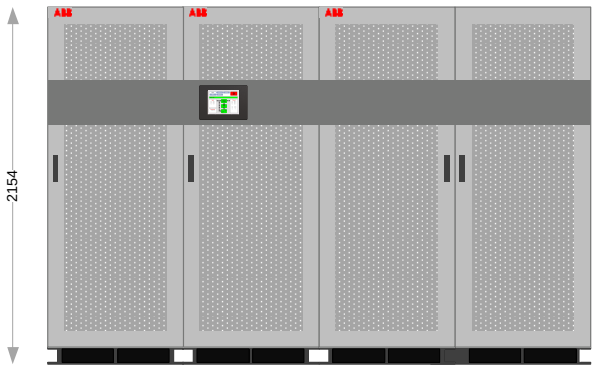
3B frame size
Right termination side





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





CE Controler Enclosure
TX Transformer Enclosure
L Left termination side
R Right termination side

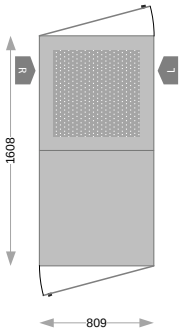
Note:
In frame size 1B without optional Termination Enclosure, Cable Ducts or Side Aperture termination side can be from left, right or bottom as the Injection Transformer terminals (customer's connection terminals) are facing front.

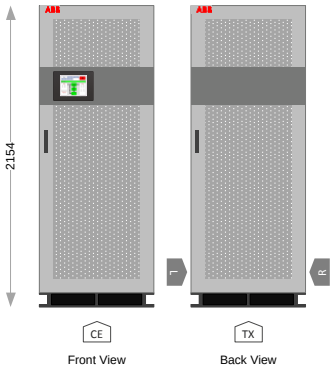
Note:
For frame sizes 2B and 3B, due to position of Injection Transformer terminals, optional Termination Enclosure or Side Aperture MUST be selected. Please see Options chapter of this document for option description.

Back-to-Back Layout Plans

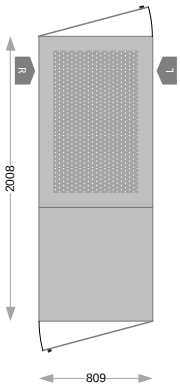
The following plans relate to the optional Back-to-Back layout with left (L) or right (R) termination side options shown. Exact termination side needs to be defined with L or R in the product type code.

