

Instructions for using the HIC-3004 User-Selectable DAC Outputs

Purpose for the user-selectable DAC outputs:

The primary purpose for the two Digital to Analog Converter (DAC) output feature is to provide analog signals based upon the COP-WIN computed cardiac indices for use with other laboratory apparatus and signal processing. This allows the possibility of combining any two of these user-selected cardiac performance signals with other laboratory acquired signals for special purpose computation applications.

Connection to the HIC-3000 DAC Output Connectors:

All signal output connections are made on the rear panel of the HIC-3004 where the ICG signals appear at a BNC connector labeled for the corresponding signal. The rear panel of the HIC-3000 also includes some 1/8" phone jacks for control signals both in and out of the instrument as shown below:



HIC-3004 Rear Panel Showing All Connector Locations

Coaxial RG-58 cables terminated with male BNC connectors are appropriate for making connections to the HIC-3000 ICG signal and DAC connectors for applications using these signals. Connect the cables to each of the BNC connectors for DAC#1 or DAC#2 when using any of the computed cardiac indices analog signals selected to appear on these outputs. The picture below shows the location of the two DAC signal output connectors.



HIC-3004 Rear Panel Showing DAC 1 & 2 Locations

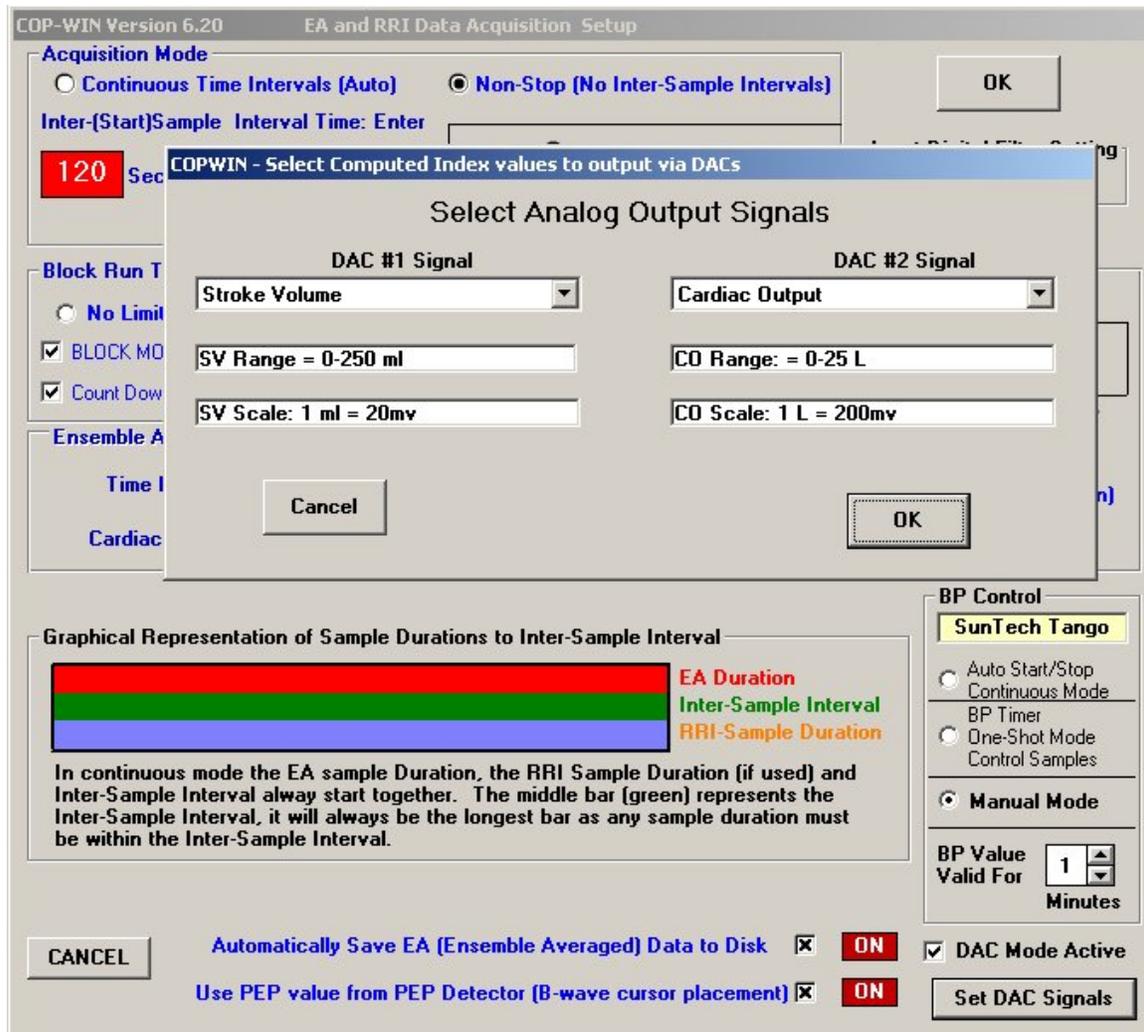
The analog signals appearing at these connectors will be analog voltages between 0 and +5 Volts. The signal voltage level range and sensitivity for each user-selectable ICG computed parameter appear in the Table below:

ICG Parameter	Range	Sensitivity Scale
Heart Rate	0 – 200 BPM	1 BPM = 25 mV
Stroke Volume	0 – 250 ml	1 ml = 20 mV
Cardiac Output	0 – 25 L	1 L = 200 mV
PEP	0 – 200 ms	1 ms = 25 mV
LVET	0 – 500 ms	1 ms = 10 mV

Table 1: DAC Output Range and Sensitivity for each User-Selectable ICG Parameter

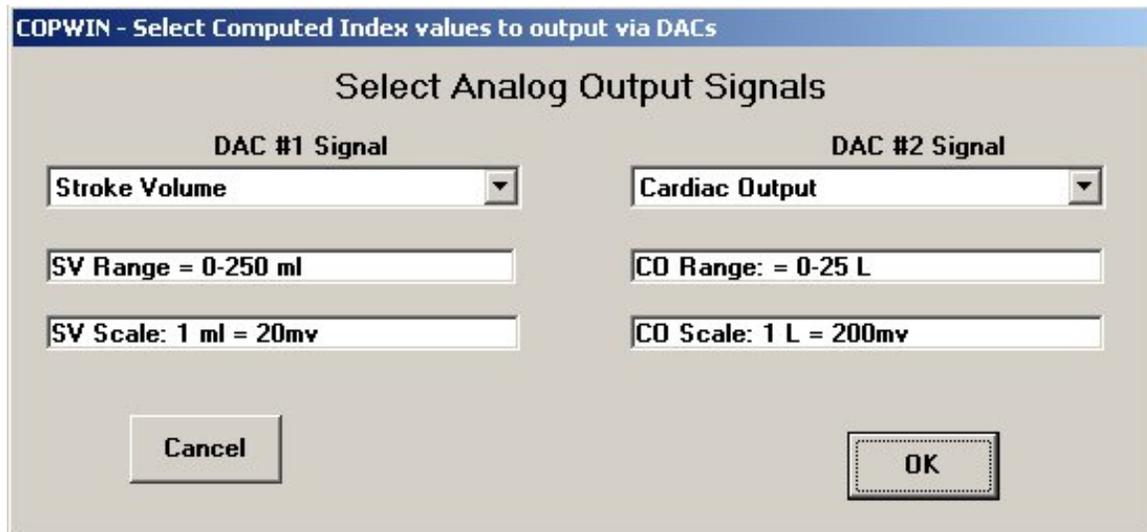
Selecting the COP-WIN 6.20 Computed Indices to Appear at the DAC Outputs:

1. First, select the “Setup Screen” by specifying the Data Acquisition Mode.
2. From the Setup Screen choose the “DAC Mode Active”, and then Click the [Set DAC Signals] button to Select Analog Output Signals. This will bring up the Analog Output Signal Selection Window as shown below:



Setup Screen with Analog Output Signal Selection Overlay Window

The DAC output signal selection window provides a drop down parameter selection box for both DAC #1 and DAC #2. The full DAC signal range and the analog voltage scale (sensitivity) for each selected parameter appears in the two fields immediately below each of the DAC parameter selection boxes as shown below:



The DAC Signal Selection Window with SV and CO Selected

Once the desired cardiac indices are selected for either or both DAC outputs, click OK!

This will result in an analog output voltage at each DAC connector whose value is proportional to the selected parameter for that DAC.

The analog signal will be updated at the end of each ensemble averaged measurement. In the continuous mode, the shorter the EA period the more rapid the DAC analog signal update will be.

The DAC output signals will therefore function like a cardiotech type of output signal!

