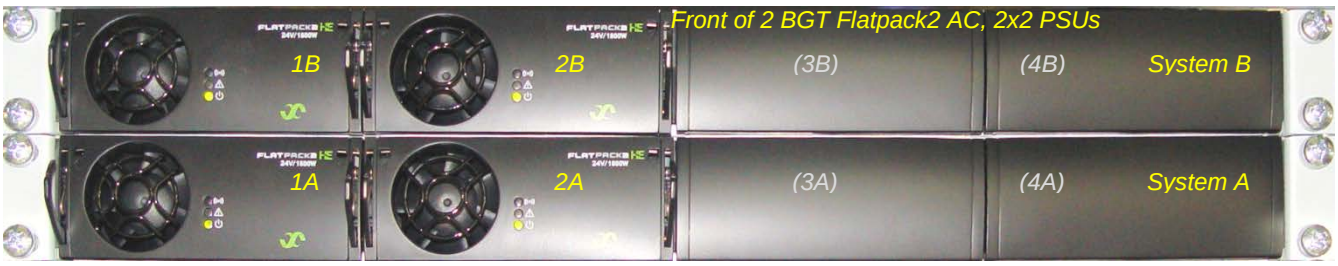
FREQUENTIS AG, DVR 0364797
Innovationsstraße 1, 1100 Vienna; Austria

20-0002591	Power Supply Rack	BGT Flatpack2 AC
ORDER NUMBER	FUNCTION	NAME



Mechanical Data

(1 HU, for use in 19" cabinets)

Front (W × H)	482.5 × 44.4 mm²
Drillings (10.3 × 7.1 mm; centre/centre)	468.1 × 31.7 mm²
Casing (W × H × D)	447.9 × 44.4 × 379.6 mm³
Mass incl. / excl. assemblies	~1 / ~9 kg

Environment

	Storage	Operation
Temperature	-40 to +75 C	+5 to +45 °C
Relative humidity (without dewing)		5 to 95 %

Electrical Data

acc. Flatpack2 HE Rectifier 24V, 1800W

Primary input	Nominal	Maximum range
≤4x AC	115 / 230 V	85 to 300 V
Frequency	50 to 60 Hz	45 to 66 Hz
Input current at nominal input 230 V		11.25 A_{rms}

Output voltage	Nominal	Maximum range
DC (preset to 24V)	+24 V	21.7 to 28.8 V
Output current (4 PSUs at 24VDC & 230 V input)		≤300 A
Max. power consumption (4 PSUs)		<7200 W

Short Description

The Flatpack2 power supply racks are compact (1 HU) and powerful DC power supply systems designed to supply Frequentis system cabinets completely. The racks hold up to 4 voltage converter units to provide 7.2 kW with AC/DC conversion.

The voltage converters provide DC-voltages of +24 V with an efficiency of >95 % at 30-70 % load for powering core racks or modules, interface racks and other cabinet equipment.

The racks BGT Flatpack2 AC use the current regulated internal fans of the voltage converters for cooling, drawing fresh air from the front to the outlet on the rear. Noise increases from <40 dB_A ($T_{ambient}$ < 25°C) to <58 dB_A at nominal input and full load.

Varistors provide transient input protection. Mains fuse in both lines disconnect for voltages above 300 V AC.

All output voltages are floating and have no galvanic connection to earth.

Manufacturer: ELTEK

Approvals

EMC EN 55022(06) Class B, FCC Part 15
EN 61000-6-1(01), -6-2(05), -6-3(07), -6-4(07)
FCC part 15B Subpart 109, ETSI EN 300 386 v.1.4.1(08)

Electrical safety IEC(09)/EN(06)/UL(2nd Ed.) 60950-1
CSA C22.2 No. 60950-1-07, 2nd Ed.

