EPD Series

500W DC OUTPUT UPS

GENERAL FEATURES

- Uninterruptible power supply for 48V batteries
- Two 10kV isolated outputs
- Two- or three-state battery charging
- Local monitoring via 3 LEDs
- Remote monitoring via 4 alarm relays
- Configurable charging parameters
- Alarm signaling through potential-free relays contacts
- Two Ethernet ports for local and remote configuration and monitoring
- One CAN port for communication with the BMS
- Integrated web server
- Battery connection via solid-state relay
- 10kVac input-output isolation



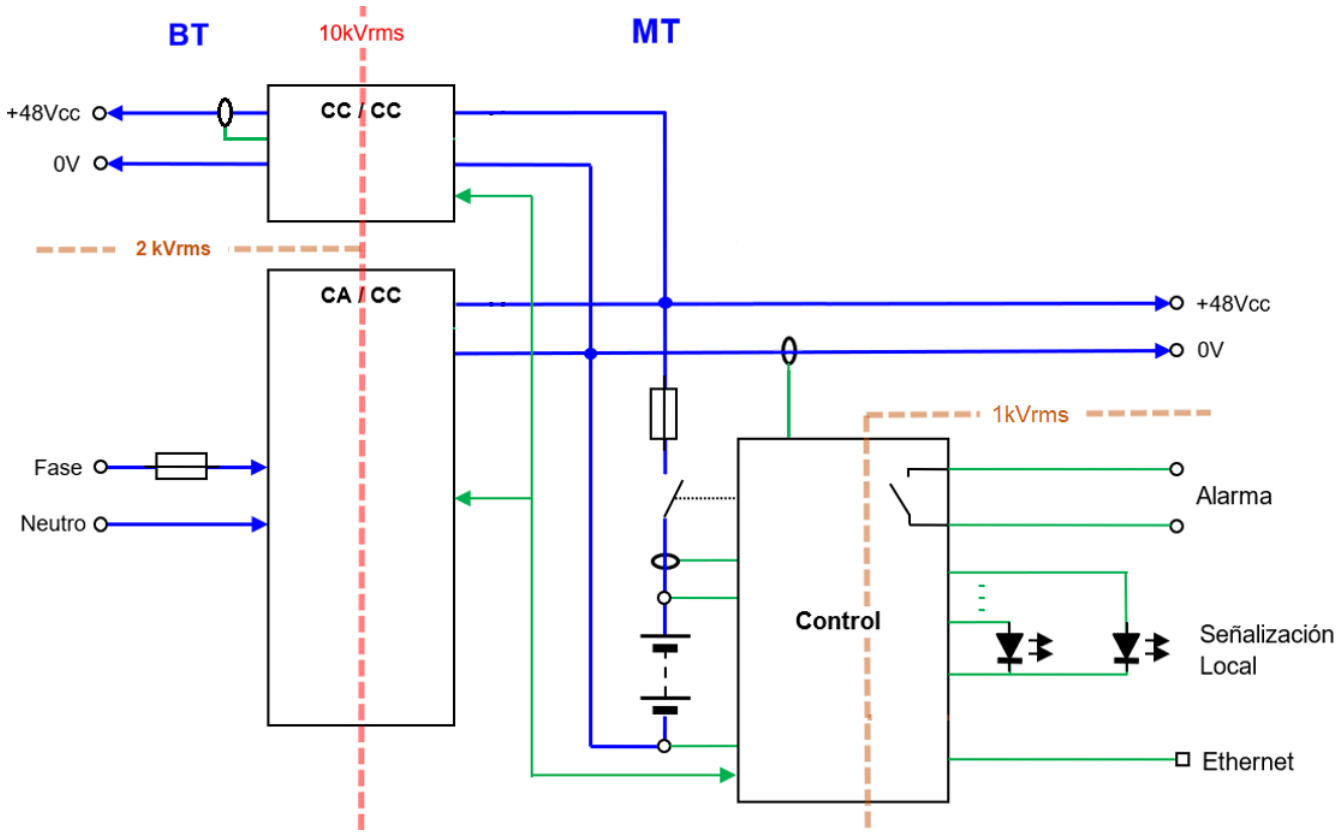
3 YEAR WARRANTY INDUSTRY

ROHS REACH

Product reference	Nominal AC input voltage	Output voltages	Nominal output power	Peak output power (10 sec.)
EPD-500	230Vac	48V BT / 48V MT	500W	750W

Several references are subjected to special MOQs and lead times. These products are not intended for use as critical components in life support or nuclear systems.

