

TECHNICAL DATA SHEET

SureWave SFC

Static Frequency Converter



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1. Introduction

1.1. Description

The SureWave SFC combines ABB's years of experience with market trends and knowledge and has driven the need to create the next generation Static Frequency Converter – ABB's SureWave SFC. The SureWave (SFC) allows the connection of 60 Hz powered equipment to a 50 Hz supply network and 50 Hz powered equipment to a 60 Hz supply network.

Additionally, the SureWave SFC can stabilize the frequency to allow the correct operation of sensitive equipment when the supply is not sufficiently regulated.

1.2. Block diagram

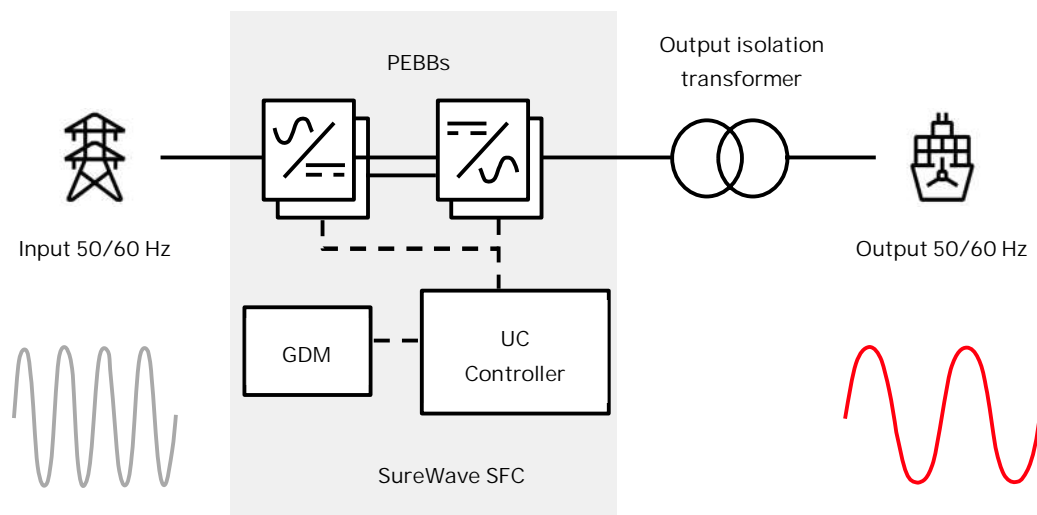


Figure 1-1: SureWave SFC simplified block diagram

GDM: Graphical Display Module

UC Controller: Main controller of the SureWave system

PEBBs: Power Electronic Building Block

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1.3. Key features and benefits

FEATURE	BENEFIT
Modern power module design	High power density, compact footprint, high efficiency, clean and stable sinewave output
Modular redundancy	High reliability with high availability for critical load
Bi-directional power flow capability	Allows supply to or from a ship
Double conversion	Ride through most common utility voltage sags and frequency variations, isolating and protecting sensitive load
Virtual Generator	Optimal and simple load sharing and grid interaction
Live load-bus synchronization	Allows the SureWave to synchronize with an AC live load-bus, and seamlessly take over the load
Overall robust system design	Superior overload capability, superb fault clearing capacity, and exceptional industrial load profile handling
Optimized termination cabinets	Functional cable routing options for easy installation and maintenance
Quick connect modules	Fast replacement, low MTTR, high system availability and operational safety
ABB Ability	Remote monitoring

Table 1-1: Key features and benefits

2. Mechanical overview

2.1. 250 kVA to 750 kVA range

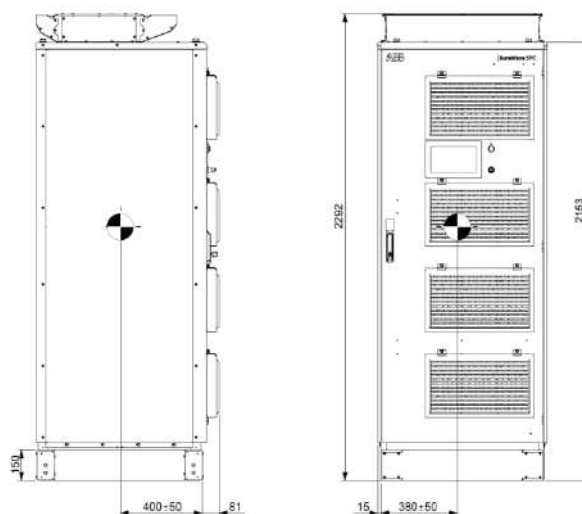


Figure 2-1: SureWave SFC 250 kVA to 750 kVA

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Dim (W x D x H)	830 x 899 x 2292 mm
Weight	1100 kg (fully populated)
Floor loading	1470 kg/m ² (fully populated)
Refer to 2UCD420000E102 for more detailed information	

