



Substation Automation and Protection Division

## Using CurveGen to Install IEC Time-Current Curves in an ANSI -2000/2000R Unit

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### Introduction

There could be occasions where a DPU-2000/2000R or TPU-2000/2000R or GPU-2000R is applied to a system where it would be useful to have IEC time-current curves available for coordination purposes. If the unit has been ordered and supplied as an "ANSI" unit, downloading an IEC curve is possible if the unit has the optional feature of User Definable Curves. The general procedure is to use the software program CurveGen to design the curve, and then download the resulting data file to the relay, creating a "User Curve". Relays with this feature have the capacity to accept 3 user defined curves. This application note provides the mathematical coefficients that are to be inputted to the CurveGen program for each of the standard IEC curves.

### ANSI Format vs. IEC Format in ABB 2000/2000R Relays

The time-current curve format used in the ANSI style units gives a Time-Dial setting range of Time-Dial #1 through Time-Dial #10 in steps of 0.1. In terms of the actual timing values in seconds, this range is a 15 to 1 range for the 2000/2000R series units. Standard IEC format gives a Time-Multiplier range of 0.05 to 1.0 which is a 20:1 range in seconds that can not quite be achieved in the ANSI style unit.

The coefficients given below align the curve for IEC multiplier 1.0 to be Time-Dial #10 when installed in an ANSI style 2000/2000R unit. Then it follows that the minimum setting of Time-Dial #1 is equivalent to an IEC Time-Multiplier of 0.0667.

If you have a selected a certain IEC Time-Multiplier setting for your application, the translation to the ANSI Time-Dial setting is given by the formula:

$$\text{Time Dial Setting} = [\text{Desired IEC Time-Multiplier Setting} + 0.0370] / [0.1037]$$

### Table of Coefficients for Use with the CurveGen Program

Coefficients	A	B	C	P
Curve Type				
IEC Extremely Inverse	5.334	0	1	2
IEC Very Inverse	0.900	0	1	1
IEC Inverse	0.009333	0	1	0.02
IEC Long Time Inverse	8.000	0	1	1

### Procedure for Creating the Data File for Downloading into the 2000/2000R Unit

- Start the CurveGen Program on your PC.
- Select the **Relay Data** tab.
- Select the **Standard ANSI** bullet.  
(Note: do not select the IEC bullet. You are selecting the ANSI bullet because the curve data will be downloaded to an ANSI format relay)
- Select the **Manually Enter Coefficients** bullet.
- Enter the coefficients A-B-C-P for the IEC curve you wish to create, from the table shown above, into the chart on your screen.
- Use the **Save As** button to save the file on your PC hard drive or to a floppy disk. The file extension **.crv** is used for this file.
- You may wish to view the curve by entering one or more Time Dial values in the table on the left side of the screen (10 and 1 is a good choice) and then press the **Apply** button.

### **Procedure for Downloading the Curve Data into a DPU2000/2000R or a TPU2000/2000R**

- Connect your PC to the relay front port and start the WinECP program.
- Establish communications to the relay in the usual manner.
- Under the Main Menu item **File**, select **Import - Program Curves**
- The program will prompt you for the file name of your data file and for the designation you wish to give this curve (User 1, User 2, or User 3).

### **Procedure for Downloading the Curve Data into a GPU2000R**

- Connect your PC to the relay front port and start the GPUECP program.
- Establish communications to the relay in the usual manner.
- Under the Main Menu select **ProgCurve - Send Curve to Unit**.
- The program will prompt you for the file name of your data file and for the designation you wish to give this curve (User 1, User2, or User 3).

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