

Power System Units Description

Enclosure 6130, Enclosure 6140

Description

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1 Introduction

This document describes the option parts of the power system that is located in the Enclosure.

For more information about the function and configuration of the power system, refer to [Enclosure Description](#).

The option parts are different due to the input power of the Enclosure as shown in [Table 1](#).

Table 1 Option Parts

Power System	Option Parts	Main Function
AC-powered system of AC-powered Enclosure	Rectifier	Converts AC voltage power to DC output voltage.
	Circuit breaker	Protects the load and the feeding from overload and short circuit.
	DC distribution unit extension	Divides system voltage on different outputs.
	Service outlet	Provides AC power temporarily for equipment that requires AC power.
	AC SPD	Protects the power system from impulse surge or overload.
	DC SPD	Protects the power system from impulse surge and overload.
	Optional battery	Provides battery backup for the Enclosure.
	Ericsson Site Controller (ESC) or Support Control Unit (SCU)	Enables remote control and monitoring of site equipment through IP connectivity.
	Power system controller	Provides energy-saving management and battery charging-discharging management.
	Battery temperature sensor	Protects the battery from over temperature.
DC-powered system of DC-powered Enclosure	Circuit breaker	Protects the load and the feeding from overload and short circuit.
	DC distribution unit	Divides system voltage on different outputs.



Power System	Option Parts	Main Function
	DC SPD	Protects the power system from impulse surge and overload.
	ESC or SCU (Optional)	Enables remote control and monitoring of site equipment through IP connectivity.



2 Rectifier (AC-powered Enclosure Only)

This section describes the rectifier module of the power system.

2.1 Overview

This section gives an overview of the rectifier module as shown in [Figure 1](#) and [Figure 2](#).

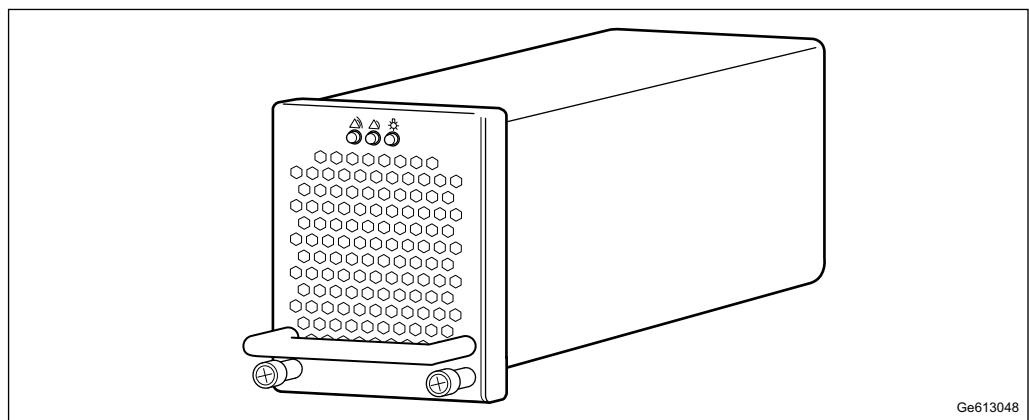


Figure 1 2.9 kW Rectifier

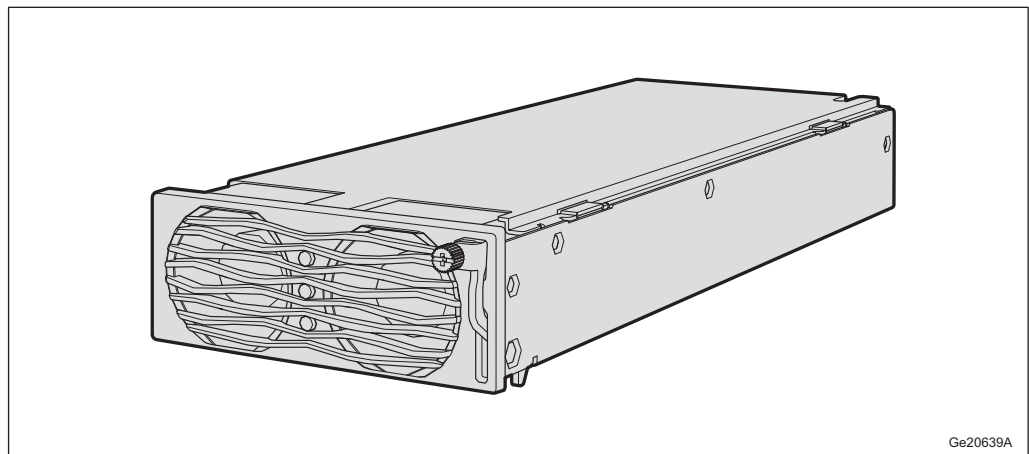


Figure 2 3.0 kW Rectifier

2.1.1 Purpose

The main function of the rectifier is to convert the incoming AC voltage into DC voltage.



2.1.2 Variants

The following variants are available:

- BML 901 398/1: The efficiency of the rectifier is 93%.
- BML 901 399/1: The efficiency of the rectifier is 96%.
- BML 901 465/1: The efficiency of the rectifier is 96%.

2.2 Function Description

The rectifier has the following functions:

- Measurement of voltage and current
- Control of output power
- Remote supervision using RS485 communication bus through the power controller.
- Protection function, including:
 - Output overload protection. When the output voltage is over $-60 \pm 1 \text{ V}$, the rectifier will be locked to protection mode. The rectifier will recover when the AC power is turned off and then on again.
 - Input over voltage protection. When the input voltage is over $310 \pm 10 \text{ V AC}$, the rectifier will be shut down, and will recover automatically when the input voltage is back to normal.
 - Input under voltage protection. When the input voltage is under $85 \pm 5 \text{ V AC}$, the rectifier will be shut down, and will recover automatically when the input voltage is back to normal.
 - Output short circuit protection. The rectifier will restart automatically when the short circuit is removed.
 - Over temperature protection. The rectifier will restart automatically when the temperature drops to normal.

The output power changes with varying temperature. [Figure 3](#), [Figure 4](#) and [Figure 5](#) show the output power derating curve.