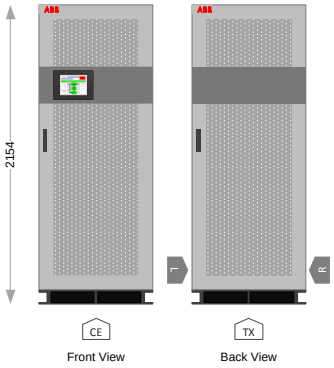
2B frame size



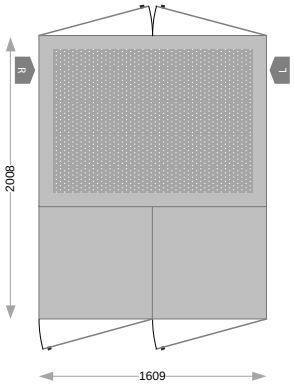


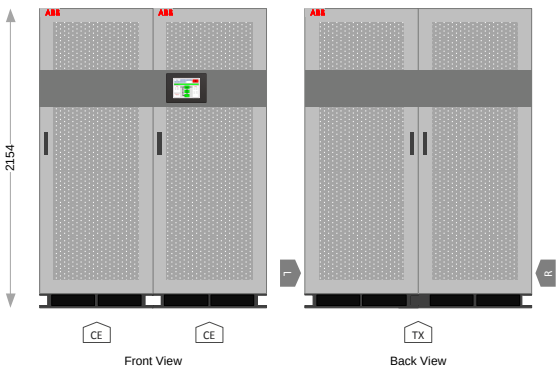
3B frame size





4B, 5B and 6B frame size

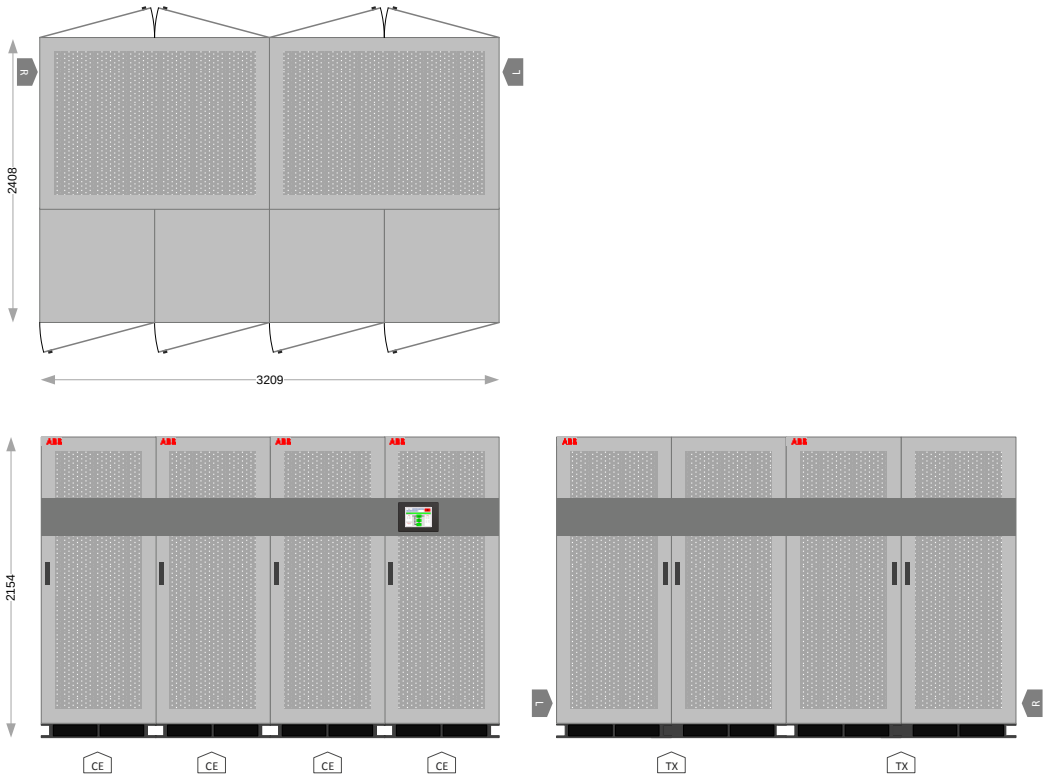




CE Controler Enclosure
TX Transformer Enclosure
L Left termination side
R Right termination side

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.

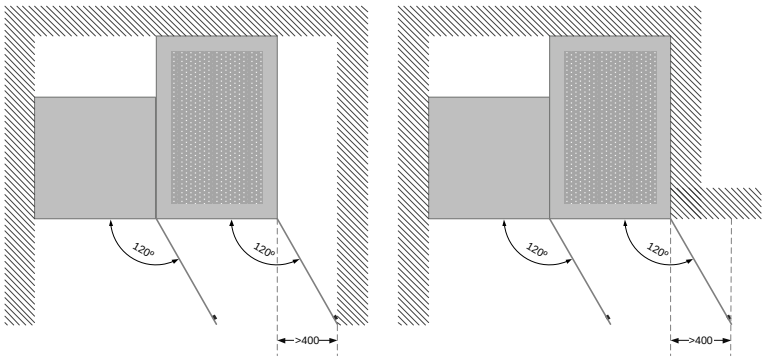
8B, 10B and 12B frame size



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.

