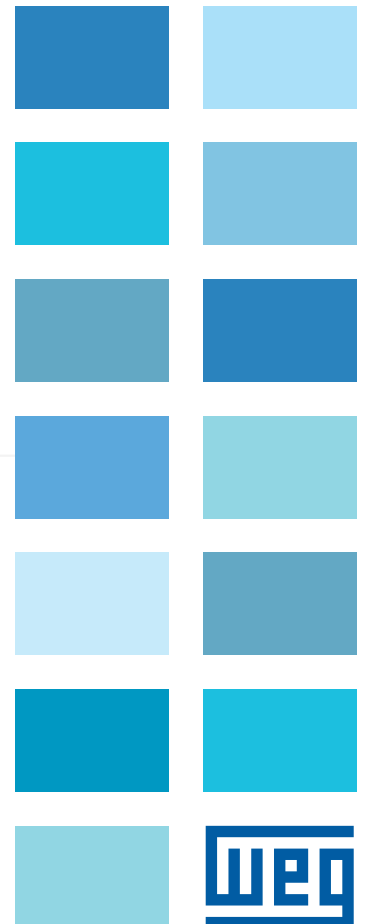
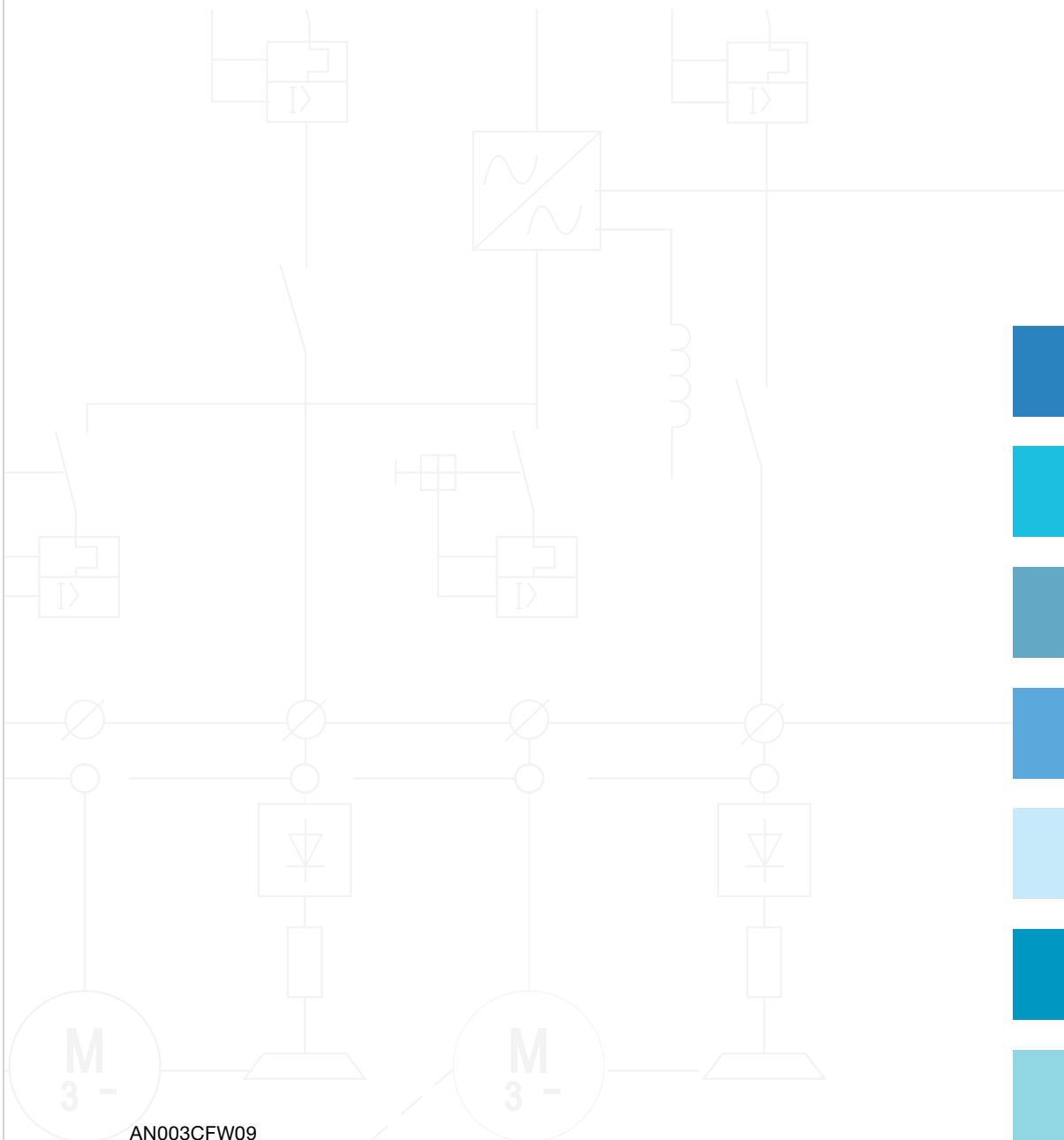


# Application Note

## CFW09 400Hz Output Frequency



## CFW09 - 400Hz Output Frequency

### APPLICATIONS:

A motor needs to operate at a 400Hz output frequency. How can this be accomplished using the CFW09 Variable Frequency Drive?