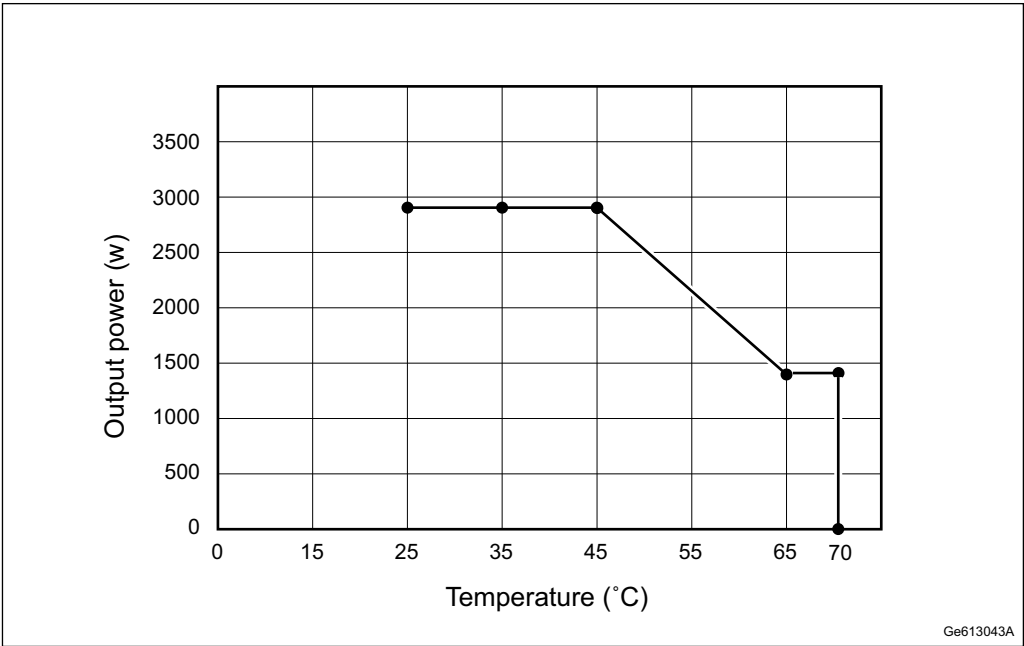


Figure 3 DC Output Power Characteristics for 93% Efficiency Rectifier

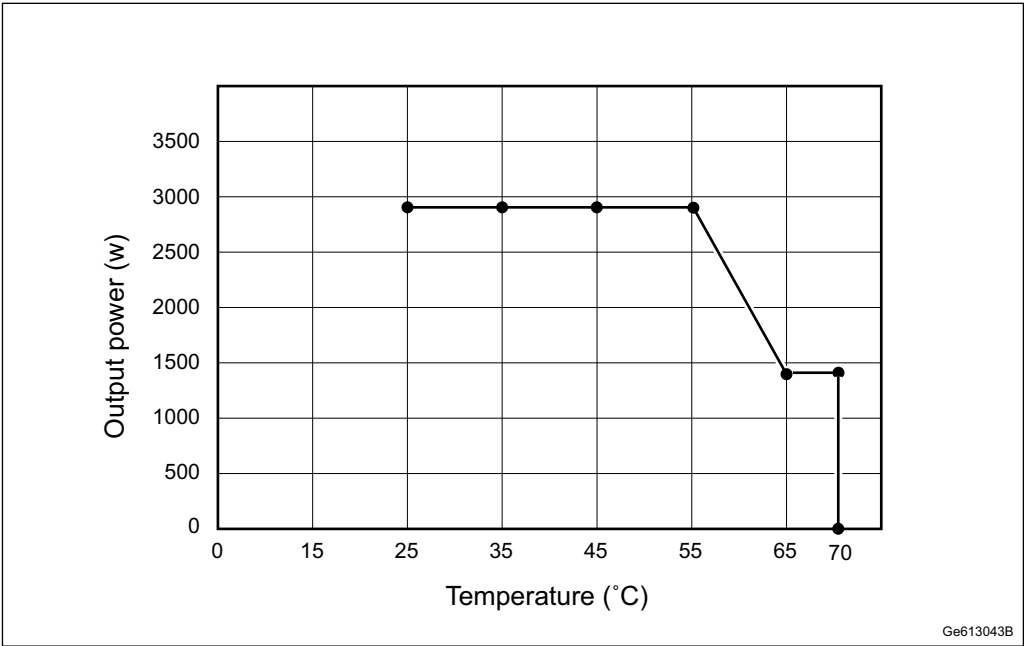


Figure 4 DC Output Power Characteristics for 96% Efficiency 2.9 kW Rectifier

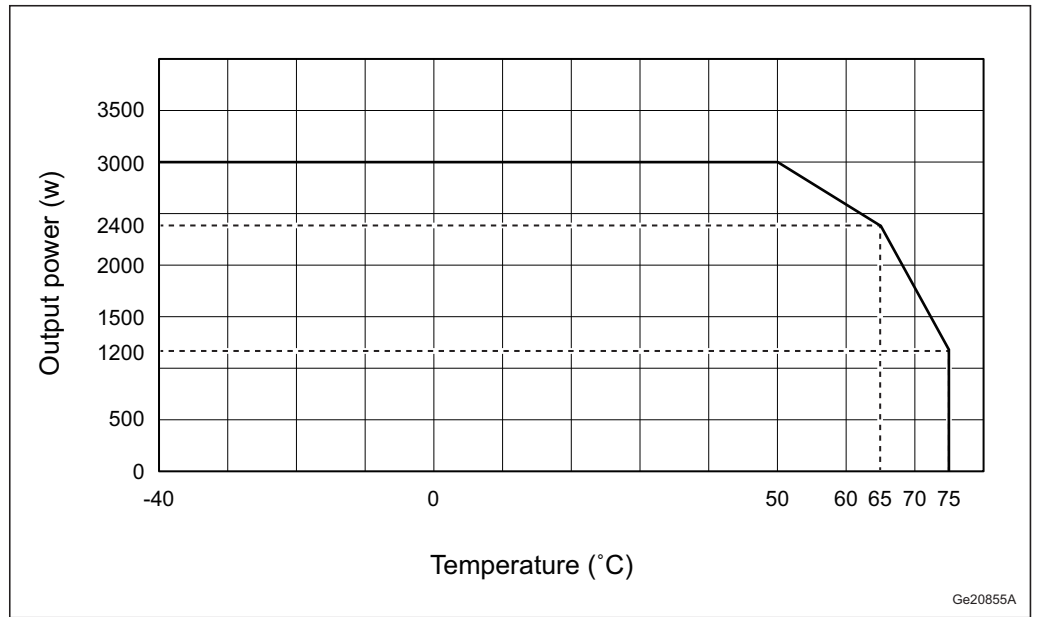


Figure 5 DC Output Power Characteristics for 96% Efficiency 3.0 kW Rectifier

2.3 Technical Data

This section describes the technical data, including dimensions and weight, environmental characteristics, and power characteristics of the rectifier..

2.3.1 Dimensions and Weight

Table 2 lists the dimensions and weight of the rectifier.

Table 2 Dimensions and Weight

Technical Data	93% 2.9 kW Rectifier	96% 2.9 kW Rectifier	96% 3.0 kW Rectifier
Width	85.2 ± 0.2 mm	85.2 ± 0.2 mm	106.5 ± 0.5 mm
Height	112.7 ± 0.2 mm	112.7 ± 0.2 mm	41.5 ± 0.5 mm
Depth	238 ± 0.35 mm	238 ± 0.35 mm	286 ± 0.5 mm
Weight	< 2.5 kg	< 2.6 kg	< 2.0 kg

2.3.2 Environmental Requirements

Table 3 lists all the environmental requirements of the rectifier.



Table 3 Environmental Requirements

Description	2.9 kW Rectifier	3.0 kW Rectifier
Temperature range, operation	-40 – +55 °C	-40 °C
Temperature range, storage	-40 – +70 °C	-10 – +50 °C
Temperature range, transportation	-40 – +70 °C	+50 – +75 °C
Humidity, operation and storage	5% – 95%	5% – 95%
Altitude, operation and storage	0 – 2000 m	0 – 4000 m
Cooling methods	Internal fans and external air	Internal fans and external air
Vibration	Follow ETS300019-2	Follow ETS300019-2
Shock	Follow ETS300019-2	Follow ETS300019-2
Drop	Follow ETS300019-2	Follow ETS300019-2
Noise	< 55 dBA sound pressure	≤ 40 dBA sound pressure

2.3.3

Power Characteristics

Table 4 lists the input characteristics and output characteristics of the rectifier.

Table 4 Power Characteristics

Technical Data		93% 2.9 kW Rectifier	96% 2.9 kW Rectifier	96% 3.0 kW Rectifier
Input characteristics	Input voltage	180 – 275 V	180 – 275 V	85 – 300 V
	Nominal input voltage range	200 – 250 V	200 – 240 V	200 – 250 V
	Maximum input voltage ⁽¹⁾	320 V	320 V	320 V
	Frequency	45 – 65 Hz	45 – 65 Hz	45 – 66 Hz
	Maximum input current	18.5 ± 1.85 A	18.5 ± 1.85 A	20 A
	Power factor	≥ 0.99	≥ 0.99	≥ 0.99
	Leakage current	< 3.5 mA	< 3.5 mA	< 3.5 mA
	Rated power	2900 W	2900 W	3000 W (176–290 VAC)



Technical Data		93% 2.9 kW Rectifier	96% 2.9 kW Rectifier	96% 3.0 kW Rectifier
				1250 W (85–175 VAC linear derating)
	internal fuse	25 A	25 A	25 A
Output characteristics	Default output voltage	-53.5 ± 0.1 V DC	-53.5 ± 0.1 V DC	+53.5 ± 0.1 V DC
	Output voltage range	-42 – -58.5 V	-42 – -58.5 V	+42 – +58 V
	For line regulation of output voltage and current, see Figure 6 and Figure 7 .			
	Current sharing unbalance ⁽²⁾	≤ ±5%	≤ ±5%	≤ ±3%
	Line regulation	± 0.1%	± 0.1%	± 0.1%
	Load regulation	± 0.5%	± 0.5%	± 0.5%
	Voltage regulation accuracy	± 0.6%	± 0.6%	± 0.6%
	Maximum current	50 A	50 A	50 A
	Peak current	55 A	55 A	62.5 A
	Hold up time	10 ms	10 ms	10 ms
	Output voltage ripple	200 mVp-p	200 mVp-p	200 mVp-p