			220 V Models		400 V and 480 V Models	
Frame Size	Controller Enclosure Dimensions (HxWxD)	Transformer Enclosure Dimensions (HxWxD)	Controller Enclosure Weight	Transformer Enclosure Weight	Controller Enclosure Weight	Transformer Enclosure Weight
	mm	mm	kg	kg	kg	kg
1B	2154x809x804		1155		1010	
2B	2154x809x804	2154x809x804	581	1520	581	1235
3B	2154x809x804	2154x809x1204	714	2380	714	1760
4B	2154x1618x804	2154x1609x1204	1162	3880	1162	2885
5B	2154x1618x804	2154x1609x1204	1294	3880	1294	2885
6B	2154x1618x804	2154x1609x1204	1427	3880	1427	2885
8B	2154x3209x804	2154x3209x1604	NA	NA	2324	7300
10B	2154x3209x804	2154x3209x1604	NA	NA	2590	7300
12B	2154x3209x804	2154x3209x1604	NA	NA	2856	7300

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.

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

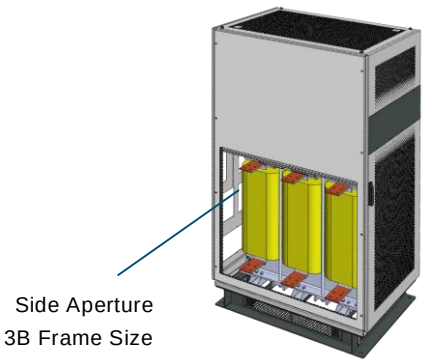
BB Back-to-Back Layout

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.

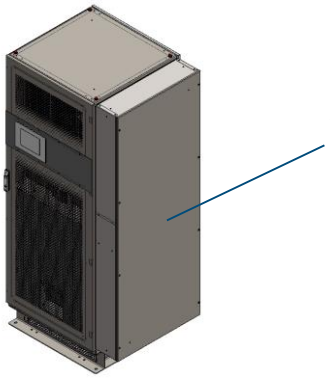


Side Aperture
3B Frame Size

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.

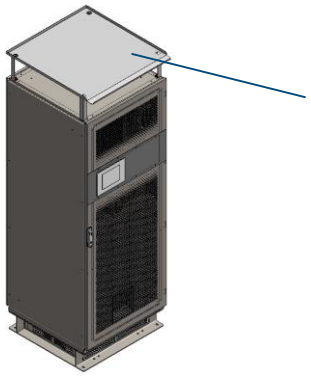
Note:
The Gland plate is delivered as a blind plate without any holes.



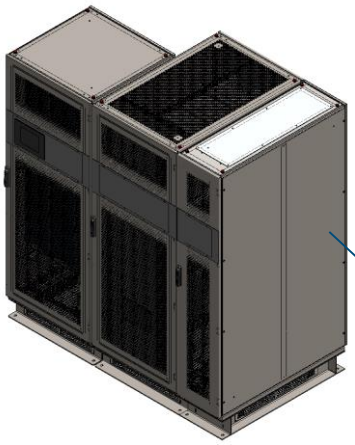
Top Entry Cable Duct
1B Frame Size

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



Roof Kit
1B Frame Size

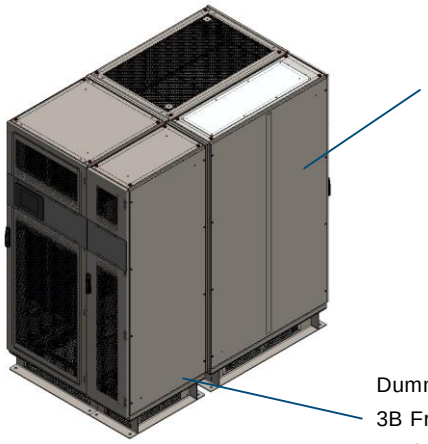


Termination Enclosure
3B Frame Size
Side-by-Side Layout

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.



Termination Enclosure
3B Frame Size
Back-to-Back Layout

Dummy Enclosure
3B Frame Size
Back-to-Back Layout

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.