### ANSWER:

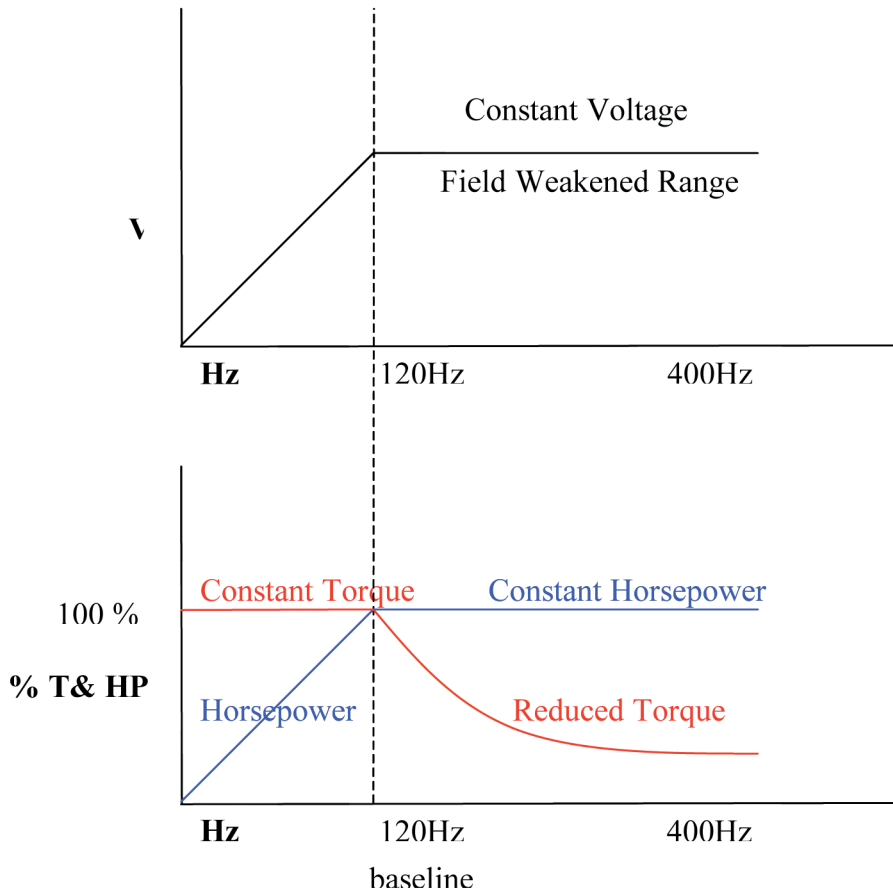
A motor with a frequency rating equal to or higher than 117.65Hz is needed to achieve the desired 400Hz output frequency.

### EXPLANATION:

The inverter can output up to 3.4 times the Motor Rated Frequency. Therefore the minimum frequency rating is determined by dividing the desired output frequency of 400Hz by 3.4 ( $400/3.4=117.65\text{Hz}$ ). For this example let's use a 2 pole 120Hz motor. The sync speed of this motor would be  $120\text{Hz} \times 120/2 \text{ poles} = 7200 \text{ rpm}$ . If we set parameter P403 to 120Hz and output 3.4 times that, we get 408Hz out. The speed will increase accordingly to 24000 rpm. *Note: The motor will work in field weakening region every time the frequency is above the motor rated frequency of 120Hz and it is important to know if this situation is ok with the customer.*

As the output frequency increases so does the voltage until the supply voltage level is met. Obviously we can not exceed the supply voltage so the voltage becomes constant after the baseline frequency of 120Hz is met. As we increase the output frequency above the baseline the result is increased speed with weakened torque or constant HP operation. *Note: Above 2:1, motor torque drops sharply and operation is not recommended.*

## CFW09 - 400Hz Output Frequency



The Motor Rated Frequency of 120Hz is entered at parameter (P403). Adjustable limits are 0- 300Hz for V/Hz mode, and 30-120Hz for Vector mode. Parameters P142 through P146 allow changing the standard V/F curves (50 and 60Hz) defined at P202. Special V/F profiles can be set up and used for motors with non-standard voltages/frequencies.

For V/Hz mode, the parameters you need to change to have Constant torque up to the 120 Hz Base Frequency in V/Hz mode follow:

- Set Type of Control to “v/f adjustable” (P202=2)
- Set Motor Name Plate Data (P400 through P406)
- Set Adjustable V/F parameters (P142 through P146)

Care should be taken when setting parameter (P144). It determines the output voltage at 3 Hz and default is 8%. Depending on the “motor rated frequency” this value can be too high and the inverter can trip out. A good approach for setting (P144) is:  $P144 = (3/P403) \times 100\%$  with 100% being the default value of the maximum output voltage at P142. If an increase in starting torque is needed, increase the value of (P144) gradually.

In Vector Mode the curve is automatically adjusted according to the motor data you set at P400 through P406. Therefore you only have to set the drive to Vector mode at (P202) and set (P134) according to the maximum speed you want.



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