(1) No damage to the power system

(2) Values with 50% – 100% load

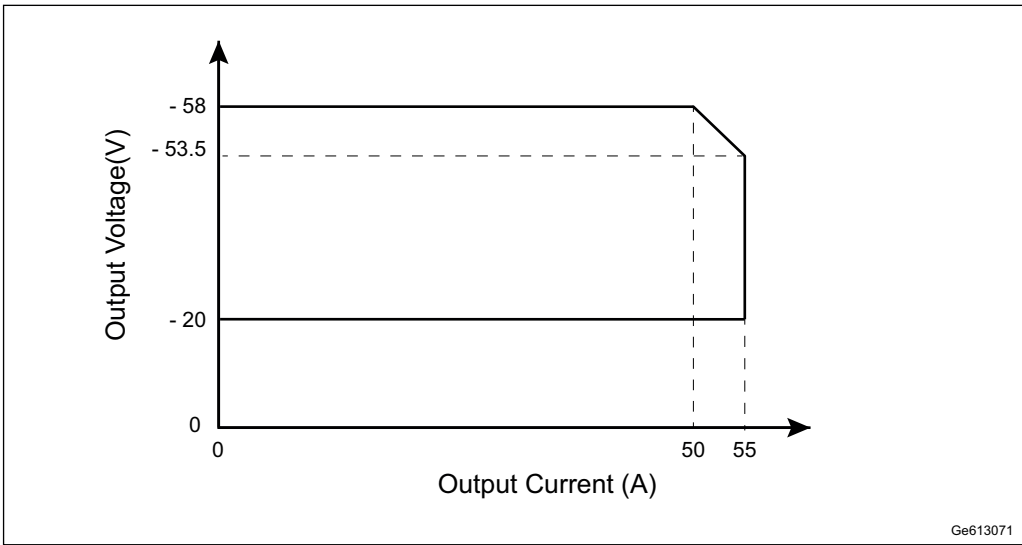


Figure 6 Line Regulation; Output Voltage versus Output Current (2.9 kW Rectifier)

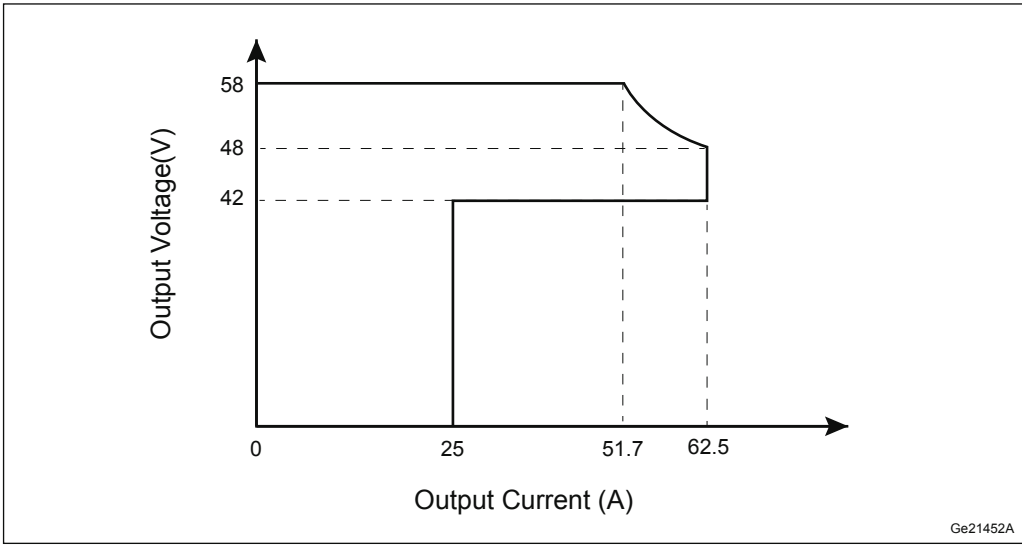


Figure 7 Line Regulation; Output Voltage versus Output Current (3.0 kW Rectifier)

2.4 Indicators and Interfaces




This section describes indicators and the interfaces of the rectifier.

2.4.1 Indicators

Table 5 lists the indicators and relative indication information about the indicators on the rectifier.



Table 5 Indicators

Indicator	Description	Location	Indications
	Optical Indicator, green	Front	— On: Normal — Off: No input voltage
	Optical Indicator, yellow	Front	— On: — Protection mode due to overload or over temperature — In hibernate mode — In charging mode — Off: Normal
	Optical Indicator, red	Front	— On: No output caused by over output, fan fault, over temperature or module inner fault. — Off: Normal

2.4.2

Interfaces

Figure 8 and Figure 9 show the interfaces on the rectifier.

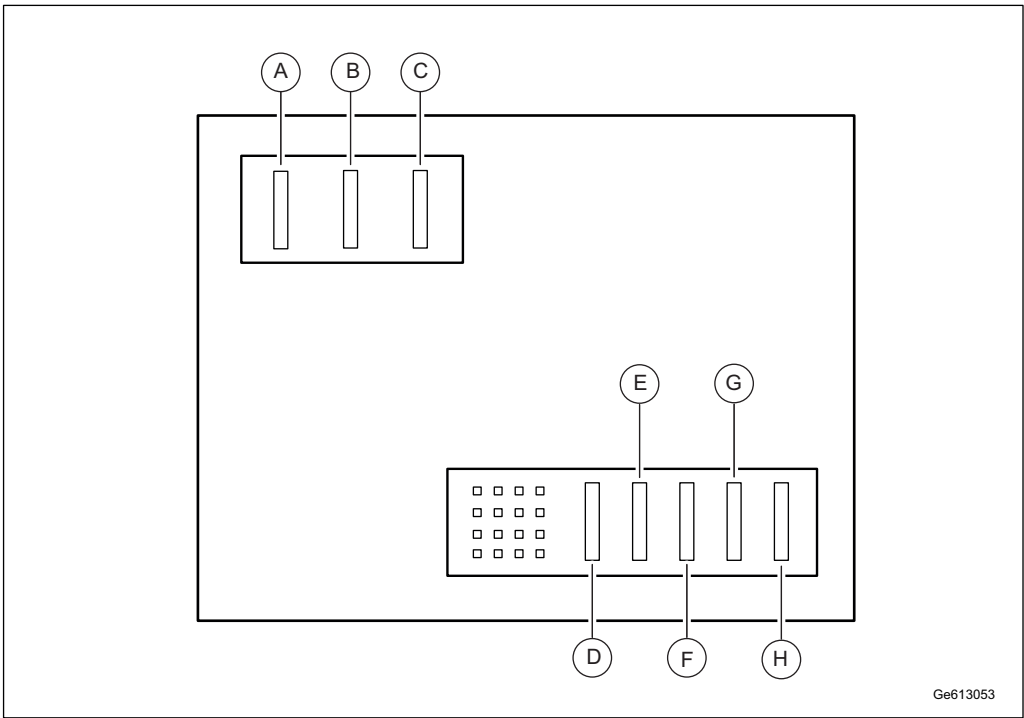


Figure 8 2.9 kW Rectifier Interfaces

Table 6 2.9 kW Rectifier Interfaces

Position	Description
A	N
B	PE
C	L
D	Pre-charge
E	DC+ output
F	DC+ output
G	DC- output
H	DC- output

