Technical instruction
ACS250 micro drives, 110-480 V
Modifying the constant V/F output for enhanced performance

Overview
ACS250 provides enhanced V/F (volts to hertz) control for general purpose AC motor control applications.

The performance of the ACS250 drive can be optimized for a wide variety of applications using programming parameters to modify the V/Hz curve produced. Changing the parameters allows the user to adjust the voltage applied to the motor. Applied motor voltage can be increased to provide more low speed torque for better performance in constant torque applications or it can be decreased to provide optimal energy savings at low speed in variable torque applications. This is referred to as the V/F characteristic adjustment function.

In addition the motor start up/low speed voltage can be increased using the V/F voltage boost parameter to give improved starting/low speed performance. This is referred to as the V/F voltage boost function.

Note that the V/F characteristic adjustment parameters are located in the long parameter group.

How to access the long parameter group
- 1. Press \[\text{button} \] for >1 second to enter “long parameter group selection mode”.
- 2. Use \[\text{button} \] to select long parameter group “PAr L”.
- 3. Press \[\text{button} \] to exit “long parameter group selection mode” and save selection.
(Refer to the following graphic or table 7.2 Changing parameters in the user’s manual.)

V/F Voltage boost function

2603 V/F Voltage boost (IR compensation)
Parameter 2603 allows the user to directly adjust the voltage applied to the motor at low speeds which will improve starting and low speed performance.

Parameter 2603 defines the voltage applied to the motor at 0.0 Hz, as a percentage of 9905, motor rated voltage. If 9905=0, the voltage will be proportional to the incoming supply voltage. As the output frequency from the drive increases, the voltage boost is reduced linearly up to 50 % of the motor rated frequency. This is shown clearly in graph no. 1 on the next page.

Modifying parameter 2603 also changes the V/A (volts to amps) characteristic of the drive to compensate for the motor losses at low frequencies. If 2603 is too low, the motor may not develop sufficient output torque at low frequency. If 2603 is too high, the motor current will also be too high, and will likely result in the drive tripping F0001 (instantaneous overcurrent) or F0009 (thermal overcurrent trip). When adjusting 2603, it is advisable to check that the output current does not exceed the motor rated current when operating at low frequencies; otherwise 2603 should be reduced.
Example

For a typical 230 V, 60 Hz AC induction motor, the user should set 9905 (motor rated voltage)=230 V and 9907 (motor rated frequency)=60 Hz to give standard linear V/F operation.

If the application requires additional torque at low speed, the user can provide voltage boost by increasing the voltage applied to the motor at lower speed.

- Set 2603 to an increased value.
- For example, if set to 20 % the drive output will give the V/F characteristic indicated by the black line in graph no. 1 below.

Graph no. 1

**V/F Characteristic adjustment function**

The V/F characteristic adjustment function allows an additional set point to be specified on the standard V/F output applied to the motor. For most applications, only two of these points are required, and the V/F characteristic operates as described in the section above. In some applications, it can be advantageous to define a further point, and the following parameters allow the user to directly adjust the voltage applied to the motor at a predefined frequency.

These parameters are located in the long parameter group.

**2610 V/F characteristic adjustment voltage**

This parameter specifies the voltage to be applied to the motor at the frequency specified in 2611. The range for this parameter is from 0 to 9905 (motor rated voltage). The default value for this parameter is 0.

**2611 V/F characteristic adjustment frequency**

This parameter specifies the frequency at which the voltage (set by 2610) should be applied to the motor. The range for this parameter is from zero to motor base frequency, as defined in parameter 9907. See graph no. 2 on the right for further details. The default value for this parameter is 0 (setting to 0 disables this function).

Example

For a typical 230 V, 60 Hz AC induction motor, the user should set 9905=230 V and 9907=60 Hz to give standard linear V/F operation. In a centrifugal fan application, to provide the best possible energy savings, a parabolic V/F curve is desirable, reducing the voltage applied to the motor at low frequencies. This V/F curve can be approximated using the following technique. The resultant characteristic will be shown in graph no. 2.

- Navigate to the long parameter group.
- Set the V/F characteristic adjustment frequency (2611) to 50 % of 9907 (e.g. if 9907=60 Hz, 2611=30 Hz).
- Set the V/F characteristic adjustment voltage (2610) to 25 % of 9905 (e.g. if 9905=230 V, 2610=58 V).

Graph no. 2

It is important to remember that increasing the motor voltage at any point will result in increased current and therefore increased heating of the motor, and so this function should be used with care.

For applications where the motor may operate continuously at low speed, a force ventilated motor may be required.

For more information please contact your local ABB representative or visit:

[www.abb.com/drives](http://www.abb.com/drives)

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