What You Need to Know About
UL 1741 SA

GRID SUPPORT FUNCTIONS
Overview

► What is “SA”?

► What is the timing roll out?

► OutBack Solutions
What is “SA”?
What is “SA”

UL 1741 SA for Grid Support functions

- UL 1741 SA is the test standard by which we certify that our inverters
  - Meet HECO Rule 14H Requirements
  - Meet CA Rule 21 Requirements

- As more PV is installed on electrical grids, grid operators need flexible tools to help ensure stability and reliability

- Starting September 8th 2017, new installations in HI and CA require inverters to be listed as providing “Grid Support” or “Smart Inverter” functions
Players in Grid Support

IEEE 1547 IS CATCHING UP

 Voluntary Industry Standard

 Local State Law

 Test

 IEEE 1547 20XX

 UL 1741 SA

 CA Rule 21 HECO Rule 14H

 Interconnection Agreements
# Grid Support

**Solutions**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Category</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Existing “twitchy” trip settings required by previous standards increased potential for grid instability.</td>
<td>Ride Through</td>
</tr>
<tr>
<td>2</td>
<td>Voltage rise limits the amount of solar a region can support, as is.</td>
<td>Voltage Regulation and Power Functions</td>
</tr>
</tbody>
</table>
# Grid Support Functions

## SUMMARY

<table>
<thead>
<tr>
<th>Category</th>
<th>UL 1741 SA</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ride Through</td>
<td>L/HVRT Low and High Voltage Ride Through</td>
<td>If the AC grid voltage high or low limits are exceeded, inverter must meet the mandatory and permissive operation requirements as well as the must trip limits.</td>
</tr>
<tr>
<td></td>
<td>L/HFRT Low and High Frequency Ride Through</td>
<td>If the AC grid frequency high or low limits are exceeded, inverter must meet the mandatory and permissive operation requirements as well as the must trip limits.</td>
</tr>
<tr>
<td>Voltage Regulation and Power Functions</td>
<td>SS- Soft Start Ramp Rate RR- Normal Ramp Rate</td>
<td>The rate of power increase when first ramping (Start Ramp) and subsequent increases in offsetting or selling (Normal Ramp)</td>
</tr>
<tr>
<td></td>
<td>SPF - Specified Power Factor</td>
<td>Power Factor to be produced by the inverter when offsetting</td>
</tr>
<tr>
<td></td>
<td>Volt/VAr Mode</td>
<td>Response to grid voltage with inverter reactive power</td>
</tr>
<tr>
<td></td>
<td>Volt-Watt</td>
<td>Response to grid voltage with inverter watts</td>
</tr>
<tr>
<td></td>
<td>Frequency-Watt</td>
<td>Response to grid frequency with inverter watts</td>
</tr>
<tr>
<td>Anti-Islanding</td>
<td>Anti-Islanding Protection</td>
<td>Protection to ensure inverter doesn't backfeed a disabled grid</td>
</tr>
</tbody>
</table>
# Grid Support

<table>
<thead>
<tr>
<th>UL 1741 SA</th>
<th>HECO Rule 14H</th>
<th>CA Rule 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-Islanding Protection</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>L/HVRT Low and High Voltage Ride Through</td>
<td>X</td>
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<td>L/HFRT Low and High Frequency Ride Through</td>
<td>X</td>
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</tr>
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<td>Volt/VAR Mode</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>SPF - Specified Power Factor</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>RR- Normal Ramp Rate and SS- Soft Start Ramp Rate</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Frequency-Watt (Optional)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Volt -Watt (Optional)</td>
<td>X</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>HECO Specific Function</th>
<th>HECO Rule 14H</th>
</tr>
</thead>
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<tr>
<td>Remote Connect/Disconnect</td>
<td>X</td>
</tr>
</tbody>
</table>
Ride-Through

EXAMPLE

Continuous Operation Capability

MUST TRIP
Ride-Through

EXAMPLE

Must Operate: Volt/Var, Volt-Watt

If you can help, please do.

Continuous Operation Capability

MUST TRIP

May ride-through or may trip

If you can help, please do.