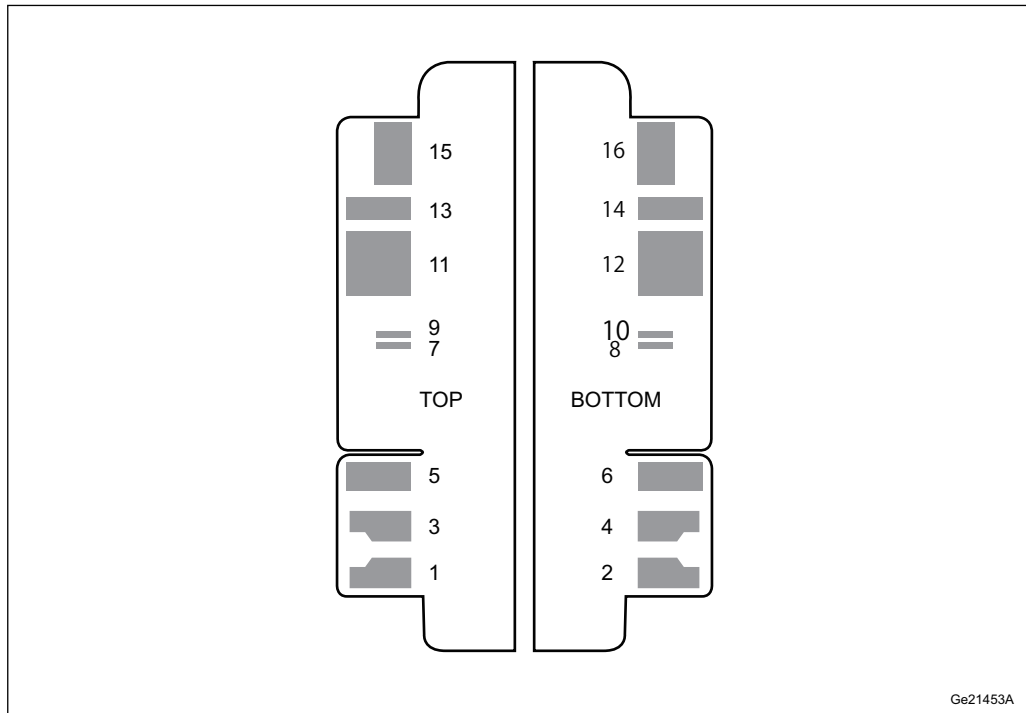


Figure 9 3.0 kW Rectifier Interfaces

Table 7 3.0 kW Rectifier Interfaces

Socket Type	Position	Description
AC input	1, 2	L
	3, 4	N
	5, 6	PE
DC output and signal	7	CANL
	8	CANH
	9	AC_D2
	10	AC_D1
	11, 12	OUTPUT+
	13, 14	Pre-charge
	15, 16	OUTPUT-



3 Circuit Breaker

3.1 Overview

This section describes the circuit breaker of the power system. The type of circuit breakers is thermal magnetic in the power system.

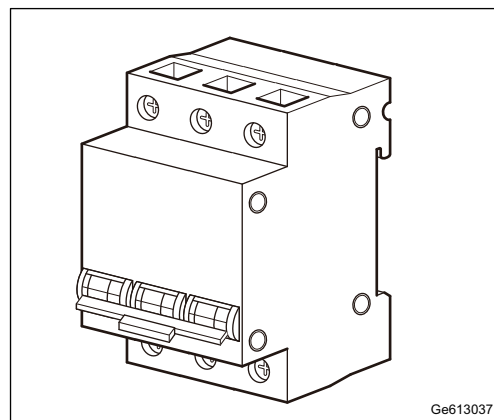
3.1.1 Purpose

The main function is to protect the feeding to the load and the load from a short circuit or overload.

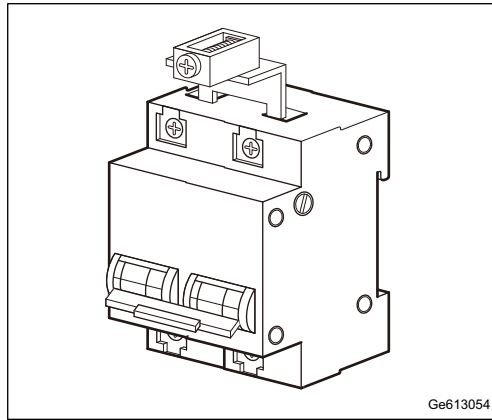
3.1.2 Variants

The following variants are available for the Enclosure. Different variants are used to protect different loads for different user scenarios.

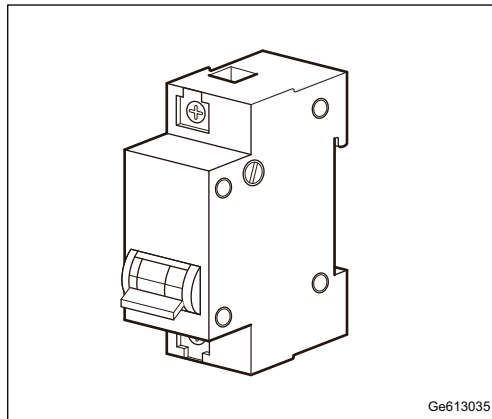
- CB for AC input (40 A or 63 A)



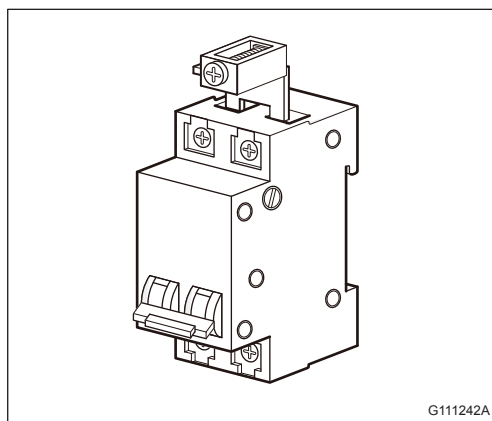
- CB for battery (200 A)



— CB for DC out (125A)



— CB for DC out (100 A)



— CB for DC out (6 A to 63 A)

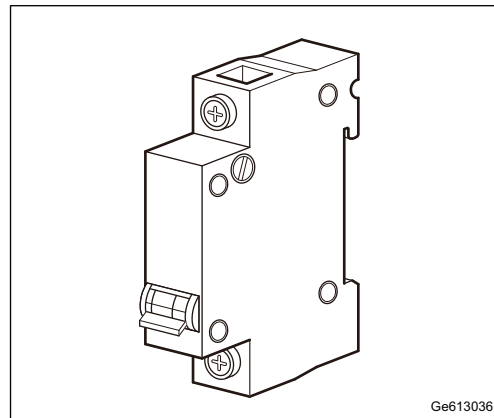


Table 8 lists the main differences of different variants.

Table 8 Variants

Variants	Width	Poles	Rated Current
CB for AC input (40 A or 63 A)	54 mm	3	40 A or 63 A
CB for battery (200 A)	54 mm	2	200 A ⁽¹⁾
CB for DC out (125 A)	27 mm	1	125 A
CB for DC out (100 A)	36 mm	2	100 A ⁽²⁾
CB for DC out (6 A to 63 A)	18 mm	1	— 63 A — 32 A — 25 A — 16 A — 10 A — 6 A

(1) The battery circuit breaker consists of two 125A circuit breakers mechanically fixed together and electrically connected in parallel. The electrical rating for this combined CB will be 200 A. This CB will be described as “125A 2-poles” in CPI.

(2) The 100 A circuit breaker consists of two 63 A circuit breakers mechanically fixed together and electrically connected in parallel. The electrical rating for this combined CB will be 100 A. This CB will be described as “63 A 2-poles” in CPI.



3.2 Technical Data

This section describes the dimensions, environmental characteristics, electrical characteristics, tripping curves, and installation requirements of the circuit breakers.

3.2.1 Environmental Characteristics

[Table 9](#) lists the environmental characteristics of the circuit breakers.

Table 9 Environmental Characteristics

Technical Data	Description
Temperature range, operation	-40°C – +70°C
Temperature range, storage ⁽¹⁾	-25°C – +60°C
Relative humidity, operation	≤ 95%
Relative humidity, storage	≤ 80%
Altitude	≤ 2000 m
Pollution degree	3

(1) Maximum three years

The maximum allowed load current of the circuit breakers depends on the ambient temperature as shown in [Table 10](#).