BLOCKS DIAGRAM



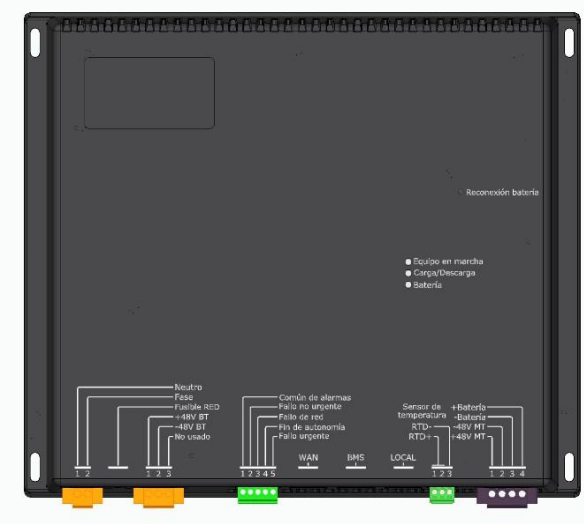
INPUT		
Input voltage range	184 … 264Vac	
Line frequency range	47 … 63Hz	
Starting current	<20A	
Power factor	>0.95	
Efficiency	> 85% [1]	
OUTPUT	**1 (MT)**	**2 (BT)**
Nominal output voltage	48V	48V
Output voltage range	39 … 60V	39 … 60V
Maximum current	12.82A	6.41A
Peak peak current (10s per minute)	19.23A	12.82A
Line regulation	0.1%	0.1%
Ripple	< 50mVpp	< 50mVpp
Noise (BW 20MHz)	< 100mVpp	< 100mVpp
Nominal power	500W	250W
Peak power (10s)	750W	500W
Total rated power	500W	
Total peak power 10s	750W	
BATTERY		
Charging method	Constant current / constant voltage / floating.	
Battery type	LiFePO4 / Lead Acid	
Maximum charging current	6.5 A	
Battery self-consumption at standby	<0.5 mA	
Battery self-consumption (without AC)	<15W	
Battery temperature measurement	Yes	
Battery capacity measurement	Yes	
Battery test	Yes	
Battery overcurrent protection	Due to electronic limitation + fuse	
Battery reverse protection	Yes	
Low battery shutdown	Yes	
ENVIRONMENTAL		
Storage temperature	-25 … 70ºC	
Operating temperature	-10 … 60ºC	
Maximum relative humidity	95% non-condensing	
Refrigeration	By natural convection[2]	
Environmental requirements	RoHS compliant according to Directive 2011/65/EU and REACH	
Mechanical and temperature tests	See Table 2	
EMC		
Emissions	See Table 3	
Immunity	See Table 4	
SAFETY		
Electrical safety	Class II equipment IEC 62368-1:2020	
Dielectric strength: • [Input, Output 2] / [Output 1, Signals, Comms] • [Output 2] / [Input, Output 1, Signals, Comms] • [Alarms, Comms] / [Input, Output 1, Output2]	10kVac 50Hz 1 min. 2kVac 50Hz 1 min 1kVac 50Hz 1 min	

MECHANICAL	
Size (Width x Height x Depth)	281 x 245.6 x 101 mm
Weight	2.3 kg
CONTROL	
Battery reconnection button	Allows the unit to start in the absence of mains voltage.
LEDs	Equipment running Internal fault Input voltage out of range Output voltage out of range Charging mode (constant current or constant voltage) Battery discharge Battery test in progress Battery test failed Battery voltage out of range
Alarms	Input mains failure (FAC) • Voltage out of range • No mains voltage Urgent fault (URG) • Battery failure • Internal device failure • Battery disconnection Non-urgent fault (NUR) • Battery overvoltage • Output voltage out of range • Temperature probe failure End of runtime (FAU) • The battery has reached its minimum voltage
Alarm Specification	
Type	Solid-state relay
Logic	FAC, NUR, FAU – Normally Open URG – Normally Closed
Maximum voltage	200V
Maximum current	0.2A
PROTECTIONS	
Overcurrent in loads	Electronic current limiting
Deep battery discharge	Battery disconnects
Overcurrent in the battery	Electronic current limiting + fuse
Overcurrent at the input	Fuse
COMMUNICATIONS	
Ethernet	2 ports for local and remote communication
CANBUS	1 port for communication with BMS

[1] Vin = 230 Vac, Nominal output power

[2] For proper cooling of the equipment, it is essential to mount it on a wall, with the ventilation grilles correctly oriented to allow airflow inside the equipment.