Nominal Voltage

% Nominal Voltage

Time

0.16 s 1 s 2 s 10 s 11 s 12 s

50%

70%

88%

Nominal Voltage

110%

120%

If you can help, please do.
Inverter grid support makes a difference

What is the Roll Out Timing?
Grid Support

“SMART” INVERTER JOURNEY

- September 2011: California Public Utilities Commission to Revise Rule 21 to Support "Smart" Inverters
- February 2013: Smart Inverter Working Group (SWIG) Formed

2012

2013

2014

2015

2017

- September 2016: UL 1741 SA Published
- September 2017: UL 1741 SA is Effective
- December 2014: California PUC Requiring "Smart" Inverters
  12 MOS after UL 1741 SA
- August 2014: Phase 1 Industry Comments Filed
- January 2014: SWIG Submitted Phase 1 Recommendations
- October 2015: Hawaii PUC Updates Rule 14H Requiring "Smart" Inverters
  12 MOS after UL 1741 SA
  Limited Functions Effective Immediately
- July 2015 - August 2016: Working Group Develop UL 1741 SA
Jurisdictions Require “Grid Support” - September 8th
Jurisdictions Require “Grid Support”

Once the new IEEE1547 is published these functions will be required nationally
HECO Rule 14H

Hawaiian Electric Company Rule 14H Updates

► All inverters interconnected under CSS or CGS after October 2015 in Hawaii must update their system on 9/8/2017 to provide grid support functions.

► After 9/8/2017 all new installations will require inverters be listed to UL 1741 SA for grid support utility interactive inverters.

8 September 2017
Updated HECO Rule 14H is Effective

Up to September 7th
May Use any Inverter with Limited “Grid Support” Functions

September 8th and Beyond
Firmware Update any Interconnected Inverter Installed between October 2015 - September 7th 2017
New Interconnected Installations Must Use UL 1741 SA “Grid Support” Listed Inverter

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CA Rule 21 Updates

► Starting 9/8/2017, applications for interconnection will require inverters be listed to UL 1741 SA.

► Applications before that date can use any inverter that is on the CEC list of approved equipment.

8 September 2017
Updated CA Rule 21 is Effective

*Up to September 7th*
Applications Submitted to Interconnect May Use Any CEC Listed Inverter
Even if Installation is After September 7th

*September 8th and Beyond*
To Interconnect Must Use UL 1741 SA “Grid Support” Listed Inverter
OutBack Solutions

SAME LEGENDARY DESIGN, NEW ADVANCED FEATURES

► OutBack’s products are proven and reliable
► Same form factor. Same spare parts.
► GIP files will streamline settings for an area

QUICK START GUIDE NOW IN EVERY BOX! FULL MANUALS AVAILABLE ONLINE AT WWW.OUTBACKPOWER.COM
Product Availability

Presales

First-come, first-served basis

GS8048A & GS4048A availability August 2017
## GS-01 Series are the new Inverter with Grid Support Functions

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS8048A</td>
<td>Grid-Interactive and Stand-Alone Inverter/Charger</td>
</tr>
<tr>
<td>GS8048A-01</td>
<td>New!</td>
</tr>
<tr>
<td>GS4048A</td>
<td></td>
</tr>
<tr>
<td>GS4048A-01</td>
<td>New!</td>
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</table>

- **Pricelist Names**
- **PO Information**
- **Box Labels**
- **Inverter Labels**

**GS4048A**

Split-Phase 120/240 Vac 50/60 Hz Grid Support Utility-Interactive Inverter/Charger with AC Transfer Relay
Technical Support

**FIRMWARE INFORMATION**

- GIP files will streamline settings for an area

- If replacing inverter in older system:
  - Will need to upgrade all inverters with firmware with MATE3s

**Must use MATE3s or AXS Port for “Grid Support” Inverters**
How to Load a GIP File

**PROCESS FLOW**

1. **Start with Blank SD Card**
2. **Download compressed (.zip) GIP file at Firmware Update page at www.outbackpower.com**
3. **Extract and download all files**
4. **Insert SD card into MATE3s**
5. **Enter LOCK menu and enter changed installer Password**
6. **Select settings and then select Inverter**
7. **Enter the Grid Interface Protection Menu**
8. **Enter the Load Grid Protection Menu and select .GIP file that is required by the utility.**
9. **Press the <Load> soft key to install and press <Continue> to exit**
Summary

► What is SA/Grid Support
► What is the timing roll out?
► OutBack Solutions
Thank you for your time.

www.outbackpower.com