Table 10 Correction Current

Temperature (°C)	Maximum Allowed Load Current of Circuit Breakers (A)									
	Rated 4 A	Rated 6 A	Rated 10 A	Rated 16 A	Rated 25 A	Rated 32 A	Rated 40 A	Rated 50 A	Rated 63 A	Rated 125 A
-35	4.87	7.70	13.89	20.78	32.21	41.04	51.63	64.92	83.48	275
-30	4.81	7.58	13.62	20.43	31.72	40.46	50.86	63.97	82.06	265
-25	4.75	7.46	13.35	20.08	31.22	39.82	50.04	62.92	80.64	255
-20	4.68	7.34	13.07	19.75	30.70	39.71	40.21	61.86	79.19	245
-15	4.62	7.21	12.81	19.40	30.18	38.51	48.37	60.77	77.72	235
-10	4.55	7.09	12.53	19.05	29.65	37.84	47.51	59.67	76.22	225
-5	4.49	6.96	12.23	18.70	29.10	37.15	46.63	58.54	74.70	215
0	4.42	6.83	11.93	18.33	28.55	36.47	45.74	57.40	73.14	205
5	4.35	6.70	11.63	17.96	27.98	35.75	44.83	56.23	71.54	195
10	4.29	6.56	11.33	17.58	27.41	35.03	43.90	55.05	69.91	185
15	4.22	6.42	11.01	17.20	26.82	34.30	42.95	53.81	68.24	175
20	4.15	6.27	10.67	16.80	26.22	33.54	41.98	52.56	66.53	165
25	4.07	6.14	10.34	16.40	25.61	32.77	40.99	51.28	64.78	155
30	4.00	6.00	10.00	16.00	25.00	32.00	40.00	50.00	63.00	145
35	3.93	5.84	9.63	15.55	24.33	31.17	38.93	47.82	60.11	135
40	3.85	5.68	9.24	15.11	23.67	30.34	37.85	46.24	58.19	125



Temperature (°C)	Maximum Allowed Load Current of Circuit Breakers (A)									
	Rated 4 A	Rated 6 A	Rated 10 A	Rated 16 A	Rated 25 A	Rated 32 A	Rated 40 A	Rated 50 A	Rated 63 A	Rated 125 A
45	3.77	5.52	8.85	14.66	23.00	29.48	36.75	44.81	56.21	115
50	3.69	5.36	8.45	14.20	22.28	28.60	35.61	43.33	54.16	105
55	3.61	5.19	8.01	13.71	21.56	27.69	34.43	41.81	52.03	95
60	3.53	5.01	7.55	13.21	20.08	26.75	33.21	40.23	49.81	85
65	3.44	4.83	7.06	12.70	20.02	25.78	31.95	38.58	47.50	75
70	3.36	4.64	6.55	12.75	19.21	24.77	30.63	35.77	43.05	65

3.2.2 Electrical Characteristics

Table 11 lists the electrical characteristics of the circuit breaker.

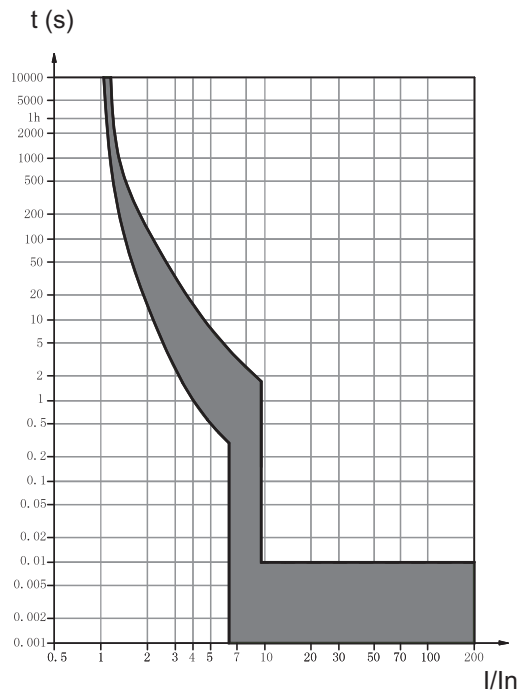
Table 11 Electrical Characteristics

Technical Data	CB for DC Out (125 A)	CB for AC In	CB for DC Out (6A to 63 A)	CB for Battery
Rated voltage	80 V	400/415V	400/415V	80 V
Rated breaking capacity	10 kA	6 kA	6 kA	10 kA

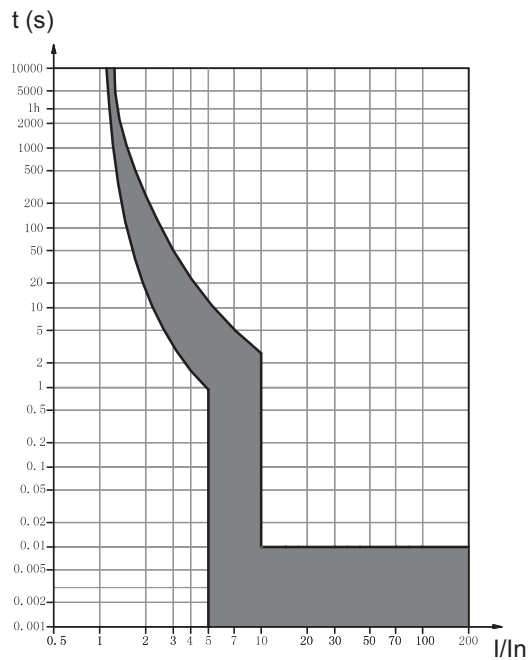
3.2.3 Tripping Curve

The tripping curve variants are listed as follows:

- CB for DC out (125 A) and CB for battery (200 A): $8 I_n$



— CB for DC out (6A to 63 A) and CB for AC in (40 A): $5 - 10 I_n$



3.2.4 Installation Requirements

Table 12 lists the installation requirements of the circuit breaker.



Table 12 Technical Data of Installation

Technical Data	Description
Wiring type	Screw terminal
Wiring capacity	<ul style="list-style-type: none">— 1 – 50 mm² for the following variants:<ul style="list-style-type: none">• CB for AC input (40 A)• CB for DC out (125 A)• CB for DC out (100 A)• CB for DC out (6 A to 63 A) — 35 – 95 mm² for CB for battery (200 A)



4 Service Outlet (AC-powered Only)

This section describes the service outlet of the AC-powered system.

4.1 Overview

This section gives an overview of the service outlet.

4.1.1 Purpose

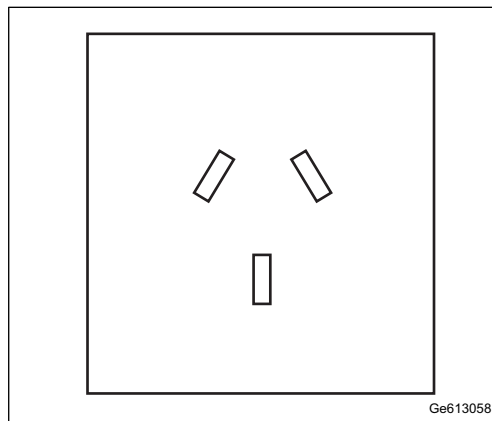
The main function of the service outlet is to provide AC power for external electrical devices.

The service outlet has leakage current and over current protection function by the internal Residual Current Breaker (RCB).

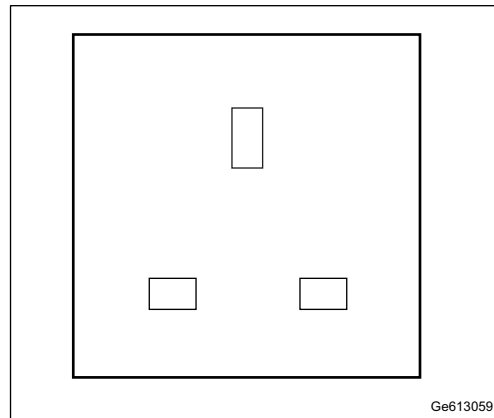
4.1.2 Variants

The following variants are available:

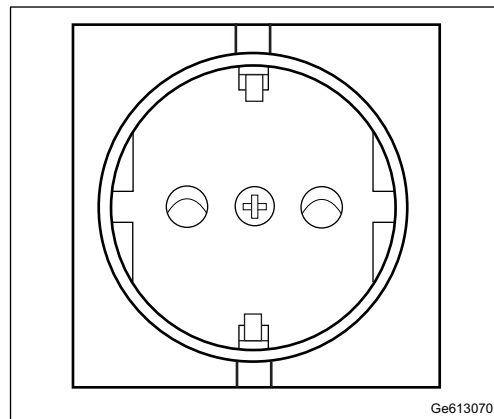
- CN: Service outlet for China



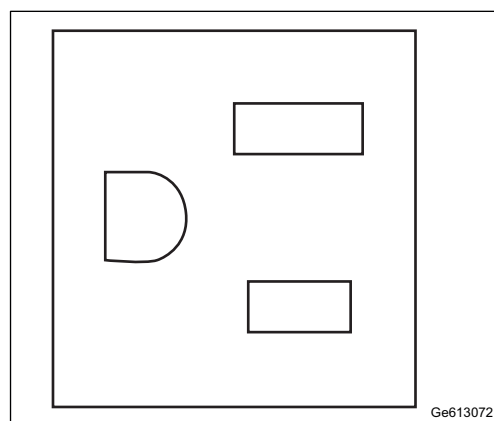
- UK: Service outlet for United Kingdom



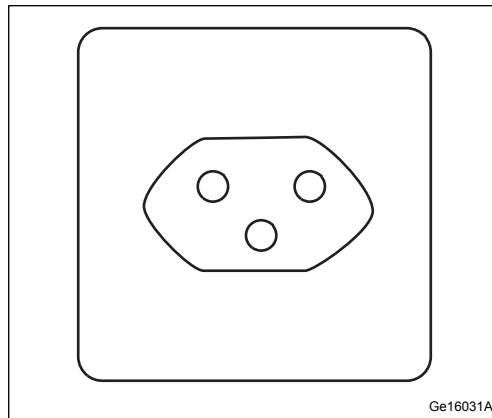
— EU: Service outlet for Europe



— US: Service outlet for the United States



— CH: Service outlet for Switzerland



4.2 Technical Data

This section describes the dimensions, environmental characteristics, and power characteristics of the service outlet.

4.2.1 Dimensions

[Table 13](#) lists the dimensions of the service outlet variants.

Table 13 Dimensions

Technical Data	CN	UK	EU	US	CH
Width	49.9 mm	49.9 mm	49.9 mm	27.0 ± 0.5 mm	50 mm
Height	49.9 mm	49.9 mm	49.9 mm	27.5 ± 0.5 mm	50 mm
Depth	29.7 mm	29.9 mm	39.9 mm	32.8 ± 0.5 mm	37 mm

4.2.2 Environmental Characteristics

[Table 14](#) lists the environmental characteristics of the service outlet.

Table 14 Environmental Characteristics

Technical Data	Description
Temperature range, operation	-25 – +55 °C
Temperature range, storage	-30 – +70 °C
Humidity	≤ 95%
Altitude	0 – 2000 m



Technical Data	Description
Pollution degree	2

4.2.3

Power Characteristics

Table 15 lists the power characteristics of the service outlet

Table 15 Power Characteristics

Technical Data	CN	UK	EU	US	CH
Rated voltage	250 V AC	250 V AC	250 V AC	125 V AC	250 V AC
Rated current	10 A	13 A	16 A	15 A	10 A
Leakage current	30 mA	30 mA	30 mA	30 mA	30 mA
Insulation resistance	100 M, 500 VDC	100 M, 500 VDC	100 M, 500 VDC	100 M, 500 VDC	100 M, 500 VDC

5 DC Distribution Unit

This section describes the DC distribution unit of the power system.

5.1 Overview

This section gives an overview of the DC distribution unit.

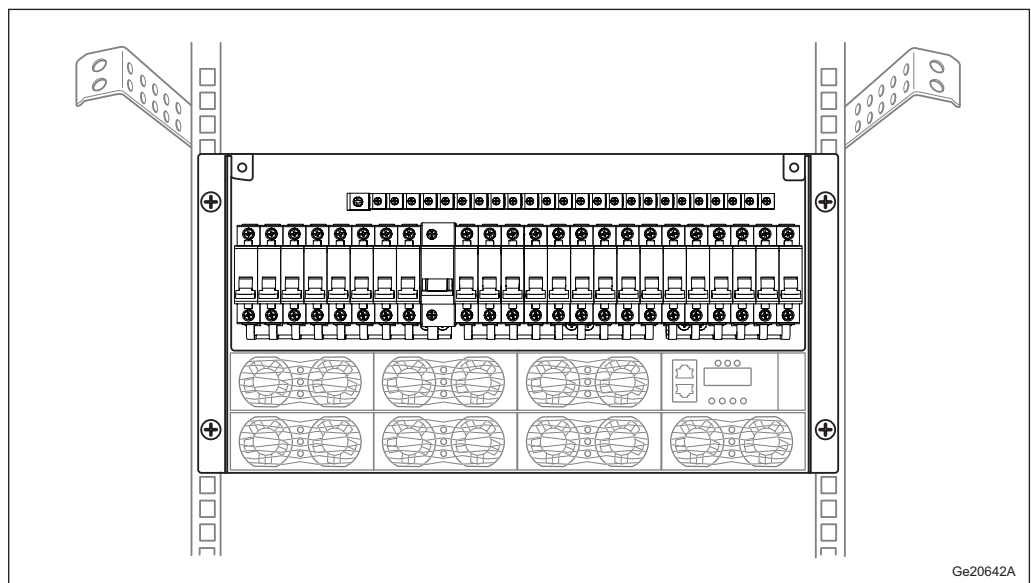
5.1.1 Purpose

DC distribution unit is mainly to distribute the DC power for the power system.

5.1.2 Variants

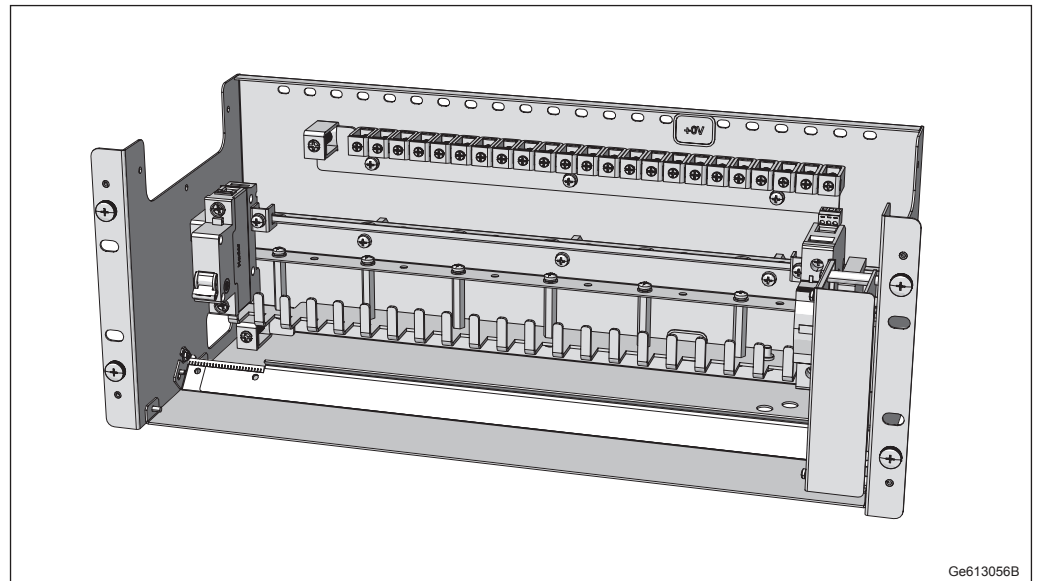
The following variants are available:

- 24-Position distribution unit. The variant is only used for 21 kW AC-powered Enclosure.

