



## Daker DK 4.5-10 kVA

**UK**

ENGLISH

3



## Index

---

	<b>Introduction</b>	<b>2</b>
<b>1</b>	<b>Important Safety Instructions</b>	<b>2</b>
<b>2</b>	<b>Parallel system installation</b>	<b>3</b>
<b>3</b>	<b>Single Unit Check</b>	<b>5</b>
<b>4</b>	<b>Parallel Setting</b>	<b>7</b>
<b>4</b>	<b>Parallel Mode Start up</b>	<b>8</b>
<b>5</b>	<b>Trouble Shooting</b>	<b>9</b>

This document is a reference guide to install the Daker DK UPS 4,5-10kVA in parallel for N+1 redundancy operation. The parallel installation and configuration procedure is divided in 4 phases :  
**Parallel system installation** – To physically connect each unit.

**Single Unit check** – To verify and confirm that each unit works properly with the correct parameters and output voltage

**Parallel Setting** – To setup each units' parameters to work in parallel mode.

**Parallel Mode Start up** – To verify that the parallel system works normally.

## 1 Important Safety Instructions

---

- Only qualified and trained electricians are allowed to install the UPSs in single unit or parallel systems.
- Please read the Installation guide carefully before installing these UPSs to avoid electrical hazards or damages to the UPS and the loads connected.
- To prevent potential leakage current hazard, ensure that the AC main supply is securely grounded.
- Please note that the Parallel function of the UPS can be enabled only in "Normal Mode" operation.
- Before to set a parallel installation, ensure that the output voltage tolerance for each UPS at zero-load condition is less than 0.5Vac. Please consult your authorized dealer if any of the UPS output voltage has the tolerance over 0.5Vac.
- Ensure that the communication cables plugged into the UPS RJ45 connectors are connected securely to avoid damage to both the UPS and the output devices.
- Ensure that two and only two UPS units of the parallel system have the terminal resistors on the rear set in "On" position.
- Only UPS with the same rating and type can be installed in parallel.
- Please ensure to add a 40Arms/250Vac and 30Arms/250Vac NFB(Non-fuse Breaker) at the input and output of each UPS respectively.

## 2 Parallel system installation

### Accessories

The following accessories (included in the parallel kit) are requested to install the UPS in parallel mode.

ACCESSORIES	DESCRIPTION	QUANTITIES		
		2 UPS	3 UPS	4 UPS
C1 	Standard cat5 cable with Rj45 connector (max length: 1050mm)	x 1	x 2	x 3
C2 	Standard cat5 cable with Rj45 connector (max length: 1900)	x 1		
F1 	Bracket to secure C1 and C2 to the UPS box	x 2	x 3	x 4

- The design of the air flow for the convertible UPS is to flow in from the front ventilation holes to the rear ventilation holes.  
It is recommended to leave at least 30 cm around the UPS and Battery bank to allow good ventilation conditions.  
Please refer to the UPS manual for the detailed installation guide.
- To reduce noise interference do not cross or mix input , output, and battery cables.
- Please install the communication wires for parallel and control signal functions (including cat5, serial, usb and EPO cables) keeping them away from input/output and battery cables.
- To prevent potential leakage current hazard, ensure that the AC main supply is securely grounded.
- Please refer to the single UPS input/output current specifications and recommended conductors listed below:

### AC input and output

MODEL	MAXIMUM CURRENT	CONDUCTOR SECTION
4,5-6KVA	33A	AWG #9
10KVA	54,3A	AWG #7

### Battery Input

MODEL	MAXIMUM CURRENT	CONDUCTOR SECTION
4,5-6KVA	25A	AWG #10
10KVA	41A	AWG #10

## 2 Parallel system installation

Recommended Circuit Breakers to be installed at the UPS input/output

MODEL	INPUT (CBi)	OUTPUT (CBo)
4,5-6KVA	40A	30A
10KVA	63A	63A

The breaker **type** should be “C” or “D” with the following current ratings:

- Install and connect the UPS units according to the diagrams in **figure 2, 3, 4, 5**.