CE FC RoHS 2011/65/EU

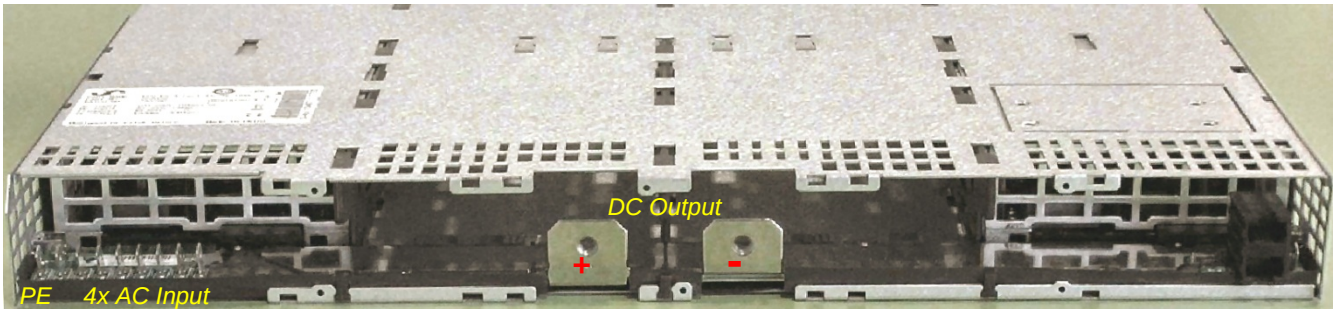
The rack and its voltage converters may only be installed and put into operation by qualified personnel.
The unit does not contain serviceable parts. If damage or malfunction should occur during operation, immediately disconnect power and send the complete unit to Frequentis for inspection.

Voltage Converter Units

	Order Number	Description (refer to PSU data sheets)
PSU Flatpack2 AC/DC 24V/1800W	20-0002570	AC input, +24 V DC output; ≤1800 W
BP Flatpack2 1HU BK	10-0008615	Filler panel for empty insertion slots

Connectors

	Position	Connector #/Type	Function
PSU adapter	front	1A – 4A (1B – 4B)	Adapter for voltage converters, secondary side
$L1_1$, $L1_2$, $L1_3$, $L1_4$	rear, left	4x Faston	4x AC inputs
$L2_1$, $L2_2$, $L2_3$, $L2_4$	rear, left	4x Faston	
DC Output (+, -)	rear, centre	M6 terminal	DC output
CAN Bus	rear, right	2x RJ45	Monitoring output
⏚ (GND)	rear, left / right	Faston / M4	Protective earth (connection to the site's equipotential bonding system)



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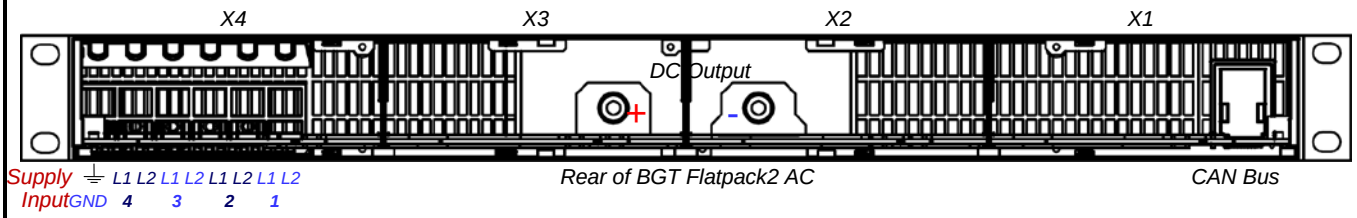
Functional Description



Main Components

- 19" casing 1 HU 20-0002591
  - incl. rear protective grids
- ≤4x PSU Flatpack2 AC/DC 24V/1800W 20-0002570
- Filler panel BP FLATPACK2 1HU BK 10-0008615

For safety-critical reasons, connect the site's primary power supply only at the ETA Connection Module AC inside the cabinet.

Power Supply Concept

The racks BGT Flatpack2 AC are designed to be connected to mains via the *ETA Connection Module AC* (order no.: 20-0002769), which is the interface to the customer furnished supply lines.