2.2. 1.0 MVA to 1.5 MVA range

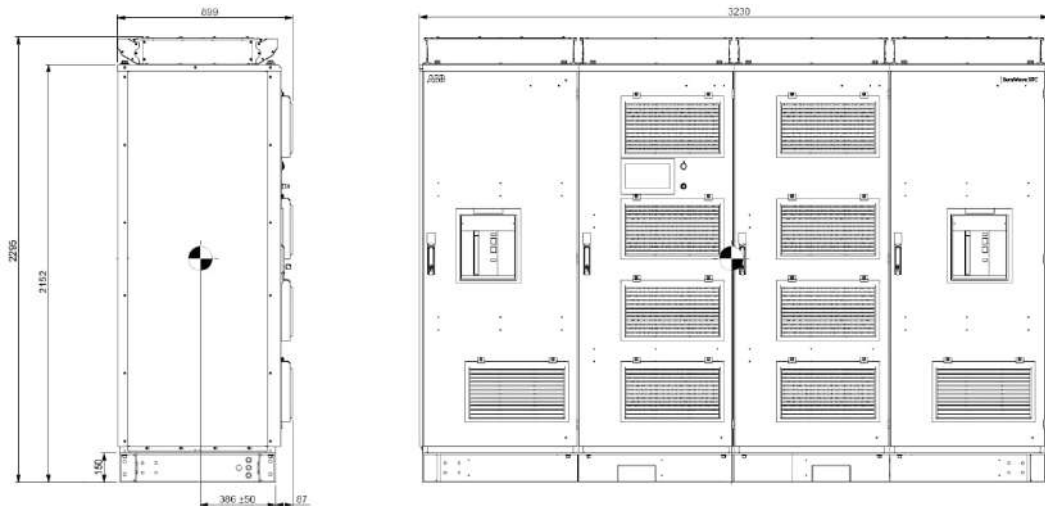


Figure 2-2: SureWave SFC 1.0 MVA 1.5 MVA

Dimensions (W x D x H)	3230 x 899 x 2295 mm
Weight	Max. 3300 kg (bottom entry fully populated)
Floor loading	1140 kg/m ² (bottom entry fully populated)

Refer to 2UCD420000E101 for more detailed information.

2.3. 1.75 MVA to 2.25 MVA range

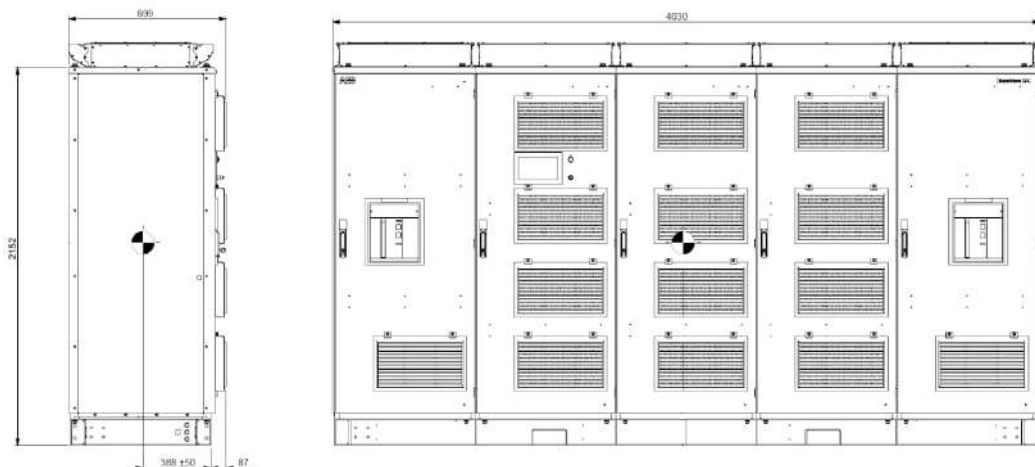


Figure 2-3: SureWave SFC 1.75 MVA to 2.25 MVA

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Dimensions (W x D x H)	4036 x 899 x 2295 mm
Weight	4400 kg (bottom entry fully populated)
Floor loading	1210 kg/m ² (bottom entry fully populated)

Refer to 2UCD420000E103 for more detailed information.