**CAUTION** The MTBS is an optional for maintenance.

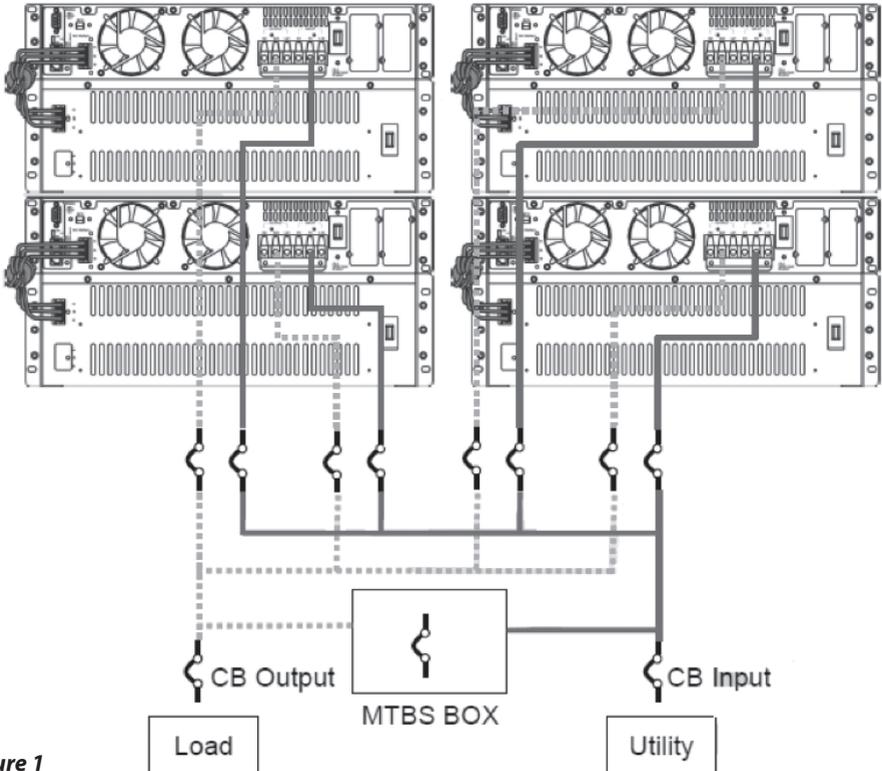


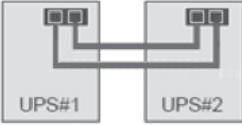
Figure 1

**CBi** : installation input breakers  
**CBo** : installation output breakers  
**CB1** : UPS utility input breaker

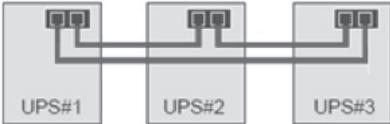
—— Utility input  
 - - - - UPS output

- Connect the parallel CAT5E cables as a "Ring Network" (**Figure 3**) using the parallel kit plate to fix them to the UPS rear panel (**Figure 4**)