CONNECTIONS



Connector	Pin	Signal
AC Input	1	Neutral
	2	Phase
Output 2	1	+48V BT
	2	-48V BT
	3	Reserved
Alarm Output	1	Common alarms
	2	Non-urgent failure
	3	Network failure
	4	End of autonomy
	5	Urgent failure
WAN Port	-	-
BMS Port	-	-
Local Port	-	-
Temperature Sensor	1	RTD+
	2	RTD+
	3	RTD-
Output 1	1	+48V MT
	2	-48V MT
	3	+Battery
	4	-Battery

Connector	Type	Aerial
AC Input	Weidmüller 1780410000	Weidmüller 1944090000 Premium code 26010367
Output 2	Weidmüller 1780420000	Weidmüller 1944340000 Premium code 26010368
Alarm Output	Phoenix Contact MC1.5/5-G-3.81	Phoenix Contact FK-MCP1.5/5-ST-3.81 PC 26010559
WAN Port	Abracon ARJM11C7-502-AB-ER2-T	RJ45 Male
BMS Port	Amphenol RJHSE5E80	RJ45 Male
Local Port	Link-PP LPJ16264N28NL	RJ45 Male
Temperature sensor	Phoenix Contact MC1.5/3-G-3.81	Phoenix contact FK-MCP1.5/3-ST-3.81 Premium code 26010498
Output 1	Weidmüller 1780430000	Weidmüller 1944350000 Premium code 26010570

DESCRIPTION

The device consists of a charger-rectifier that, when AC input voltage is present, provides a regulated output voltage and charges the battery in a controlled manner.

The device includes a switching power supply and a battery charger with up to three states. It also incorporates alarm circuits that signal faults in the input voltage, the battery, or the charger itself. The alarm outputs are potential-free relay contacts.

Mains voltage operation

In normal operation, the device provides the output current and simultaneously charges the battery in a controlled manner until it reaches float status. The maximum charging current, as well as the rest of the battery charging parameters, are configurable by the user via the device's Ethernet connection. If the sum of the charging current and the output current exceeds the device's maximum current, the output power is prioritized.

With battery support, the device can temporarily provide peak currents higher than the maximum.

The average of this extra current provided by the battery must not exceed the average charging current, as this would cause the battery to discharge.

If the device is unable to provide output voltage, either due to a failure in the input AC voltage or a failure of the device itself, the corresponding alarm will be triggered.

Operation without mains voltage

In the absence of mains voltage, the battery supplies power to the output and the device. The output voltage will then depend on the battery's discharge curve.

If the battery discharges below a certain level (configurable), the end-of-battery alarm will be triggered, and after a certain time, it will be permanently disconnected from the device to prevent a deep discharge that could damage it. Once mains voltage is restored, charging begins again.

Battery Test

If you don't have an external BMS, you can configure a periodic test to check the condition of the batteries.

Battery Temperature Sensor

The device includes a temperature sensor that can be attached to the battery. When used, the fast and float charge voltages will be optimally adjusted based on the battery temperature. This helps preserve the battery's lifespan.

ETHERNET PORTS

The device's configuration and status monitoring are carried out through two Ethernet ports. The system has the following features:

- IPv4 support.
- Web-based M2M communication for configuring, querying, and updating the device.
- User authentication via Web user and password authentication.
- User authentication via LDAP.
- Firmware, alarm, and configuration queries can be remotely configured via the Web interface.
- DHCP dynamic host configuration protocol.
- Clock synchronization via SNTP.

In addition to the features mentioned above, the system also includes a function that allows the device to boot with a specific fixed IP address using the (Battery Reconnect) button located on the front panel.