2.4. Mechanical characteristics

IP21	Optional (no filters fitted)
IP42 – Standard option	Inlet and outlet air filters fitted
Cooling	Air forced
Rated air flow	0.125 m ³ /s per PEBB120
Exhaust air rise - 100% load	40 deg C (typical at full power)
Acoustic noise	< 80 dBA at 1 m

2.5. Enclosure and plinth material characteristics

Enclosure finish	Powder coated RAL7035T
Enclosure material	Bright Zinc galvanized steel sheet (1.6 mm thickness)
Plinth finish	Powder coated RAL7012T
Plinth material	Mild Steel plate (1.6 – 16 mm thickness) Electrogalvanized Steel Sheet (up to 2 mm thickness)

3. General overview

3.1. PEBB Characteristics



Figure 3-1: Power Electronic Building Block (PEBB)

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Dimensions (W x D x H)	723 x 710 x 223 mm
Weight	115 kg
Power flow	Bidirectional
AC supply	3 phases, 3 wire
Nominal AC voltage	380 - 480 Vac line to line
Rated AC current	300 Aac
Cooling	Air Forced

Table 3-1: PEBB general specifications

3.2. System technical summary

AC voltage	380 – 480 Vac line-line
AC frequency range	50 – 60 Hz
Efficiency	96% (typical @ 100% load)
THDi at the input terminals	< 3% (at rated load)
THDv at the output terminals	< 2.5% (linear load)
Overload capability	250% for 2 seconds
Graphic Display Module (GDM)	Functional, high resolution, resistive 10" display
Acoustic noise	<80 dBA @ 1 m
Cooling	Air forced
Cooling exhaust	Top hat
Input termination cabinet (only for >750kVA)	Left or right
Cable entry (only for >750kVA)	Top or bottom
Communication	MODBUS TCP/IP, Ethernet

3.3. 250 kVA to 2.25 MVA complete range

	1 x PCS120 enclosure			2 x PCS120 enclosure			3 x PCS120 enclosure		
Nominal output power [kVA]	250	500	750	1000	1250	1500	1750	2000	2250
Module pairs	1	2	3	4	5	6	7	8	9
Termination Cabinet	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
I/O Breaker	N/A	N/A	N/A	E4.2 2000	E4.2 2000	E4.2 2000	E4.2 3200	E4.2 3200	E4.2 3200
Breaker rating current [A]	N/A	N/A	N/A	2000	2000	2000	3200	3200	3200
Nominal output current [A]	300	600	900	1200	1500	1800	2100	2400	2700
Nominal output power [kVA]	250	500	750	1000	1250	1500	1750	2000	2250
Output power @ 0.9pf [kW]	225	450	675	900	1125	1350	1575	1800	2025

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3.4. Heat dissipation and air flow

Power (kVA)	Cable routing	Heat Dissipation (kW)	Air Flow (m ³ /hr)	CFM (ft ³ /min)
250	Bottom only	10	720	424
500	Bottom only	20	1440	848
750	Bottom only	30	2160	1271
1000	Bottom/Top	40	2880	1695
1250	Bottom/Top	50	3600	2119
1500	Bottom/Top	60	4320	3131
1750	Bottom/Top	70	5040	2966
2000	Bottom/Top	80	5760	3390
2250	Bottom/Top	90	6480	3814

Note: "A duct can be fitted to carry the exhaust hot-air flow away, the duct exhaust flow back pressure should not be higher than 70pa, so the SureWave can tolerate it without the need of helper fans"

3.5. Electrical characteristics

3.5.1. Electrical Connections

Input / output connections	L1, L2, L3 / L1', L2', L3'
Protective earth	Chassis earth connection
Transformer screen (PE)	Unique PE connection towards transformer screen

3.5.2. Transformer configuration

An input or output transformer is required to isolate the converters common mode voltage and for correct operation of the SureWave SFC. (LVPSU = Low Voltage Power Supply for the control and fans 24Vdc supply)