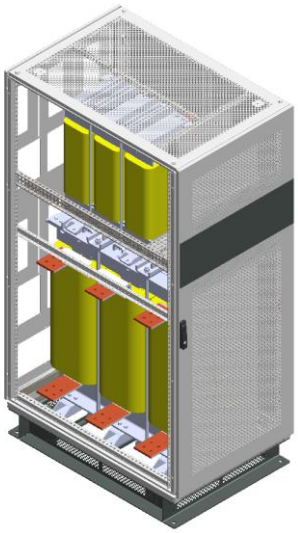
Termination Palms (TPx)

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.

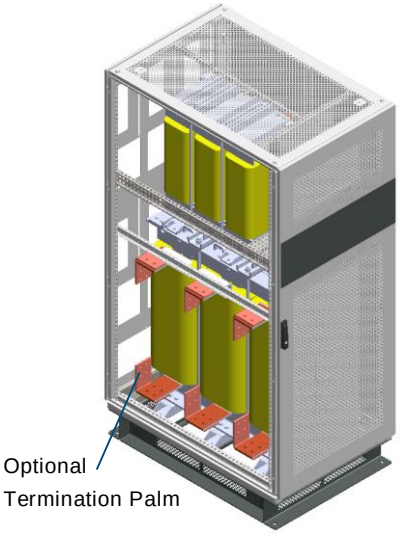
See example of standard offering and TPx option on the images on the right.

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

Standard terminations



TPx Termination Palms



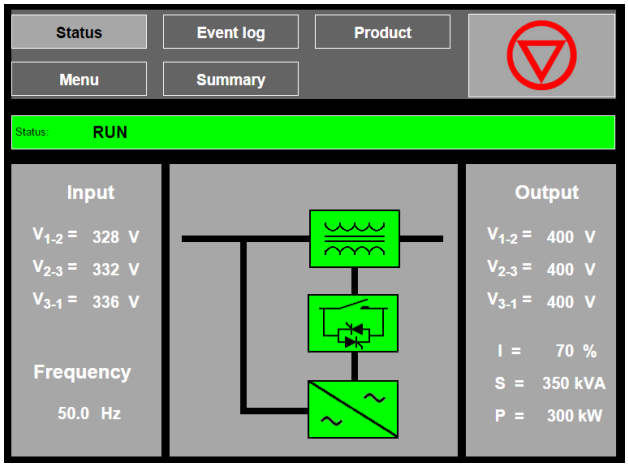
Optional
Termination Palm

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.

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



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

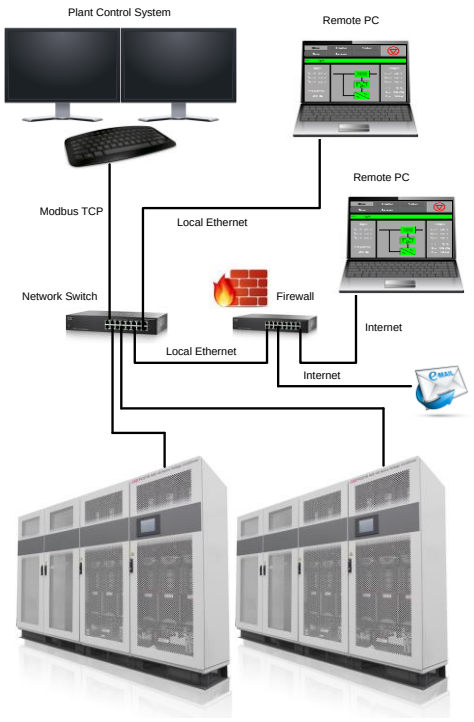
Remote Monitoring

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

Communication Type	Description	Connection
Remote Web Pages	HTML server - Ethernet connection	Standard RJ45
Monitoring system	Modbus TCP	Standard RJ45
Remote notifications	E-mail	Standard RJ45

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.

