IONPURE®

SERVICE BULLETIN 2017-03

Title Firmware for DCR power controllers

Date October 2017 (rev2 January 2020)

Scope This bulletin applies to Ionpure power controllers, models IP-DCR600V15A-R2 (W2T 827 122), and IP-DCR600V15A-M (W2T 827 123).

Purpose The firmware for the Digital Communication Rectifier (DCR) has undergone some revisions since the initial DCR introduction. This bulletin explains the differences between the various versions. The recommended firmware version is v2.2.

Introduction

The DCR was introduced in May 2016 as a replacement for the G2 power controller, and was designed to provide improved tolerance to unreliable or unstable AC power sources. It also offers advanced communication features, including support for Ionpure Power Panel software for device configuration and troubleshooting. The DCR was offered in two models, a retrofit version (-R2) with the same mounting dimensions as the G2 and ability to communicate with the G2 display board, and a Modbus version (-M) that is compatible with the new Ionpure Touch Panel display.

Because the architecture of the DCR is slightly different than the G2, the DC output has a somewhat different waveform. While the original DCR worked well as a replacement for the G2 in most cases, it actually provided more power to the CEDI module for the same DC current setpoint, thus affecting AC current draw. It was also discovered that the current limit feature was not working as intended. These issues were addressed in two successive firmware updates. This Service Bulletin describes the history of and the reasons for the firmware changes, as well as the operational differences between the versions. Only the most reason version (v2.2) is approved for use.

Firmware Version v1.2

Output current control based on *average* current
Output voltage and current reported in *average* units
Analog input signal of 0-5VDC or 4-20mA equals output of 0-15 A

Benefits:
1. Verification of output can be done with average meter

Issues:

1. Average values do not reflect actual power to the load with a phase angle waveform - actual power is higher than average (and thus higher than G2).
2. Since actual power delivered to the load can be higher than desired, this can result in tripping of upstream 20A circuit breaker when operating at average DC output current > 10A.
3. Input signal was always scaled to 0-15A output regardless of dipswitch setting, negating the function of the current limit dipswitch

Firmware Version v2.0

Current control based on *RMS AC+DC* current
Output voltage and current reported in *RMS AC+DC* units
Analog input signal of 0-5VDC or 4-20mA equals output of 0-15 A (same as v1.2)

Benefits:
1. Since controlling on RMS current, the power level delivered to the load for a given output current is similar to the G2 (addressing problem of tripping upstream circuit breaker).
2. RMS AC line current and RMS AC+DC load current are equal so measuring the load current can be done with an RMS AC clamp meter on the line side.
3. Can use the RMS current and voltage numbers to calculate resistance or power.

Issues:
1. Verification of output requires *RMS AC+DC* meter.
2. Input signal was always scaled to 0-15A output regardless of dipswitch setting, negating the function of the current limit dipswitch.

Firmware Version v2.2 (since updated to 2.30.00 in April 2019)

Same as v2.0 except analog input signal of 0-5VDC or 4-20mA equals output of 0-current limit setpoint (dipswitch)

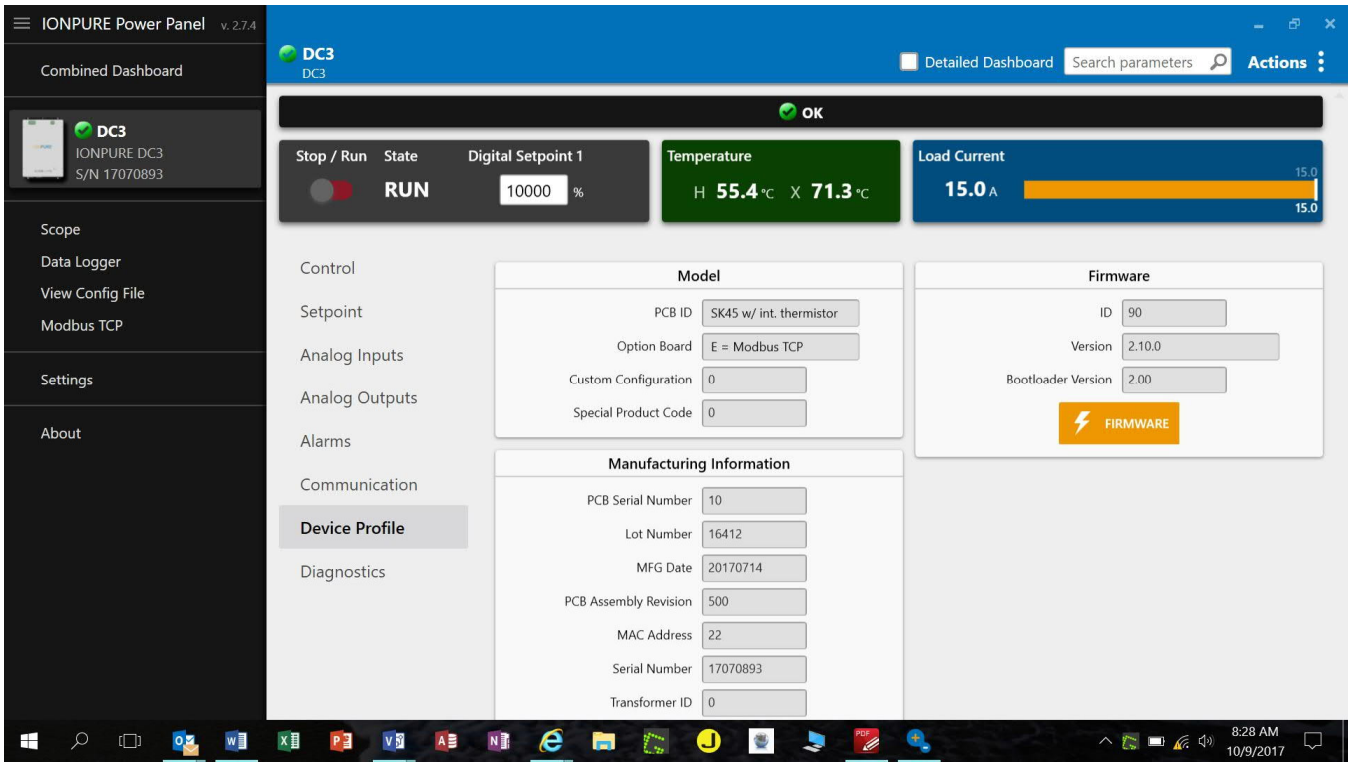
Benefits:
1. Same as v2.0, above.
2. Same as v2.0, above.
3. Same as v2.0, above.
4. Current limit dipswitch now functional