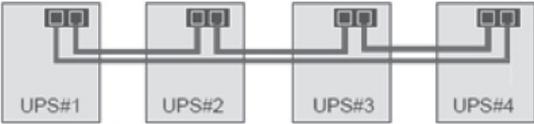
**2 units parallel**



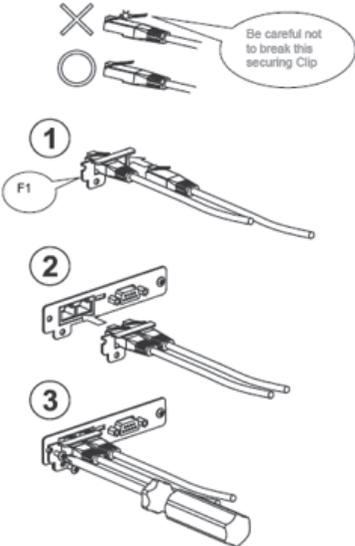
**3 units parallel**



**4 units parallel**



**Figure 2**

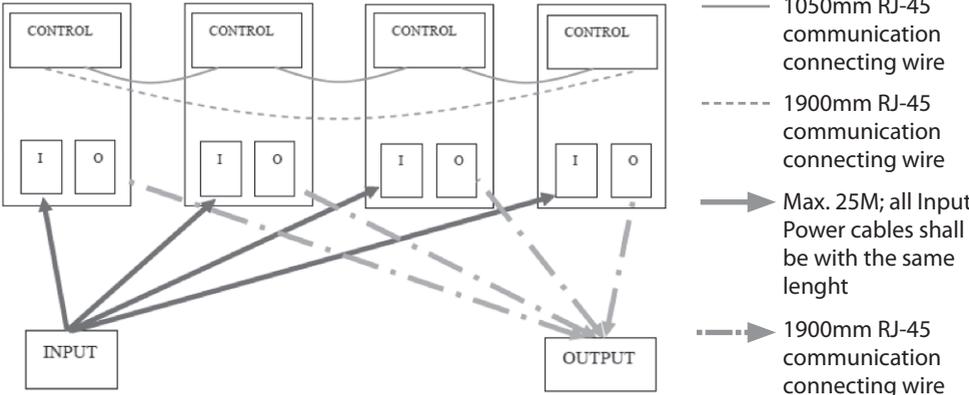


**Figure 3**



**CAUTION**

The maximum length of the communication connecting wires shall be less than 7M.  
All the Input/ output power cable should have the same length (max 25m)



**Figure 4**

### Parameters Check



#### CAUTION

The following operations have to be done on each UPS separately and independently.

- Ensure that all the circuit breakers at the input (Cbi) and output (Cbo) are set to off position.
- Ensure that all the utility input breakers (CB1) for each UPS is set to off position
- Turn on the AC input of the UPS to be checked :  
Turn on only the input breaker CBi connected to the UPS to be checked, and the utility breakers CB1 on the rear panel of the UPS itself. **DO NOT TURN ON THE INVERTER !**



Figure 5

- Enter in setting mode by pressing <On> & <↓> keys simultaneously for 3 seconds (**Figure 6**).
- Verify that all the UPS's parameters match with the default values (**Table 1**)

# Daker DK 4.5-10 kVA

Item Press <↓> to change	Display List			
	Default	Press <↓> to change		
Buzzer on/off	b_on	b_of		
Self-Test	t_non	t_run (Available in Line-Mode Only)		
Bypass Voltage Range	S_Lo	S_Hi		
Inverter Synchronize Frequency range	5f03 <sup>Hz</sup>	5f01 <sup>Hz</sup>		
Inverter Output Voltage *	o230 <sup>v</sup>	o200 <sup>v</sup>	o208 <sup>v</sup>	o220 <sup>v</sup>
		o240 <sup>v</sup>		
Operation Mode	norL	Eco	cF50 <sup>Hz</sup>	cF60 <sup>Hz</sup>
Output Voltage Adjustment		oA-3 <sub>s</sub>	oA-2 <sub>s</sub>	oA-1 <sub>s</sub>
		oA 1 <sub>s</sub>	oA 2 <sub>s</sub>	oA 3 <sub>s</sub>
Parallel ID Number **	1d01	1d02	1d03	1d04
Parallel Function On/Off ***	P 01	P 02		
SAVE	SAvE	Press <↓> to Save		
After Saved UPS Locked	LINE OFF	Shut off AC input power to reset the UPS		

**Table 1**

\*\* Single unit ID number must be "01", or UPS will have an Er17 error occurred.

\*\*\* Single unit Parallel function must be "OFF" (P 01), or UPS will have an Er21 error occurred.



