Revision History

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1 Overview

This application note describes the procedures for connecting a voice coil motor (VCM) and MaxTune DC servo drive, and for configuring and tuning the MaxTune drive for operation of the VCM.

2 System Setup

2.1 Requirements

- MT-2/6, MT-4/12-100VDC servo drive
- Voice coil motor
- Firmware: Available in 1.3.2a9.0.48VDC (special version for 48 VDC bus).
  
  **Note:** VCM will be supported in standard firmware 1.4.X.

- MaxTune software version 1.3.2.21 or later
2.2 Wiring

Refer to the system wiring diagram below, and make the following connections:

- **Power supply:**
  Connect 48 VDC to P4 (L1, L2)
  Connect 220 VAC to P4 (L1C, L2C)

- **Motor:**
  Connect the motor to interface P2 (U, V)

- **Feedback (incremental encoder A/B) – optional**
  Connect the encoder to interface C4.

**Note:** If position feedback is not used, the drive can control motor only in Current (torque) mode.

Refer to EMI Suppression in MaxTune User Manual
2.3 Motor and Drive Configuration

**Notes:** The instructions in this document assume that you are familiar with the MaxLink software.

1. In MaxLink, Select “PBA Motors CVC” for the Family dropdown box.
2. Choose the appropriate model number of the motor under the Model and the correct encoder.
3. For Voice coil motor “Verify” button not working. Click on “skip motor setup procedure” and click on “Write” button and click “Next”.
4. For Voice coil “Velocity and Current Limit” and “Move and Set Direction” windows not working. Click on “Approve” button and Click “Next”.
5. Click on “Save to Drive” and go to script section for commutation testing and fine tuning for current loop.

**Note:** If the VCM motor is used without encoder feedback, MOTORCOMMTYPE is set to 2. Without encoder feedback the drive can be used only in the Current operational mode.
3  Commutation Testing

3.1 Script for Testing Commutation

In the Script pane, enter the Commutation Testing script shown below.

**Commutation Testing Script**

```
EN
RECORD 2 2000 "ICMD "V
RECTRIG "IMM
T 0.5
#DELAY 5
T -0.5
#DELAY 5
K
#PLOT
```

3.2 Evaluating Commutation

Execute the script.

The positive Current command will generate a positive speed, while the negative Current command will generate a negative speed.

The positive and negative speeds should be almost equal, as shown in the figure below.

**Commutation is correct.**

![Graph showing commutation testing](image)

If the direction of the current command and speed are in opposition, swap the wiring of the motor phase (U,V). Do not use the variable MFBDIR (Motor and Feedback Direction), which has no effect on VCM motors.
4 Current Loop Tuning

4.1 Script for Testing Current Loop

Actual current rise time should be quick (fast response) and, if possible, without overshoot.

In the Script pane, clear the script, and enter the Current Loop Testing script shown below.

**Current Loop Testing Script**

```
KCBEMF 0
KCFF 1
KCI 1
KCP 1
CONFIG
#DELAY 100
EN
RECORD 2 2000 "ICMD "IQ "V
RECTRIG "IMM
T 1
#DELAY 1
T 0
#DELAY 100
K
#PLOT
```

Try to find suitable vale for KCBEMF, KCFF, KCI, KCP.
5  Position Loop Tuning

The MaxLink Autotuning wizard can be used for position loop tuning.

Note: If the motor moves only small distances, it is likely to hit its limit in the first step of Autotuning (Move and Estimate Load Inertia). It is therefore recommended that you enter an approximate value for load inertia, and skip the first step of the Autotuning.

Use Gain Optimization window continue Autotuning procedures same as AC drivers. if necessary, fine tune parameters by manually adjusting.