

# Encoder Speed Follower

## Using an encoder signal as a speed reference with a ACS380/880

Some applications require two or more pieces of equipment to run at the same speed. For example, a production line of conveyors that transfers product through a system from conveyor to conveyor. If one conveyor runs at a slower speed, product will back up and the system will need to be shut down. It is important for each conveyor to start/stop and accelerate/decelerate at the same time. This document outlines the adjustments needed to achieve this using an encoder signal as a speed reference for the ACS380 and ACS880 drives.

- Note: reference the ACS880 and ACS380 firmware manual for setting up the encoder module. This is the only process that is slightly different from each drive type.

When setting up the drive to follow the encoder signal as a speed reference we will have to look at three parts.

- Acceleration/deceleration time
- Mapping the speed reference
- Matching the speed signals.

### Accel/Decel Time

Because we are trying to follow the speed of another machine, we need to set the acceleration (23.12) and deceleration (23.13) time to zero. If there is acceleration or deceleration time greater than zero, the speed will lag when changing speeds.

23.12	Acceleration time 1	0 sec
23.13	Deceleration time 1	0 sec

### Mapping the speed reference

To setup the drive to use the encoder signal as a speed reference we need to go to parameter 22.11 (Speed ref1 selection) and change it to "Other", then set this to parameter 90.10 (Encoder 1 speed). This is the encoder speed signal in rpm.

<b>22.11</b>	<b>Speed ref1 selection</b>	Selects speed reference source 1. See also parameter <b>22.13</b> <b>Speed ref1 function</b> .	<b>AI1 scaled</b>
	Zero	None.	0
	AI1 scaled	<a href="#">12.12 AI1 scaled value</a> (see page 93).	1
	AI2 scaled	<a href="#">12.22 AI2 scaled value</a> (see page 94).	2
	FB A ref1	Fieldbus adapter A reference 1.	4
	FB A ref2	Fieldbus adapter A reference 2.	5
	PID	<a href="#">40.01 Process PID actual value</a> (output of the process PID controller).	15
	Other	The value is taken from another parameter.	-

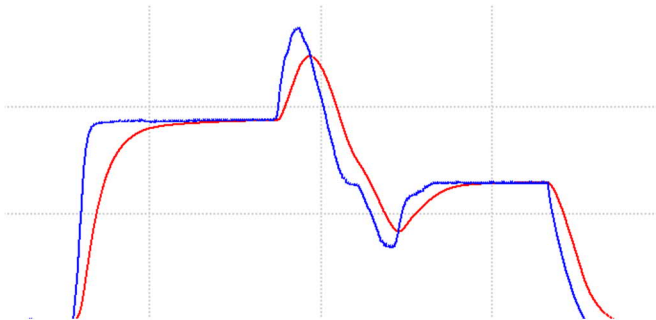
90.10 Encoder 1 speed	Displays encoder 1 speed in rpm. This parameter is read-only.	-
-21474836.48 ... 21474836.47 rpm	Encoder 1 speed.	-

### Matching the speed signals

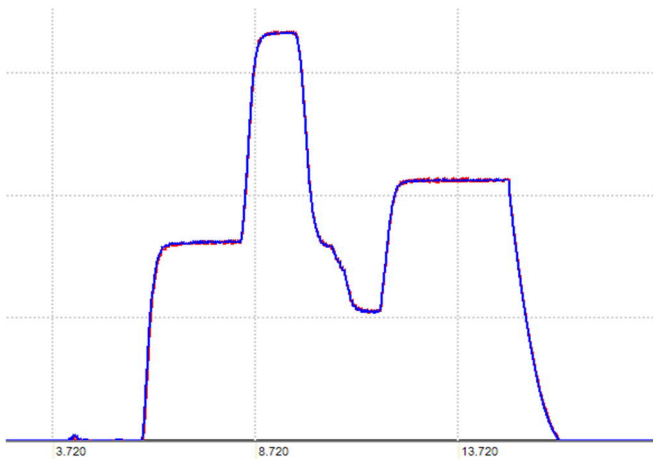
As a default setting there is a 500ms speed filter in the speed controller. This will need to be changed to 0ms, otherwise the speed of the motor will lag the encoder speed signal.

46.11 Filter time motor speed	Defines a filter time for signals 01.01 Motor speed used, 01.02 Motor speed estimated, 01.04 Encoder 1 speed filtered and 01.05 Encoder 2 speed filtered.	500 ms
-------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------	--------

Below is a graph of the encoder speed reference (Blue) compared to the drive speed (Red) with parameter 46.11 at default settings.



Below is a graph of the encoder speed reference (Blue) compared to the drive speed (Red) after parameter 46.11 was set to zero.



This is the basic setup for an encoder speed follower. You may run into issues with matching speed if the equipment is not the same. For example, if the diameters of conveyor 1 and conveyor 2 are different, the motors speed at the shaft will be the same, but the speed of the conveyors surface will be off.

This document is a supplement to the following drive firmware manuals:

- 3AXD50000029275 – ACS380-01 drives
- 3AXD50000085967 – ACS880-01 drives