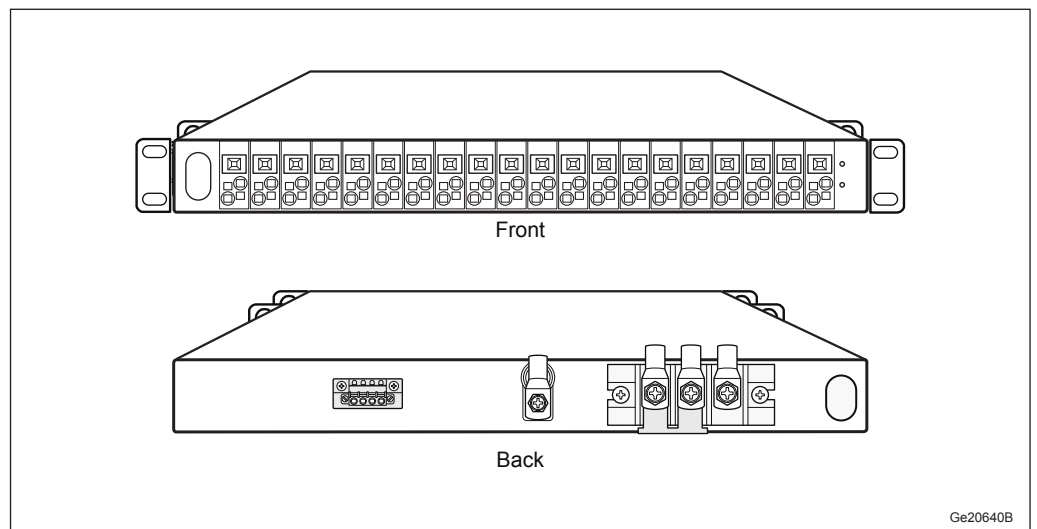


Note: The 24-position distribution unit is not replaceable.

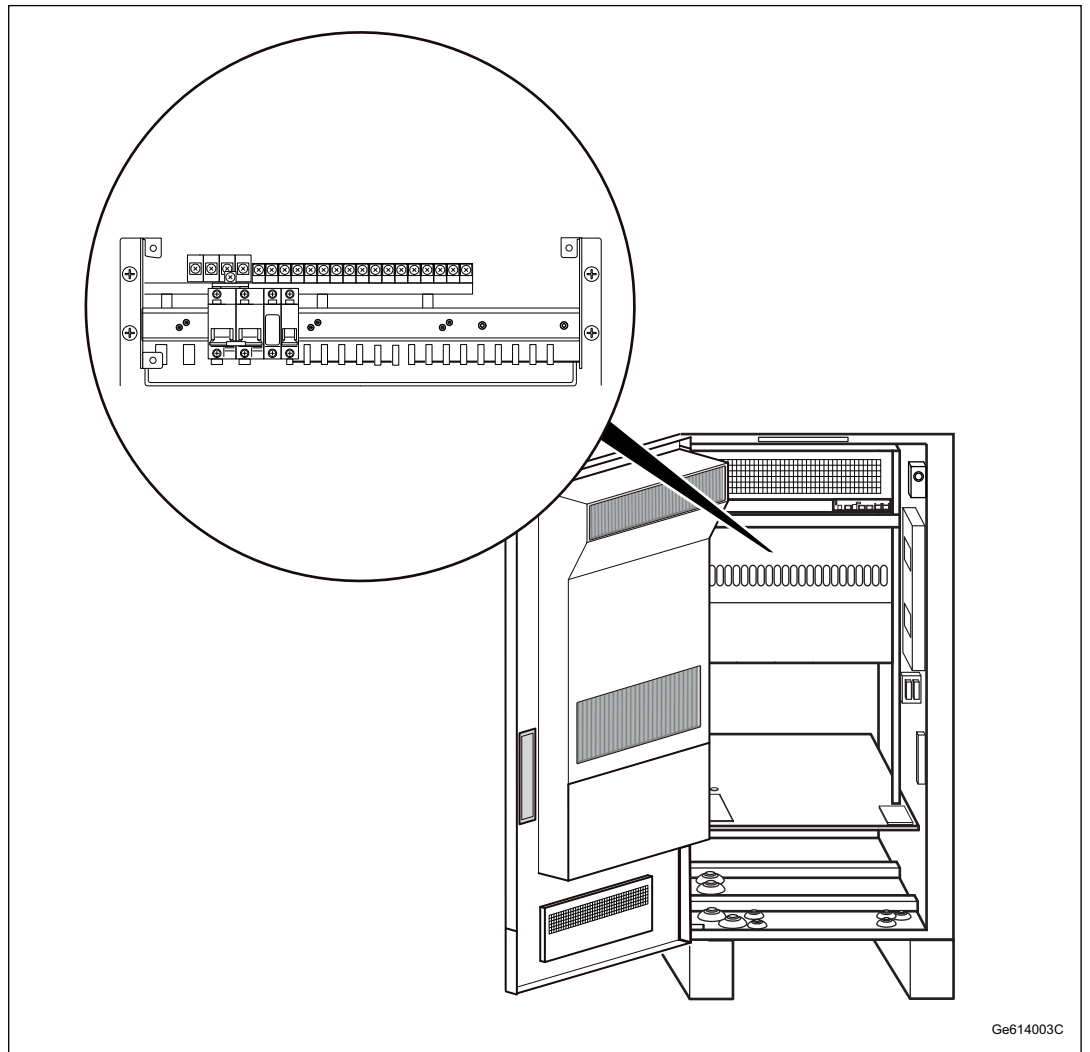
- 21-Position distribution unit. This variant is mainly used for:
 - DC-powered Enclosure
 - AC-powered Enclosure with extension need for more circuit breakers (Optional)



- 20-Position distribution unit. The variant is used for both DC-powered and 21 kW AC-powered Enclosure. It is optional and can be replaced.

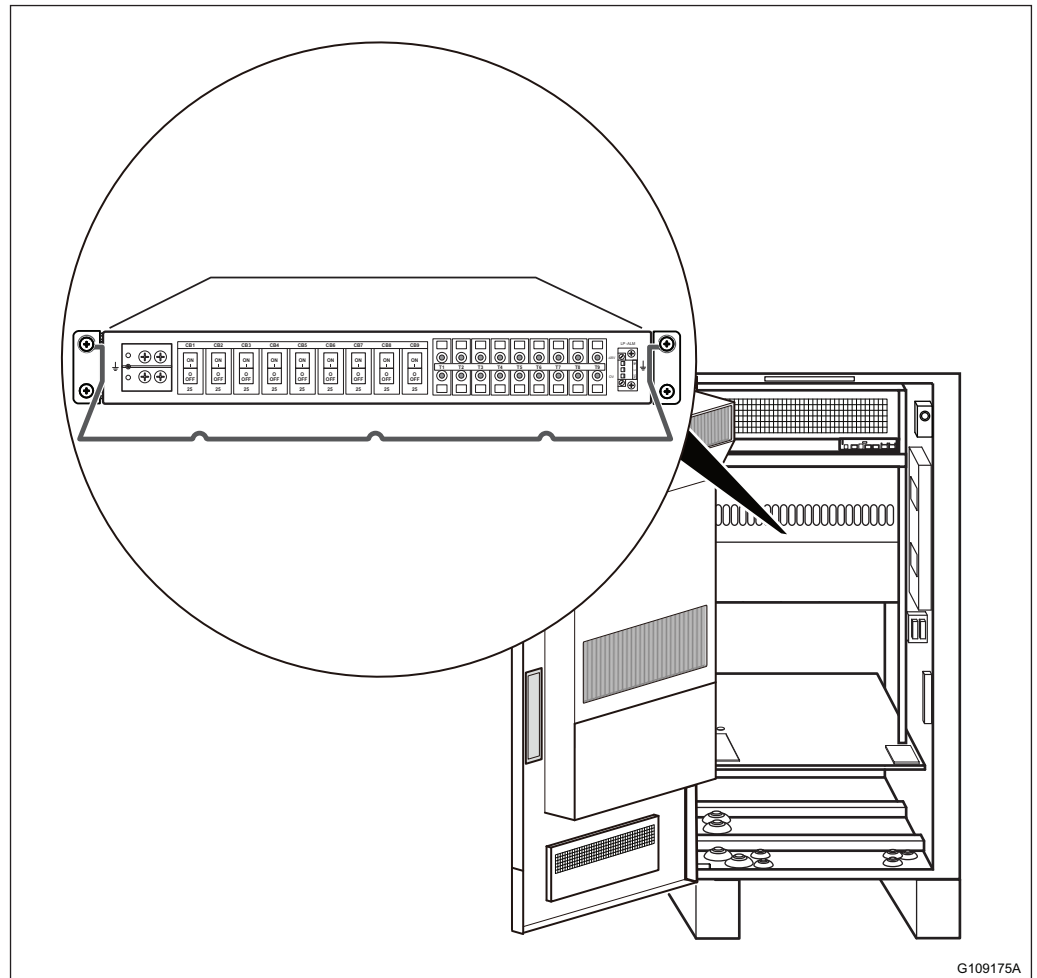


- 18-Position distribution unit. The variant is only used for AC-powered Enclosure.