Using the Synchronization Signal Output:

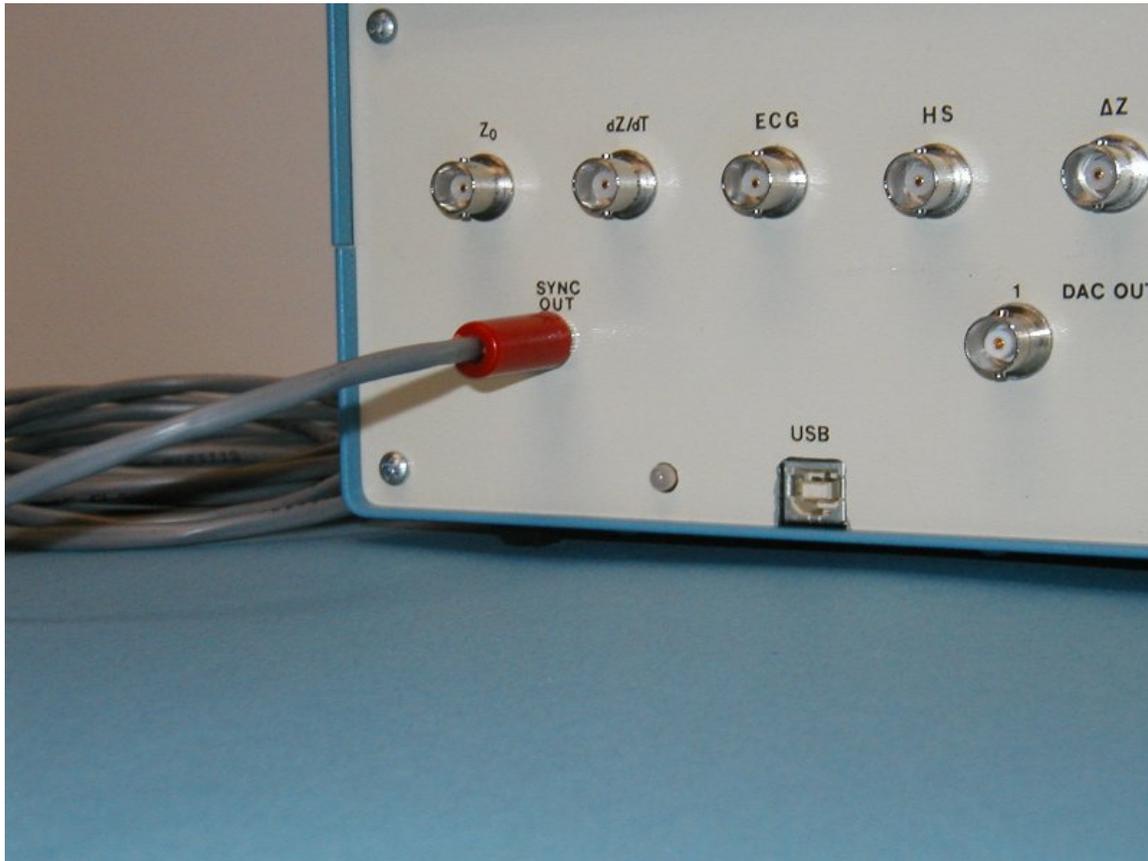
The purpose of the Synchronization (Sync) output is to synchronize each new valid DAC analog signal update for the selected cardiac parameters that are computed by COP-WIN at the end of each Ensemble Average (EA) measurement with data associated with other laboratory apparatus. It allows other data acquisition systems to know when the DAC output signals have a new valid update. Therefore, it is really intended to signal other laboratory apparatus of a new analog data event, or to indicate the end of an EA event!

Description of the Sync Pulse signal:

The synchronization pulse signal is available at a 1/8" phone jack located on the rear panel of the HIC-3000 instrument. The signal is a digital logic level (5 Volt) pulse that switches from 0 volts to + 5 volts for a period of 15ms following the computation for the selected cardiac parameter that occurs at the end of each EA period.

Location and Connection of the Sync Output Connector:

The miniature phone jack Sync Output connector is located in the lower left corner area of the HIC-3000 rear panel just above the instrument's serial number. The picture below shows the Sync connector in this region of the HIC-3000 rear panel with the synchronization output cable installed.



The HIC-3004 Sync Output Connector Location

The type of cable and connector of connector required for this application is a two-wire audio cable with a 1/8" mono phone plug with the signal appearing on the tip, and the sleeve serving as the ground connection.