IDEAL POWER

APPLICATION NOTE 401

IBC-30kW-480
Contactor Management

1.0 PURPOSE AND SCOPE

This application note details a revised contactor management scheme for use with Ideal Power's ("IPWR") IBC-30kW-480 Battery Converter (IBC-30). Although this contractor management scheme specifically addresses a bug in Firmware Revision V.06.098 it is compatible with all previous firmware releases. Its immediate adoption and implementation on both deployed systems and in-house inventory is required.

This document assumes that the reader is already familiar with the IBC-30 Modbus interface, and that manual or automatic control of the IBC-30 contactors is in use. Contact Ideal Power at support@ idealpower.com for technical support as required.

Note that this contactor management scheme applies only to the IBC-30. You can verify a IBC-30's firmware revision via the front panel display, or by reading the C Version register.

2.0 OVERVIEW

Unfortunately, in V.06.098, a PV specific "array start check" may erroneously be activated while attempting battery discharge if unique and specific low voltage and fault conditions are satisfied. This bug may be engaged when the IBC-30 is waiting to restart (which could be due to a previous fault or simply due to being idled) and the measured DC voltage is less than 200 V. These conditions may be accidently satisfied if either battery or IBC-30 contactors are opened for maintenance or safety purposes, and/or if a DC Conductance Control Method has been previously saved to flash.

Once the bug is encountered, the IBC-30 will "lock-up" requiring an onsite visit to cycle AC power, which resets the IBC-30's Control Board. **Closing contactors while in this lock-up state may damage the unit.** It is highly recommended that all contactors remain open, should this condition ever be experienced.

The contactors in the IBC-30 are controlled via the Modbus "V_Contactors" register with register values expressed in hexadecimal format. The bit definitions are: bit 0: 0 = automatic, 1 = manual; bit 4: 0 = open, 1 = close; bit 8: read back open / close status; bit 15: array start check, 0 = allow, 1 = disable.

3.0 RECOMMENDED CONTACTOR MANAGEMENT APPROACH

Previously, the Modbus register V_Contactors factory default setting was 00 (automatic operation). Automatic operation of the DC contactors is typically used only in PV applications. It is not the generally used for battery systems, where the external system controller is manually controlling the contactors, as defined below:

- V_Contactors = 01 (manually opens contactors)
- V_Contactors = 11 (manually closes contactors)

To address the bug detailed in section 2.0 of this document, the following verifications and updates to IBC-30 factory defaults and your site controller code, must be made:

- after a power cycle, ensure that your factory default V_P2_Method_ID = 1 (NET), to ensure that the IBC-30 will not attempt a discharge on its own after a fault clears
- update the V_Contactors factory default to "8001", and save to flash
- re-program your site controller to always set V_Contactors = "8001" as the new means to manually open contactors: do NOT use 01
- re-program your site controller to always set V_Contactors = "8011" as the new means to manually close contactors: do NOT use 11

These changes to our factory defaults are straightforward to implement. Updating the factory defaults and saving to flash with the IPWR Modbus Tool is a two-step process:
- if 1 is not already the factory default, write a "1" to V_P2_Method_ID
- write "8001" to V_Contactors
- write "1" to asmi_flash_enable

Updating the factory default and saving to flash with an interface (such as a Putty terminal emulator or system controller) other than the IPWR Modbus Tool requires a three-step process:
- if 1 is not already the factory default, write a "0x0001" to V_P2_Method_ID
- write "0x8001" to V_Contactors
- write "0x0001" to asmi_flash_enable
- write your active Modbus address to C_Device_Address

Note that re-writing the active Modbus address after setting asmi_flash_enable = 1; provides a second level of verification of intent to update the factory default settings. This verification step is performed automatically by the IPWR Modbus Tool.

V_Contactors is also the register where contactor status is verified after a write:
- If the register reads "8001", the contactors are in manual mode and open
- If the register reads "8111", the contactors are in manual mode and closed

Confirm the revised factory defaults have been correctly saved to flash by AC power cycling the IBC-30, and read registers noted below to confirm new factory defaults:
- If V_Contactors reads "8001", after the power cycle, the new contactor factory default has been set correctly
- If V_P2_Method_ID reads "1", after the power cycle, NET is the correct factory default

Once this new factory default is saved to flash, please implement and utilize the new recommended approaches for contactor management in your system site controller. Please contact Ideal Power at support@idealpower.com if you have any outstanding questions regarding the IBC-30kW-480 Contactor Management Application Note.

DISCLAIMERS AND INTELLECTUAL PROPERTY NOTICE

For additional questions, please contact:
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