Note: The 18-position distribution unit is not replaceable.

- 9-Position distribution unit. The variant is used for both AC-powered and DC-powered Enclosure. It is optional and can be replaced.



5.2 Function Description

Besides distribution function, the DC distribution unit also includes supervision on if the circuit breakers have tripped.

5.3 Technical Data

[Table 16](#) lists the technical data of the DC distribution unit.

Table 16 DC Distribution Unit Technical Data

Technical Data		24 Positions	21 Positions	20 Positions	18 Positions	9 Positions
Dimensions	Height	265 mm	176 mm	43.6 mm	N/A ⁽¹⁾	43.6 mm



Technical Data		24 Positions	21 Positions	20 Positions	18 Positions	9 Positions
	Width	482.6 mm	482 mm	482.6 mm		482.6 mm
	Depth	350 mm	199 mm	282 mm		118 mm
Environmental requirements	Temperature range, operation	- 33°C – +70°C	- 33°C – +70°C	- 33°C – +70°C	- 33°C – +70°C	- 40°C – +60°C
	Humidity, operation	15% – 100%	15% – 100%	15% – 100%	10% – 95%	5% – 100%
Maximum circuit breakers		24 positions for circuit breakers	21 positions for circuit breakers	20 positions for circuit breakers	2 positions for battery circuit breakers and 16 positions for other circuit breakers	Fixed 9 positions of 25A circuit breakers
Voltage range, operation		-40 V DC – -58.5 V DC	-40 V DC – -58.5 V DC	-40 V DC – -58.5 V DC	-40 V DC – -58.5 V DC	-48 V DC – -58.5 V DC
Connection cable size		1 mm ² – 25 mm ²	1 mm ² – 25 mm ²	1 mm ² – 16 mm ²	1 mm ² – 25 mm ²	2.5 mm ² – 10 mm ²

(1) This variant is an integrated part of the enclosure.



6 AC SPD (AC-powered Enclosure Only)

This section describes the AC SPD of the power system.

6.1 Overview

The AC SPD is mainly to protect the power system from overload by limiting surge current on the AC-powered input.

The AC SPD supports failure indication and remote signaling alarm contact.

6.2 Technical Data

This section describes the technical data of the AC SPD.

[Table 17](#) lists the technical data of the AC SPD.

Table 17 AC SPD Technical Data

Technical Data		Description
Dimensions	Width	72 ± 0.5 mm
	Height	99.5 ± 1 mm
	Depth	67 ± 1 mm
Installation requirements	Standard	35mm DIN rail
	Torque	— For wiring terminal: 2.5 Nm — For remote signaling port: 0.5 Nm
	Maximum cross-sectional area of wiring in remote signaling port	1.5 mm ²
	Cross-sectional area of copper conductor	— Multi-stranded: 1.5 – 25 mm ² — Single-stranded: 1.5 – 35 mm ²
Operating Environment	Temperature range, operation	-40°C – +80°C



Technical Data		Description
	Temperature range, storage ⁽¹⁾	-40°C – +80°C
	Relative humidity, operation and storage	≤ 95%
	Atmosphere	62 – 106 kPa
	Altitude	-500 – +4000 m
Degree of protection		20P
Electrical Characteristics	Connection mode	Parallel
	Protection mode	L – N, N – PE
	Maximum continuous operating voltage	L – N: 385 V AC N – PE: 260 V AC
	Frequency	50/60 HZ
	Nominal discharge current I_n (8/20 μs)	20 kA
	Maximum discharge current I_{max} (8/20 μs)	40 kA
	Protection level U_p	L – N: 1800 V N – PE: 1500 V
	Follow current I_{fi}	N – PE: 100 A _{rms}
	Maximum backup fuse	80 A gL/gG
	Response time t_A	L – N: ≤ 25 ns N – PE: ≤ 100 ns

(1) Function recheck is required when the module is stored more than one year.



7 DC SPD

This section describes the DC SPD module of the power system.

7.1 Overview

The DC SPD is mainly to protect the power system from lightning and surge that comes on any DC input or output.

The DC SPD supports failure indication and remote signaling alarm contact.

7.2 Technical Data

[Table 18](#) lists the technical parameters of the DC SPD.

Table 18 DC SPD Technical Data

Technical Data		Description
Dimensions	Width	18 ± 0.5 mm
	Height	99.5 ± 1 mm
	Depth	68 ± 1 mm
Installation requirements	Standard	35mm DIN rail
	Torque	— For wiring terminal: 2.5 Nm — For remote signaling port: 0.5 Nm
	Maximum cross-sectional area of wiring in remote signaling port	1.5 mm ²
	Cross-sectional area of copper conductor	— Multi-core line: 1.5 - 25 mm ² — Single-core line: 1.5 - 35 mm ²
Operating Environment	Temperature range, operation	-40°C – +80°C
	Temperature range, storage ⁽¹⁾	-40°C – +80°C
	Relative humidity, operation and storage	≤ 95%



Technical Data		Description
	Atmosphere	70 – 106 kPa
	Altitude	-500 – +3000 m
Degree of protection		20P
Electrical Characteristics	Connection mode	Parallel
	Protection mode	L – N, L/N – PE between -48 V and 0 V
	Maximum continuous operating voltage	85 V DC
	Nominal discharge current I_n (8/20 μ s)	20 kA
	Maximum discharge current I_{max} (8/20 μ s)	40 kA
	Protection level U_p	700 V
	Maximum backup fuse	125 A gL/gG
	Response time t_A	≤ 25 ns

(1) Function recheck is required when the module is stored more than one year.



8 Battery Temperature Sensor (AC-powered Enclosure Only)

This section describes the battery temperature sensor of the power system.

8.1 Overview

The battery temperature sensor is to sense the temperature of the battery.

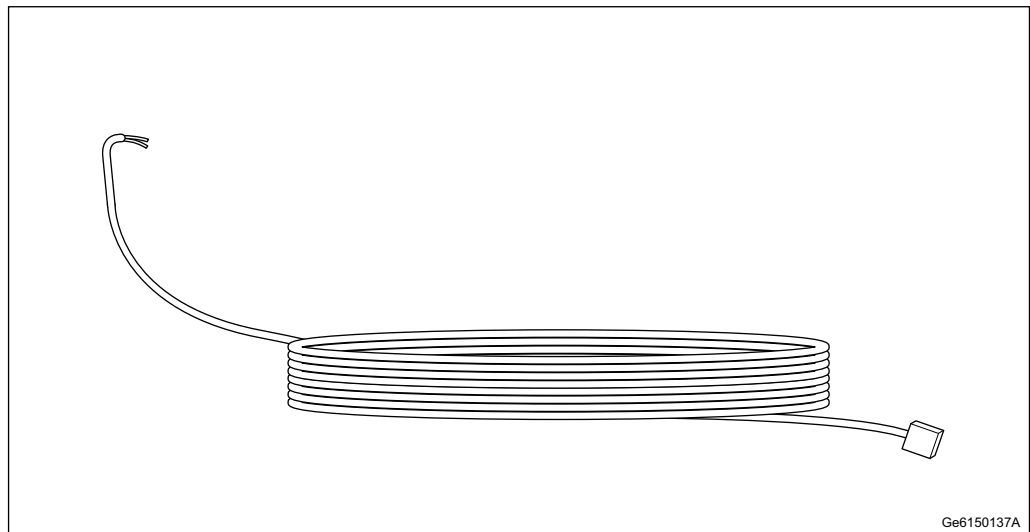


Figure 17 Battery Temperature Sensor

8.2 Technical Data

This section describes the technical data of the battery temperature sensor.

Table 19 Technical Data

Technical Data	Description
Length of the cable	10 m
Temperature range, operation	-30°C – +80°C



9 Optional Battery (AC-powered Enclosure Only)

For more information about battery supported by Enclosure, refer to Enclosure Description.

Note: Only AC-powered Enclosure 6140 reserves space for batteries internally. For AC-powered 6130 Enclosure, optional batteries could be installed externally.



10 Power System Controller (AC-powered Enclosure Only)

The power system controller provides the analog value measurement and digital value measurement. For more information, refer to Power System Controller User Guide.