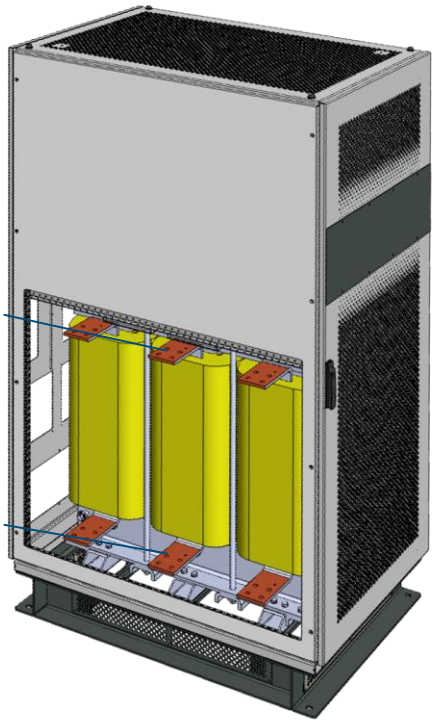
User Connections

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.

Transformer terminals	Connection
Top terminals	Utility Supply (Input)
Bottom Terminals	Load (Output)

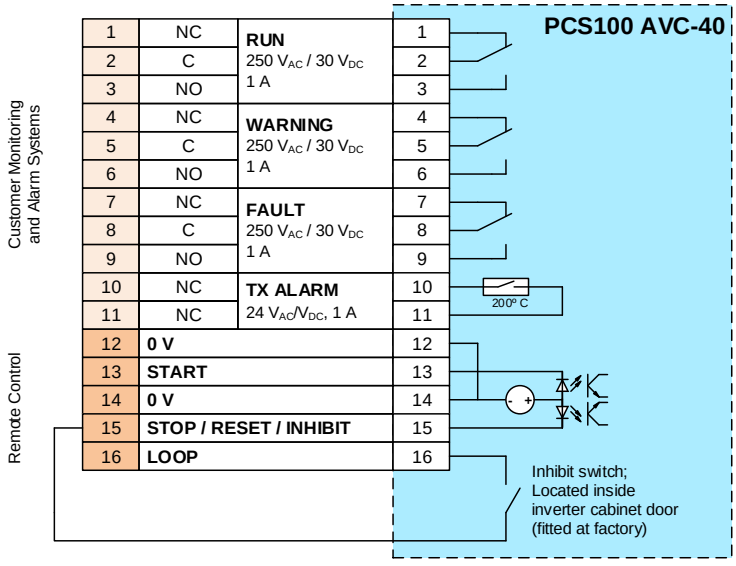
The figure on the right shows the power connection location on a 3B frame size with L (left) termination side and +SA Side Aperture option.



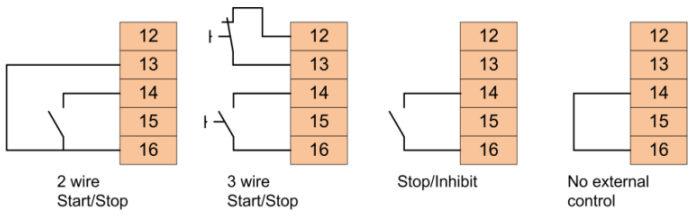
Control Connections

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.

Control Connection	Description
3 Relay Outputs	PCS100 AVC-40 status information 250 V_{AC}/30 V_{DC}, 1 A
1 Isolated Thermal Switch	Transformer over temperature information 24 V_{DC}/24 V_{AC}, 1 A Normally closed (NC) contact
2 Digital Inputs	PCS100 AVC-40 Remote control Start/Stop/Inhibit Dry contacts



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.

Frame Size		1B	2B	3B	4B	5B	6B	8B	10B	12B
Rated Power	kVA	300	600	900	1200	1500	1800	2400	3000	3600
220 V models	kA	31.5	40	50	80	100	100	N/A	N/A	N/A
400 V models	kA	15	31.5	31.5	40	50	63	65	65	65
480 V models	kA	20	25	25	40	40	50	65	65	65

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.

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

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

Related Documentation

Document Number	Document Name
2UCD074000E001	PCS100 AVC-40 User Manual
2UCD074000E003	PCS100 AVC-40 Installation Checklist
2UCD074000E004	PCS100 AVC-40 Commissioning Checklist
2UCD070000E020	PCS100 AVC-40 Detailed Performance Curves

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or contact us via:

powerconditioning@abb.com

PCS100 AVC-40
product webpage

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