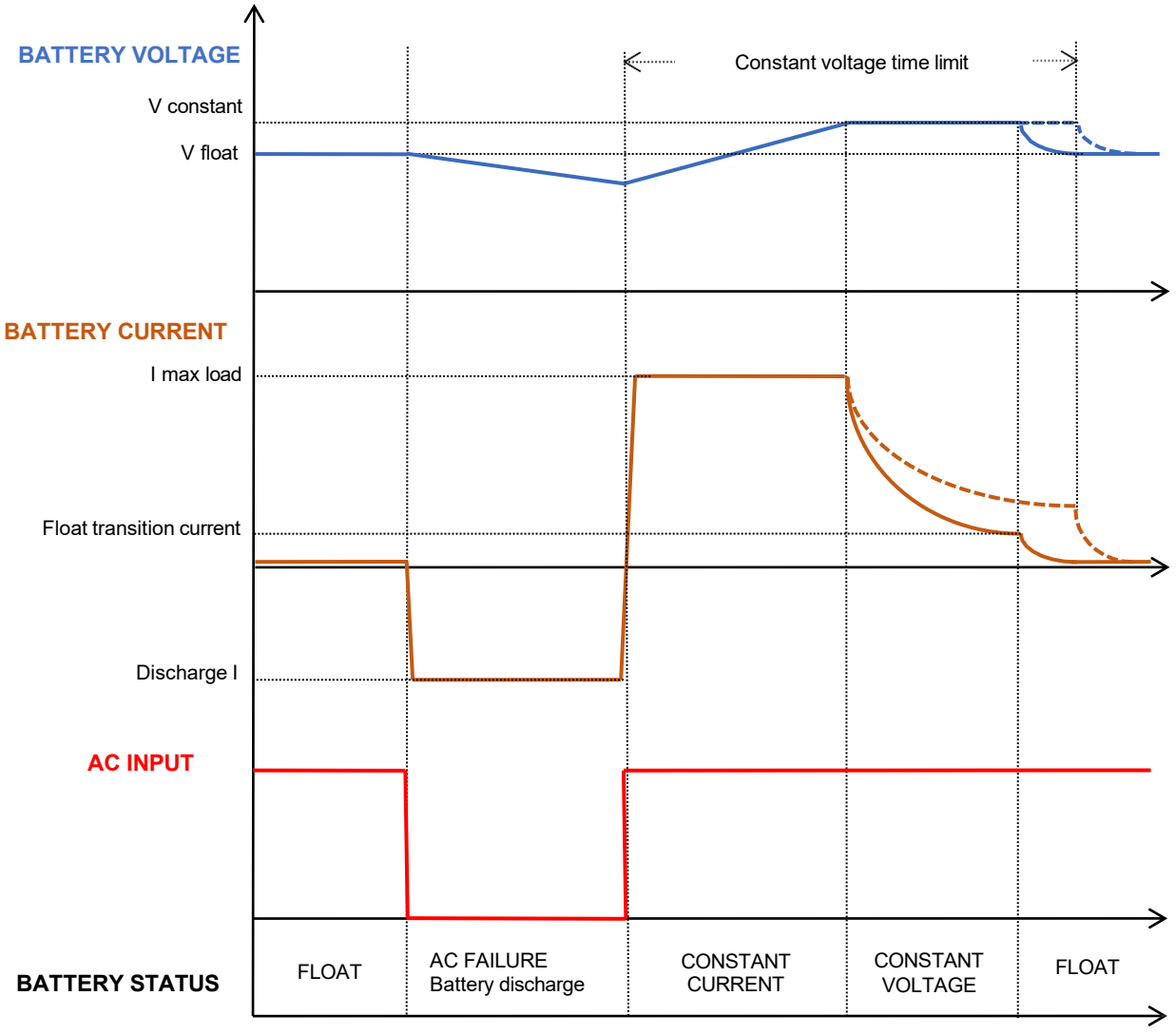
INSTALLATION

Install the equipment following the connection diagram. The charging current can be changed from the default value via the Ethernet connection.