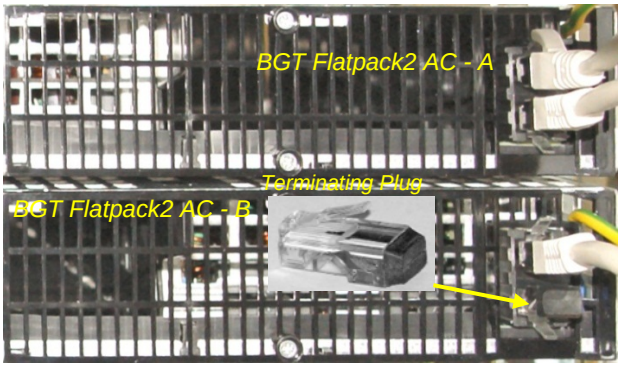
For maximum availability, the power supply concept for a Frequentis cabinet assumes two separate and independent supply lines provided on-site. This can be realised by means of two racks BGT Flatpack2 AC using one rack for Power A, the other for Power B.

No malfunction of the supply units will occur due to interruption and simultaneous variation of main voltage and frequency within the limits specified. All outputs of the PSUs are electronically protected. In case of an internal power supply defect, a redundant circuitry limits the output voltage. The output shuts down and automatically attempts to restart.

An alarm contact (dry contact) monitors the output voltages and the fans of the module via a CAN bus. In case of more than one PSU per rack is equipped, the alarm function of the racks BGT Flatpack2 AC has to be gathered (via a CAN bus) to the *DC Controller UPC4* (order no.: 20-0002722), which evaluates the status of the power supply units *PSU Flatpack2 AC/DC 24V/1800W* for the particular core system.

Two RJ45 jacks serve for feed-through of the CAN bus to other BGT Flatpack2 and finally to the controller. In order to avoid disturbances, the CAN bus has to be terminated on both ends by means of a terminating resistor.

If one of the rack's RJ45 jacks is not used (rack is the end of the CAN bus), the terminating plug has to be inserted. Missing but also mis-inserted terminating plugs will disturb the CAN bus function. The galvanic isolated CAN bus can be connected by means of a 1:1 patch cable to a power system's control system allowing monitoring and control of the voltage converters.



Alarms	**Alarms** will be indicated in case of low mains shutdown, high temperature shutdown, rectifier failure, overvoltage shutdown on output, fan failure, low voltage alarm at ≤21.5 V and CAN bus failure. Two RJ45 jacks serve for feed-through of the CAN bus to the controller units and to other Flatpack2 racks.		
Warnings (from PSUs)	will be indicated before low temperature shutdown, converter in power derate mode, remote battery current limit activated, input voltage out of range (flashing at overvoltage), loss of CAN communication with control unit.		
Indication LEDs (on front of PSUs)		red	Voltage converter failure
		yellow	Voltage converter warning
		green	Power OK LED: ON = no faults This LED monitors the same functions as the alarm relay. If the module operates under normal conditions, the green LED is on. When the alarm relay opens also the green LED goes off.

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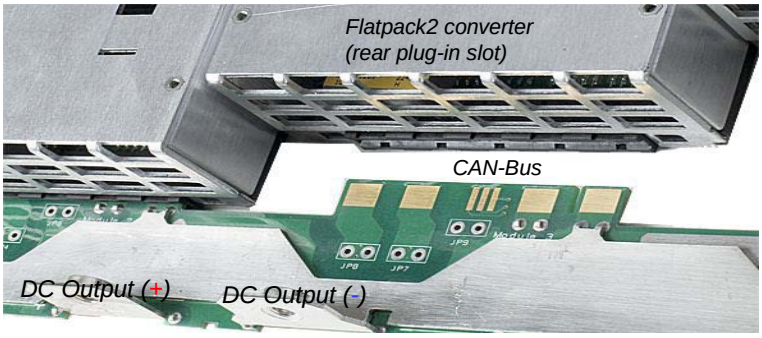
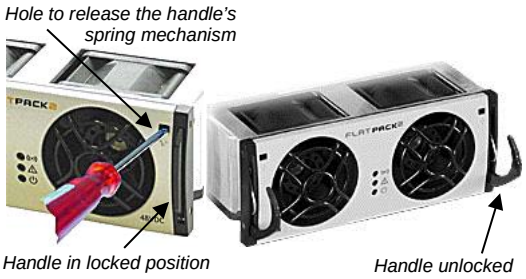
Installation