### CAUTION

“Bypass Voltage Range”, “Inverter Synchronize Frequency Range”, “Inverter Output Voltage” and “Output Voltage Adjustment” are adjustable parameters **but for parallel function every unit must have the same settings**

- Change item by pressing <↓> until the display shows the text “Save”. Press <Enter> to save the setting.
- Turn off the UPS utility input breaker (CB1) while the LCD shows “LINE OFF” to reset the UPS.

### Basic Function Check

- Turn on the AC input (UPS utility input breaker) and then turn on the UPS inverter (press <ON>)
- Test the UPS switching from normal mode to stored energy mode and viceversa
- Verify that the LCD panel works normally and doesn't display errors.

### Output Error Voltages Check

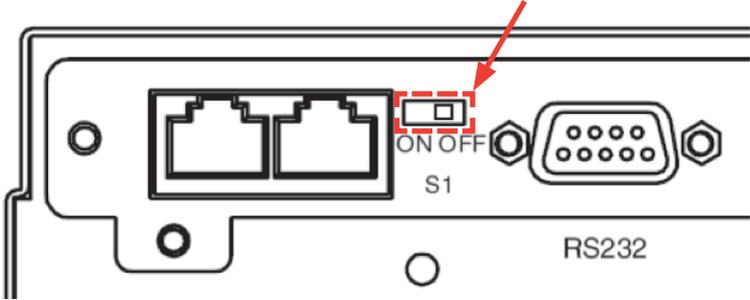
- Verify the output voltage for each UPS unit (at 0 load), and make sure the voltage difference between each unit is under 0.5Vac.
- If the voltage difference is between 0.5~1.0Vac, the parallel error current will be higher.
- If the voltage difference is over 1.0Vac, a calibration should be performed on the unit(s) which has over-limit error voltage otherwise the parallel could fail (If this condition occurs please contact your local dealer for technical support)

Turn off the inverter (press <off>) and then the AC input (Turn off CBi and the UPS utility input breaker) and restart the process for the next unit.

## 4 Parallel Setting

### Terminal resistor setting

Each UPS unit is equipped with a terminal resistor “S1” placed on the rear panel (Figure 7) besides the RJ45 connectors.



- Set the terminal resistor according to the configuration shown in the Table 2

PARALLEL UNITS	TERMINAL RESISTOR STATUSOUTPUT (CBo)			
	UPS1	UPS2	UPS3	UPS4
2 UNITS	ON	ON	--	--
3 UNITS	ON	OFF	ON	--
4 UNITS	ON	OFF	OFF	ON

Table 2

**CAUTION** Only 2 UPS units must have the terminal resistor in ON position. A wrong Terminal Resistor setting will cause unpredictable failure or UPS burned out. Eventual error can't be detected automatically by the UPS.

### Parallel Function Enable and ID Numbers setting

- Ensure that all the circuit breakers at the input and output are set to off position.
- Turn on the AC input of the UPS to be configured  
Turn on only the input breakers CBI connected to the UPS to be checked, and the utility breakers CB1 on the rear panel of the UPS itself.

### DO NOT TURN ON THE INVERTER !

- Enter the UPS in Setup Mode (See single unit check)
- Set the UPS ID . Each UPS must have a different ID number.

**CAUTION** One of the UPS must have the “Id01”. This UPS will be the default master unit of the parallel system.

## 4 Parallel Setting

- Set the Parallel function to "Enable" (P 02)

UPS#	UPS#1	UPS#2	UPS#3	UPS#4
ID NUMBER	1 d01	1 d02	1 d03	1 d04
PARALLEL FUNCTION	P 02	P 02	P 02	P 02

**Table 3**

Turn off the inverter and then the AC input (Turn off CBI and CB1 of the UPS) and restart the process for the next unit.

