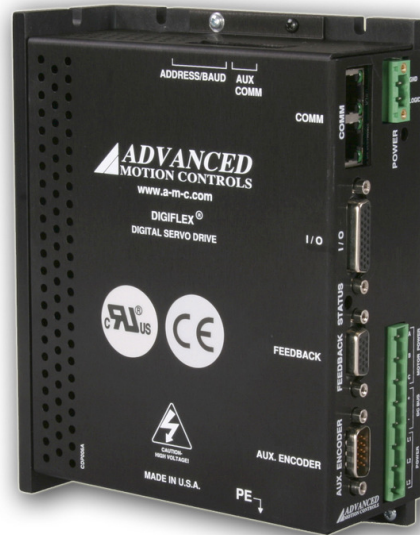


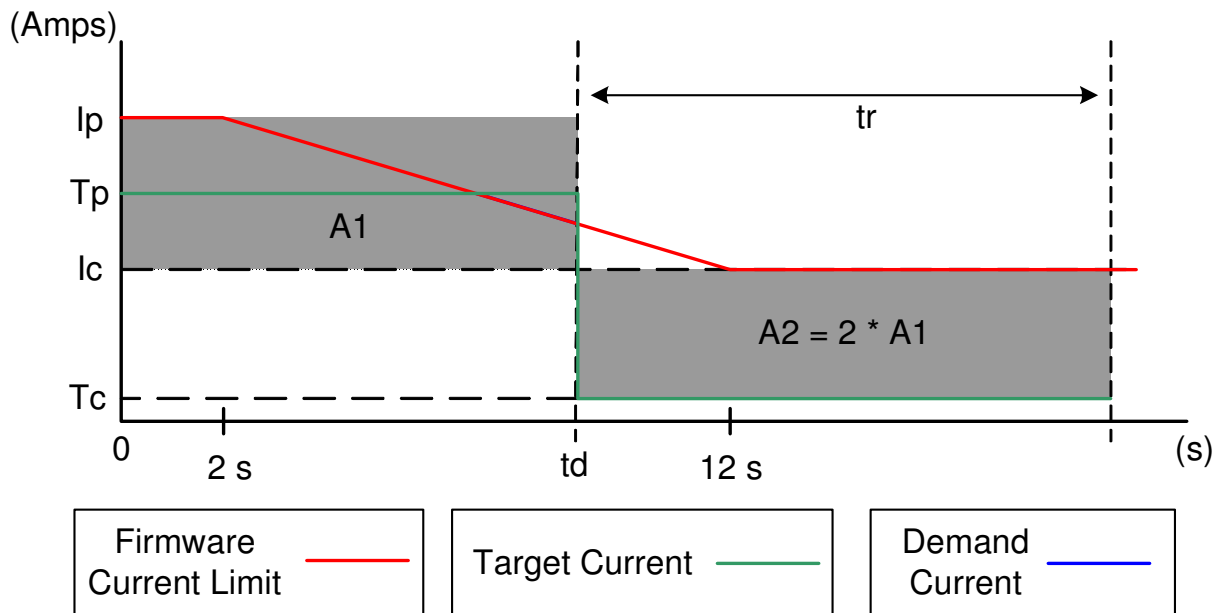
Introduction

All AMC Digiflex servo amplifiers employ a current limiting feature that limits the amount of current available from the drive. The feature is designed to protect the amplifier from damage and prevent excessive current from reaching the motor. The user is allowed to adjust (using AMC's DriveWare or DriveSuite) the amount of peak and continuous current anywhere below the hardware current limit envelope (red line in Figure 1)

The hardware current limit envelope allows peak current for 2 seconds and then a maximum fold back time of 10 seconds (assuming the amplifier's rated peak current is used for the full 2 seconds). It is possible to set a fold back time via software longer than 10 seconds as long as the entire foldback shape does not intersect the hardware envelope anywhere (red line in fig 1).



Digiflex Current Foldback Envelope



As a basis for this description, Figure 1 is assumed to have current limits set to max values. For all AMC amplifiers, max current limit values correspond to the following:

1. Peak current limit is set to the amplifier rated peak current. Rated peak current time is never allowed for more than 2 seconds.¹
2. Continuous current limit is set to the amplifier rated continuous current. Fold back to rated continuous current is no longer than 10 seconds if rated peak current is used for 2 seconds.¹

The peak and continuous currents of AMC Digiflex amplifiers may be set below the corresponding rated values, but never above the hardware limits (Figure 1, Red Line)

For simplicity, this paper uses a square wave target current command.

In Fig 1, Target current is arbitrarily held constant at T_p for some time (t_d) less than 12 seconds. As the Target current resides above I_c (continuous current line), a counter increments up until the target drops below I_c (to T_c in fig 1). While the counter increments, area 'A1' is calculated (shown in the gray area of Fig 1) based on the difference between I_p and I_c . As soon as the target drops below the I_c line, the counter begins to decrement in order to recover the area spent while target was above I_c . The counter decrements half as fast as it increments, therefore twice the area spent is what must really be recovered.

The following equations may be used to determine how long before the full peak current may be applied again. This is assuming a square wave pattern on the target Current command where the target is held constant above the I_c line and then drops instantly to a constant below the I_c line.

Equation 1: $A1 = (I_p - I_c) \cdot t_d \quad 2 < t_d < 12$

Equation 2: $tr = \frac{2 \cdot A1}{(I_c - T_c)} \quad T_c < I_c$

Variable description:

I_p = Drive Peak Current Rating

T_c = Continuous Target

I_c = Continuous Current Setting

t_d = Time when target drops below continuous current setting

tr = Recovery Time

Example 1:

I_p = 12 Amps

I_c = 6Amps

t_d = 8 Amp command for 9 s. (This is equivalent to 2 seconds of peak current and 7 seconds of fold back)

T_c = 1.2 Amps; from a value of 8 amps.

$(12-6) \cdot 9 = 54$

$(2 \cdot 54) / (6 - 1.2) = 22.5$ Seconds

$tr = 22.5$ seconds

This means it will be 22.5 seconds before the amplifier will allow the user to send a peak current command for 2 seconds with the 7 seconds of foldback again.

The amplifier would give 12 amps again with less than 22.5 seconds recovery time, but then the full 2 second peak period may not be available.

¹ Projects that require extending the hardware envelope may be considered if sufficient quantity is met. Contact AMC at http://www.a-m-c.com/download/form/form_salesengineering.html for more details.