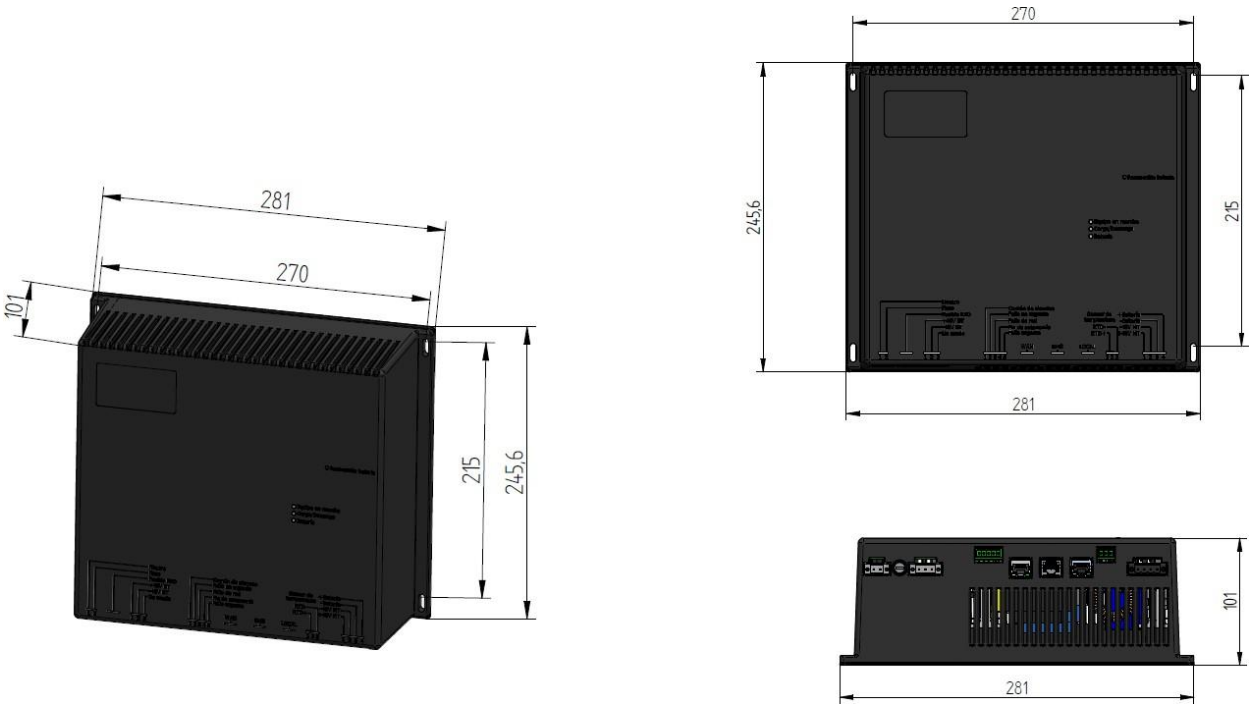
For safety reasons, the following is required:

- The equipment must be wall-mounted using the anchor points included in the box to allow for proper cooling.
- Make it easy and accessible to disconnect the equipment from the mains.
- If replacing the input fuse, ensure that you use one with the same specifications and perform the installation with the equipment disconnected from the mains.
- Install the equipment in a safe environment in accordance with current electrical safety regulations and directives.
- Use a mains connection cable with a minimum cross-section of 0.75 mm².

LOAD CHARACTERISTIC:



DIMENSIONS



Dimensions in mm.

TESTS

Table 2 – Mechanical and temperature tests

Tests	Levels to apply:	Conditions	Acceptance criteria[1]
Damp heat	According to IEC EN 60068-2-78:2012 Temperature: 40º C. Humidity: 93%. Test duration: 4 days (accelerated ageing)	Equipment connected	Criterion A
Dry heat	According to IEC EN 60068-2-2:2005 Type of test: To be defined at the time of testing Temperature: 70º C. Test duration: 16 horas.	Equipment connected	Criterion A
Cold	According to UNE EN 60068-2-1:2007 Type of test: Test Ae (heat-dissipating equipment with slow temperature variation requiring operation throughout the test) Temperature: -25°C Test duration: 16 horas	Equipment connected	Criterion A
Temperature variation	According to IEC EN 60068-2-14:2007 Cold temperature: -25º C. Hot temperature: 70º C. Time at each temperature: 3h. Number of cycles: 5 Test duration: 30h	Equipment disconnected	Criterion A
Vibration	According to ETSI EN 300 019 V2.4.1, environmental class 2.3 Random vibration test: Test direction: In all 3 axes Duration: 30 minutes per axis. Severity: From 10Hz to 200 Hz: ASD = $1m^2/s^3$ From 200Hz to 2000Hz: ASD = $1m^2/s^3$	Equipment disconnected	Criterion A
Drop	According to ETSI EN 300 019 V2.4.1, environmental class 2.3 Free drop test Severity: Height: 1.2m (mass less than 20kg)	Equipment disconnected, installed in cabinet and packed for shipping	Criterion A
IP protection rating	According to IEC 60529: 1989 IP2xB rating	Equipment disconnected	Criterion A
IK protection rating	According to IEC 62262: 2002 IK05 rating	Equipment disconnected	Criterion A

[1] **Criterion A:** No degradation of performance is allowed during the test execution.
Criterion B: The equipment must continue to operate as intended after the test. Temporary degradation of performance during the test is acceptable.