Issues:
1. Verification of output still requires RMS AC+DC meter
2. For both v2.0 and v2.2, if the AC input voltage is much higher than the required DC output voltage, then the Power Factor of the DCR may be very low. It is recommended that the isolation

transformer be designed with voltage taps in the secondary to avoid this issue and maximize the life of the DCR. This is discussed in the DCR instruction manual and in IPSB 2017-01.

Recommendation

To determine your DCR's current firmware version, you need the Ionpure Power Panel Software, available at www.ionpure.com. You must install this on a Windows PC and connect the PC to the DCR using a Micro USB cable. The DCR must be powered by a 24VDC source in order for it to be detected and accessed by the Ionpure Power Panel software. The firmware version is given on the Device Profile screen.



DCR units with serial numbers 17010 _ _ _ and higher were shipped with firmware v2.2 installed.

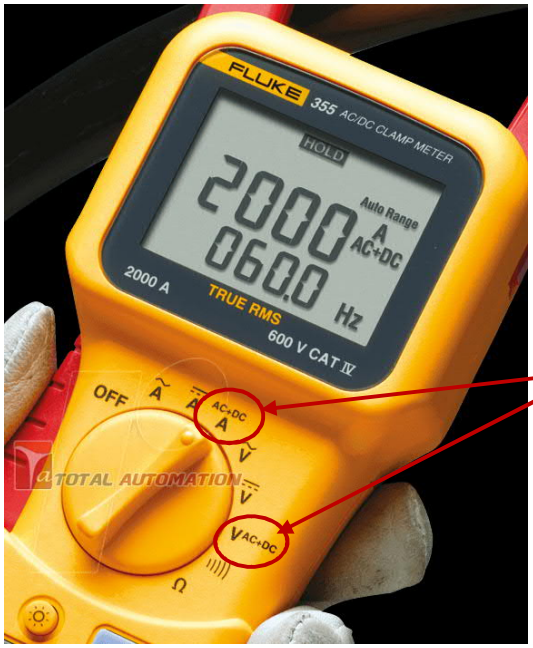
If your DCR does not have the latest firmware then version v2.2 should be downloaded from www.ionpure.com and installed as instructed in Service Bulletin IPSB-2016-03 DCR Power Controller Firmware Procedure.

Appendix A: Suitable multi-meters for the DCR600V15A with firmware 2.0 or 2.2

The DCR600V15A is a phase angle DC power controller. The DC output is created by a hybrid thyristor/diode bridge which gives an unfiltered fully rectified DC signal. Output power is regulated by advancing or delaying the point at which the internal thyristor is turned on within each electrical half cycle.

Unlike the G2 power controller, which has a slightly filtered output that can be read by an average meter, the DCR topology requires the use of specific meters to properly measure the DC current and voltage applied to a load. These meters must have True RMS AC+DC capability, such as the Fluke 355, which can simultaneously measure and display the AC and DC components of a signal.

WARNING: Use of any other meter than a True RMS AC+DC meter to verify load voltage and current will yield inaccurate results when compared to the DCR values.



Meter selections for reading AC+DC amps and volts

However, a typical True RMS AC current meter can be used on the AC input to the power controller and this reading will correlate to the AC+DC current reading on the load.

DCR analog output retransmit signals that correspond to the load current (I_m – terminals P2-1 and P2-2) and voltage (Vm – P2-3 and P2-4) are a representation of the AC+DC values. This allows them to be used by a PLC for accurate calculations of load resistance and power.