Mounting

The power supply rack BGT Flatpack2 AC is designed for mounting in a Frequentis 19" cabinet frame. When installed in a cabinet, the operating ambient temperature of the rack environment can be greater than room ambient. Therefore, forced cooling is required limiting the maximum ambient temperature specified on page 1. Installation of the rack must not inhibit the air flow through the 1 HU perforation duct at the front. Avoid uneven mechanical loading when mounting and cabling the rack in a cabinet. Use a pull-relief bar to fasten all cables!





Inserting / Removing a Voltage Converter

1) Unlock the handles by inserting a screwdriver into the holes to release the spring mechanism, and open the handles.
2) For insertion, check the keying of the rack at the rear of its upper side.
3) Insert / remove the module by sliding it fully into / out of the power shelf, so that the module makes proper contact / using both handles to pull the module loose. Support from underneath before the unit is completely inserted / free. Take care when contacting into the insertion slot.
4) Lock the handles by pushing the handles up into their housings (locked position). Then, the module will be securely locked in the shelf / ready for transport
5) Mount filler panels in unused module locations.

CAUTION. For EMC and to prevent the risk of injury, empty insertion slots have to be covered with filler panels!

One height unit (1 HU) of free space must be kept clear above and below of a pair of racks in order to prevent heat accumulation and to provide cable bending.

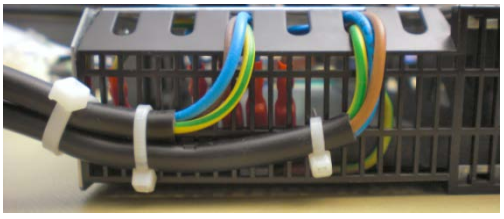
Power Supply

WARNING Risk of electrical shock.
Before connecting or disconnecting input power or load connection cables, make sure that the input power is turned off! Turn also power off before demounting a protection grid.

AC Input Terminal	
Solid / stranded wire	≥1.5 mm² / ≥15 AWG
Faston size	6.3 mm

DC Output Terminal	
Stranded wire	≥35 mm² / ≥1 AWG
Terminal size	M6
Torque	6 Nm

Do not put the rack BGT Flatpack2 AC into operation without protective grids on the rear.



For AC input, the modules are tested and approved for branch circuits up to 16 A (wire cross section ≥1.5 mm^2). External protection is required, if the supplying branch has an ampacity greater than this. Local regulations might apply.

For connection of **DC Out**, first cut out a part of the protective grid as depicted. After threading the leads through the cut-out, screw the angled ring cable lugs of 1474-LSF or 1489-LSF with M6 screws and spring washers onto the M6 terminals with 6 Nm.

Frequentis recommends to align the angled ring cable lugs horizontally. Vertical mounting as shown at the top figure requires a modified cut-out.

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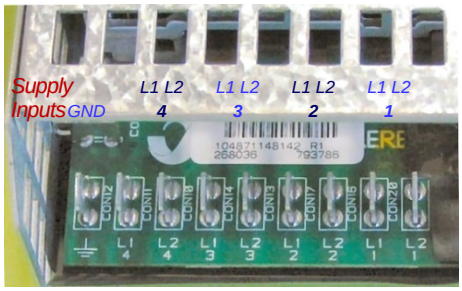
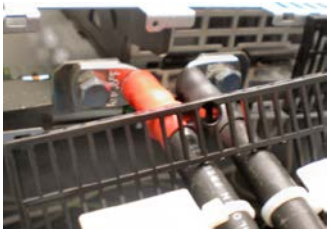
Recommended Values for 230 V AC Input



Label (right to left)	Connection	to	Recommended Wire Cross Section [mm²]	Recommended Prefuse (Line Protection)
1 (L2)	Neutral (N)	PSU 1	2.5#)	16 A
1 (L1)	Phase (P)		2.5	16 A
2 (L2)	Neutral (N)	PSU 2	2.5	16 A
2 (L1)	Phase (P)		2.5	16 A
3 (L2)	Neutral (N)	PSU 3	2.5	16 A
3 (L1)	Phase (P)		2.5	16 A
4 (L2)	Neutral (N)	PSU 4	2.5	16 A
4 (L1)	Phase (P)		2.5	16 A
⏚	Protective earth	PE	2.5	---

#) For supplying Frequentis equipment, supply cables with 1.5 mm² WCS are sufficient for AC input.