Table 3 - EMC: Emissions

TEST	PORT	REGULATION
Conducted emissions	Power supply terminals output 1	UNE-EN IEC 61000-6-3:2021 class A
	Output power terminals 2	UNE-EN IEC 61000-6-3:2021 class A
	AC input power terminals	EN 55032:2016+A1:2021 class B
Radiated emissions	Enclosure	EN 55016-2-3 y CISPR32 class B

Table 4- EMC: Immunity

TEST	REGULATION	PORT	SEVERITY	CONDITIONS	CRIT.
Power-frequency magnetic fields	EN 61000-4-8	Enclosure	100A/m	50/60Hz (1minute)	A
		Enclosure	1000A/m	50/60Hz (2s)	A
Radiated electromagnetic and radio-frequency fields	EN 61000-4-3	Enclosure	10V/m	80M - 3GHz M. 80% 1kHz	A
Conducted disturbances induced by radio-frequency fields	EN 61000-4-6	Input	10V	0.15-80MHz M. 80% 1kHz	A
		Output	10V	0.15-80MHz M. 80% 1kHz	A
		Signal	10V	0.15-80MHz M. 80% 1kHz	A
Electrostatic discharges (ESD)	EN 61000-4-2	Box	±15kV	Aire	A
		Box	±8kV	Contacto	A
Electrical fast transients / bursts (EFT/B)	EN 61000-4-4	AC Input	±4kV	Tr/Th: 5/50 ns	B
		DC Outputs	±500V	Tr/Th: 5/50 ns	B
		Signals AC	±2kV	Tr/Th: 5/50 ns	B
Surge immunity / Surge pulses	EN 61000-4-5	Input, differential mode	±2kV	Tr/Th: 1.2/50µs	B
		Signals, differential mode	±1kV	Tr/Th: 1.2/50µs	B
Damped oscillatory magnetic fields	EN 61000-4-10	Enclosure	100 A/m	0.1 MHz , 1 MHz	A
Voltage dips, short interruptions and voltage variations	EN 61000-4-11	AC Input	Class 3		B
Damped oscillatory wave	EN 61000-4-18	AC Input Output and Signals	1kV Line-to-line		A
Harmonics	EN 61000-4-13	AC Input	Class 2		A

Insulation Tests

Method:

With the equipment disconnected from the power supply, the terminals of each group are short-circuited with each other.

Input/Output groups formed:

Group	Connectors
G1	AC Input
G2	Output 1
	Temperature sensor
G3	Output 2
G4	Alarm outputs
	BMS
	WAN
	LAN Local

Insulation resistance

>100 MΩ with ±500 VDC applied between each group and the rest. The reading is taken 5 seconds after applying the voltage. The test is performed at the beginning and end of the insulation tests. The difference between both measurements is <20%.

Dielectric strenght

The voltage is applied for 1 minute without producing any disruptive discharge nor causing any change in the insulation resistance.

Pole+	Pole-	Applied voltage	Time
G1+G3	G2+G4+Enclosure [1]	10 kVac / 50Hz	60 seg.
G3	G1+G2+G4+Enclosure [1]	2 kVac / 50Hz	60 seg.
G4	G1+G2+G3+Enclosure [1]	1 kVac / 50Hz	60 seg.

[1] Since the equipment is not connected to ground, the ground reference is simulated by means of a metal sheet covering the entire enclosure, except for the connection terminals.

Voltage impulse isolation

- **Common mode**

Pole+	Pole-	Applied voltage	Number of pulses
G1+G3	G2+G4+Enclosure	±20 kV 1.2/50us	5 for each polarity
G3	G1+G2+G4+Enclosure	±5 kV 1.2/50us	5 for each polarity
G4	G1+G2+G3+Enclosure	±2 kV 1.2/50us	5 for each polarity

- **Differential mode**

Group	Pole+	Pole-	Applied voltage	Number of pulses
G1	Line	Neutral	±1kV 1.2/50us	5 for each polarity
G2	+48V_Output1	-48V_Output1	±1 kV 1.2/50us	5 for each polarity
	BAT+	BAT-	±1 kV 1.2/50us	5 for each polarity
G3	+48V_Output2	-48V_Output2	±2 kV 1.2/50us	5 for each polarity