3.5.2.1. Output transformer

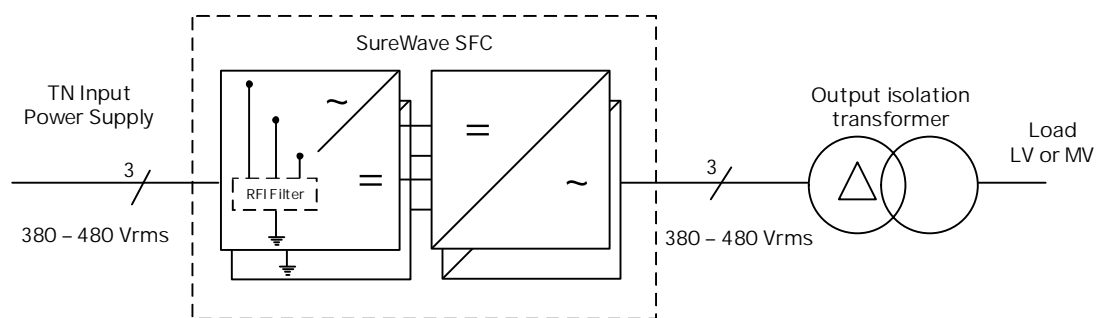


Figure 3-2: SureWave with output transformer configuration

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3.5.2.2. Input transformer

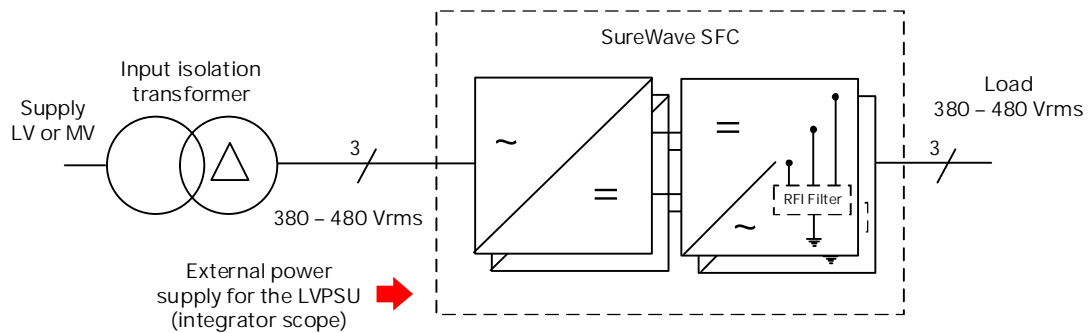


Figure 3-3: SureWave with input transformer configuration

3.5.3. AC Connection

Nominal voltage (center referenced)	Input: 380 – 480 Vac line - line +/-10% Input voltage < 380 Vac will require external supply for low voltage PSUs Output: 380 – 480 Vac line – line
Over-voltage category	III (6 kV)
System Overload 1	120% 600 s, from 80% preload
System Overload 2	150% 30 s once per 600 s not exceeding continuous rating
System Overload 3	250% 2 s, from 100% load
Conditional short-circuit current (I _{cc})	65 kA, 60 ms

3.5.4. Protection requirements

TN	3 pole circuit breaker (provided for models > 750 kVA)
TT	3 pole circuit breaker with DC capable RCD
IT	3 pole circuit breaker and insulation monitoring

3.5.5. Auxiliary power

DC voltage for control and fans	24 Vdc Generated from the 3-phase AC input < 380 Vac at the input will require external supply
Control/Fan supply voltage nominal	24 Vdc, negative referenced to chassis, SELV
Main/Hub controller load current	< 2 Adc per controller
PEBB control load current	< 1.5 Adc per PEBB
PEBB fan load current @ 24 Vdc	< 9 Adc per PEBB

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3.6. Environment

Operating temperature	0 ... 40 °C
Derated operating temperature	40 ... 50 °C derated - 2% / °C
Storage temperature	-20 ... 60 °C
Shipping temperature	-25 ... 65 °C
Climate class	3K3 according to EN 62477-1
Chemical environment	3C1 according to EN 62477-1
Pollution degree	PD2 according to EN 60664-1
Operating altitude <1000m	No derating; IEC 62477 OV cat III
Derated operating altitude 1000 - 2000m	1% current derating per 100 m above 1000 m; IEC 62477 OV cat III
Humidity	5 – 85% Non-condensing

3.7. Conformed standards

EN 62477-1 / EN 50178	Safety requirements for power electronic converter
IEC/EN 61000-6-2	Electromagnetic compatibility (EMC) – Immunity
EN 55011	Electromagnetic compatibility (EMC) – Emissions
IEC 60146-2	Self-commutated semiconductor converters

3.8. Marking

PeP Ecopassport	Product Environmental Profile
Eco Solutions	Environmental impact across the product lifecycle
CE Mark	Product complies with the basic criteria of the European Union
WEEE	Waste electrical and electronic equipment directive
RCM Mark	The product is safe to be supplied to the Australian and New Zealand market

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3.9. Safety

Isolation to auxiliary supply	Reinforced insulation – 300 V ground /600 V line; Cat III / 6 kV
Earth leakage current	High leakage currents may exist - must be permanently earthed
Common mode voltage	Substantial PWM common mode voltage will exist on the non-ground referenced supplies

4. System display and user interfaces



Figure 4-1: System display and user interfaces

1 GDM

The primary user interface for configuration of the SureWave SFC is via the Graphic Display Module (GDM) ¹. The GDM is a high resolution, 10" resistive, touchscreen display which contains a user-friendly HMI (Human Machine Interface) ².

2 HMI

The SureWave SFC visually display all the information relevant to the system and its operation and interacts with the user through a user-friendly HMI ². Via HMI the user can monitor and control the entire SFC system.

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3 Inhibit keyed switch

Mounted on the main enclosure door ³, the SureWave has installed a keyed switch which main function is to Enable/Disable the whole system for running. Actioning this during operation will cause the system to abruptly stop.

4 USB Port

Mounted on the main enclosure door ⁴, the SureWave has installed an USB port which is purely for serviceability purposes.

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