## 4 Parallel Mode Start up

### Er21 Check (Communication Failure or Can not find ID1 unit)

- Ensure that the AC input and the inverter is off for all the UPS connected.
- Turn on the AC input only for UPS#2, UPS#3, UPS#4  
The UPS#2, UPS#3, UPS#4 LCD will show "Er21".
- Turn on UPS#1 AC input.  
The UPS#2, UPS#3, UPS#4 stop showing "Er21"

UPS#	UPS#1	UPS#2	UPS#3	UPS#4
TEST	AC OFF			
TEST OK				

**Table 4**

If the error Er21 still appear on the display of one UPS please verify and eventually repeat the setting and wiring process described above to solve eventual communication problem.

 **CAUTION** do not start the UPSs inverters before the Er21 test is passed to avoid unpredictable failures or damages.

## 4 Parallel Mode Start up

### Start up procedure

- Ensure that the input and output circuit breakers are set to off position for all the UPS.
- Turn on the input breaker (CBi and CB1) of all the UPS connected ( all the units are now in bypass mode)
- Turn on the inverter of the first unit (ID01). The other units will turn off the bypass line.
- When the bypass line of the other UPSs is off, turn on them progressively.
- Turn on all the output breakers connected to the UPSs (CBo and CButoutput)

### Redundancy Function Check

If the parallel system is working properly ( N+1 redundancy operation) the N+1 redundancy LED is on.



**CAUTION**  
If the N+1 led is off the loads exceed the redundancy level. The load has to be reduced until the N+1 redundancy LED turn ON.

- To verify that the redundancy function indicator works properly repeat the start up procedure turning on only part of the UPS connected in parallel, and apply a load above the values shown in the below table, the N+1 LED will turn off.

PARALLEL UNITS	REDUNDANCY LEVEL ( LOAD %)
2 UNITS	50%
3 UNITS	66%
4 UNITS	75%

- If the redundancy check is positive repeat again the start up procedure turning on all the UPS connected

The Installation procedure is finished !

## 5 Trouble Shooting

ERROR	DESCRIPTION	CAUSE	POSSIBLE SOLUTION
<b>Er16</b>	<b>Output Parameters Setting Error</b>	If an Er16 appear during the parallel installation test, then there are one or more parameters setting conflict between the UPS units.	Possible solution: repeat the process described in the paragraph "parameters check" and make sure that the common setting are the same for each units. Process test 1.1 and check each parameters are the same setting between each unit.
<b>Er17</b>	<b>ID Numbers in conflict in or ID number Error in single unit</b>	<ol style="list-style-type: none"> <li>Two or more units have the same ID number. (Parallel system)</li> <li>Parallel function is not enabled, but ID number is not 01. (Single unit)</li> </ol>	<ol style="list-style-type: none"> <li>Change ID number setting.</li> <li>Change ID number as 01.</li> </ol>
<b>Er27</b>	<b>The UPS Must Be Operated in Normal-Mode in Parallel System</b>	The UPS is not working in "Normal Mode." "ECO Mode" and "Frequency-Converter Mode" are not supported for parallel system.	Change UPS setting as "Normal mode".
<b>Er08</b>	<b>DC BUS High Level Abnormal</b>	<ol style="list-style-type: none"> <li>If the output voltage difference between each unit is higher than 1.0Vac, an Er08 could appear on the display panel during the parallel system start up.</li> <li>Improper installation or parallel system communication failure.</li> </ol>	<ol style="list-style-type: none"> <li>Check the inverter output voltage independently for each unit and apply the calibration procedures to the units with abnormal output voltage.</li> <li>Check the parallel setting and repeat the Er-21 checks described in the Test start up paragraph.</li> </ol>
<b>Er34</b>	<b>Balance Function Conflict</b>	New UPS version unit(s) paralleled with older version unit(s).	Use "UPS Setting Tool" software to enable special function flag #8 to make the new version compatible with the old one



**World Headquarters and  
International Department**

87045 LIMOGES CEDEX FRANCE

☎: 33 5 55 06 87 87

Fax : 33 5 55 06 74 55

[www.legrandelectric.com](http://www.legrandelectric.com)