Recommended Values for 24 V DC Output



Power supply units equipped:		1	2	3	4
Max. output current	[A]	75	150	225	300
Cable cross section – Output load	[mm²]	25	70*)	120	185
External output fuse (line protection)	[A]	80	160	250	315

*) For supplying Frequentis equipment and when only two power supply units are required, supply cables with 35 mm² wire cross section are sufficient for DC output (voltage drop along the line has to be considered). For other use cases, the required WCS has to be re-calculated.

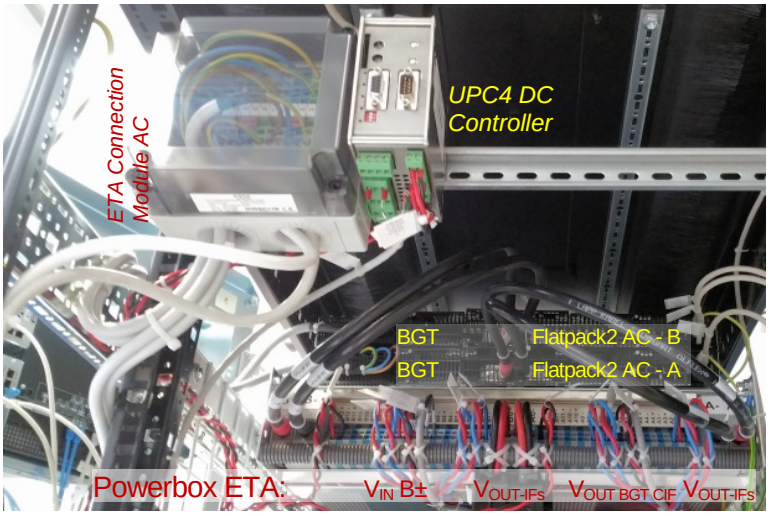
Cabling

All output cables used are predefined and prefabricated by Frequentis. The supply cables from *Powerbox ETA* to the rack BGT CIF 12k are equipped with ferrites on both ends to guarantee EMC.

Do not put the rack BGT Flatpack2 AC into operation without protective grids on the rear.

Consider the ratings on the rack's type label. The rack has to be connected to the building's equipotential bonding system. For overcurrent protection, the primary supply circuit(s) have to be properly fused.

All load cables have to be properly secured to the cabinet infrastructure by means of cable ties/clamps.



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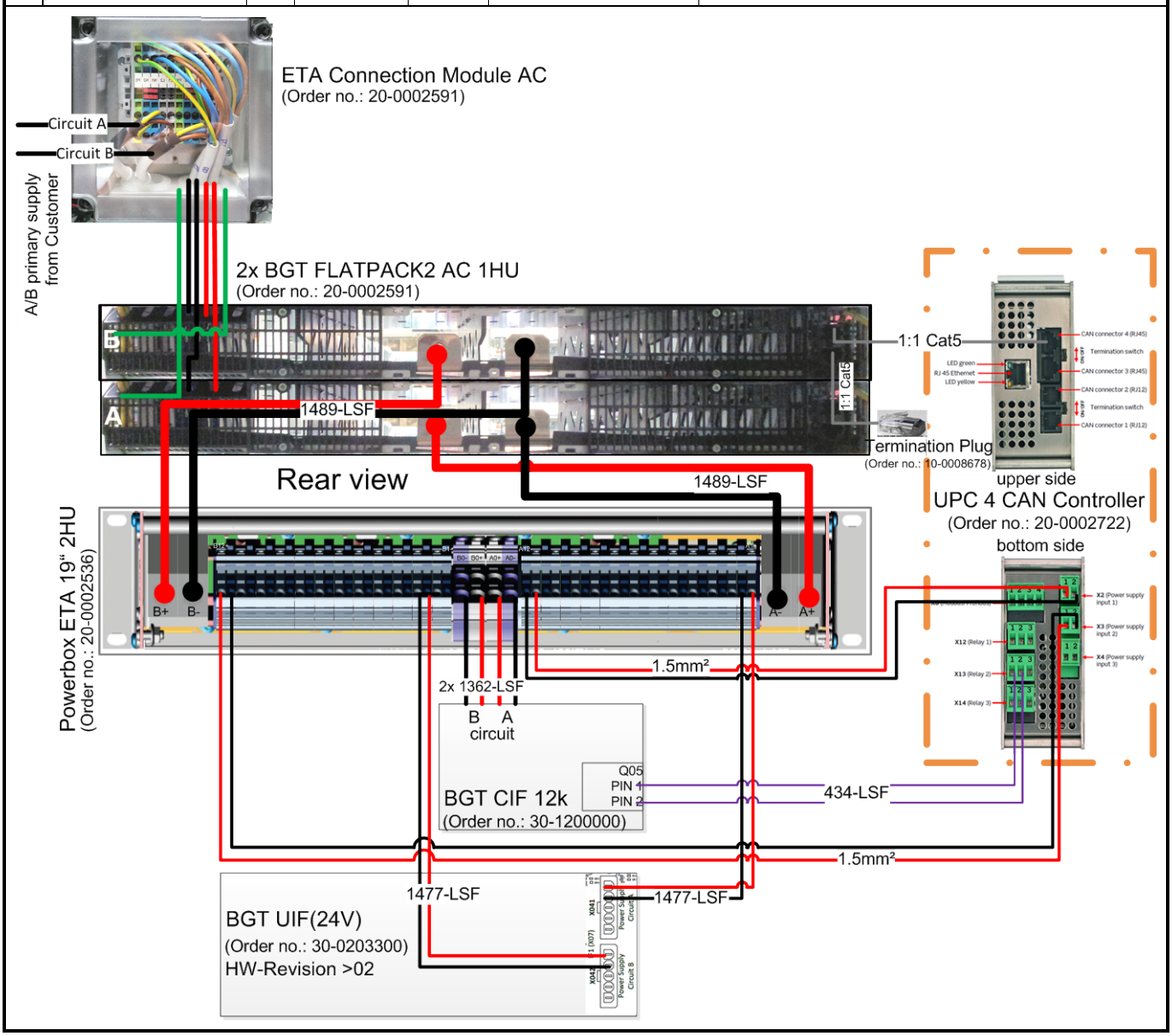
Cabling (Example)		Type	Order number	Length [m]	FROM / Connectors	TO / Connectors	Redundancy
IN	Customer furnished item, 1-phase or 3-phase; ≥1.5 mm²			≥3	Mains (AC)	Connection Module AC - Supply circuit A	Connection Module AC / DC - Supply circuit B
BGT_{IN}	1-phase or 3-phase, ≥1.5 mm² (preinstalled by Frequentis)			~0.5	Connection Module AC	N ($L1_1$), P ($L2_1$)	N ($L1_N$), P ($L2_N$); N=2/3/4BGT
BGT_{OUT}	1489-LSF (flexible)	OUT	17-1489000	0.7	*A+ / B+*	Powerbox ETA, red	(from 2nd BGT Flatpack2)
				0.7	A- / *B-*	Powerbox ETA, black	
	1474-LSF (semi-rigid)	OUT	17-1474000	0.7	*A+, A- / B+, B-*	Powerbox ETA	(from 2nd BGT Flatpack2)
	1:1 CAT≥5	OUT	-	various	RJ45 *(ALARM)*	2nd BGT Flatpack2	-
	1:1 CAT≥5	OUT	-	various	from 2nd BGT Flatpack2	DC Controller UPC4	
	RJ45 Plug	I/O	10-0008678	-	CAN-bus termination	on 2nd BGT Flatpack2	-



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