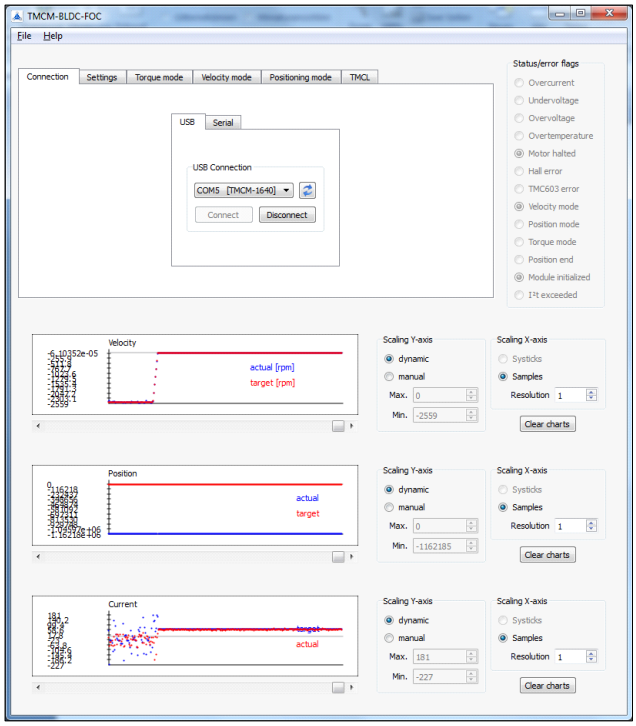
SOFTWARE

MODULE

V 2.00

TMCM-BLDC USER MANUAL



TMCM-BLDC

Adjusting Tool for
BLDC modules
Field Orientated Control
Compatible with TMCL-IDE

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TRINAMIC
MOTION CONTROL

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1 TMCM-BLDC Overview

The TMCM-BLDC is a special program for adjusting and testing settings of TMCM modules for BLDC motors. This software tool offers dialogues for all modes of operation. The TMCM-BLDC can be downloaded from www.trinamic.com and is compatible with the TMCL-IDE.

The TMCM-BLDC is a PC application running under Windows XP, Vista, and Windows 7 (Windows 3.x is not supported) that includes

- a connection dialogue for connecting the module,
- a dialogue for basic settings (motor settings, encoder settings, commutation mode, trace controller),
- three dialogues for operation modes, each for one mode of operation (torque mode, velocity mode, positioning mode),
- a dialogue for entering and executing TMCL commands in direct mode,
- a file menu for exporting and importing settings, storing or restoring them. Further, settings can be exported to TMCL for use with the TMCL-IDE.

The TMCM-BLDC is designed for finding initial settings, e.g. the values for P and I parameters of a specific mode of operation. Each value can be changed on the fly and the results are shown immediately on the diagrams. After optimum values are found they can be exported to the TMCL-IDE for developing programs that run standalone on the module later on. TRINIAMIC recommends using this TMCM-BLDC tool first and proceed afterwards with the TMCL-IDE.

Note:
The TMCL-IDE offers another BLDC dialogue for setting and testing parameter values. At least, a customer may decide himself, which software tool comes up best to his requirements.

2 Getting Started

The first step is to connect the module by clicking the *Connect* button. (Please refer to the specific hardware and firmware manuals of your module for further information about connecting cables etc. prior to this.) Proceed if the communication between module and PC is established.

THE PROGRAM SURFACE GIVES AN IMPRESSION HOW TO WORK WITH TMCM-BLDC:

The *settings* tab is needed for adjusting general settings of the module. The other three tabs are designed for trying out *torque mode*, *velocity mode*, and *positioning mode*. The last tab is used for controlling the module with *TMCL direct mode*. All TMCL commands can be entered as usual.

On the right side of the window are *status and error flags*. Below the tabs are diagrams for velocity, position, and current. These diagrams and the status/error information can be used for controlling settings visually in order to identify best results as well as deficient settings. It is possible to scale each X-axis and Y-axis to get a comfortable report. Status/error flags and diagrams are for diagnostic tasks only and remain visible, while the program is used. The input field on top can be chosen by selecting a specific tab.

Please note that the status/error flags and the charts have to be activated by starting the trace controller on the settings tab, which polls the corresponding values from the board on a regular basis.

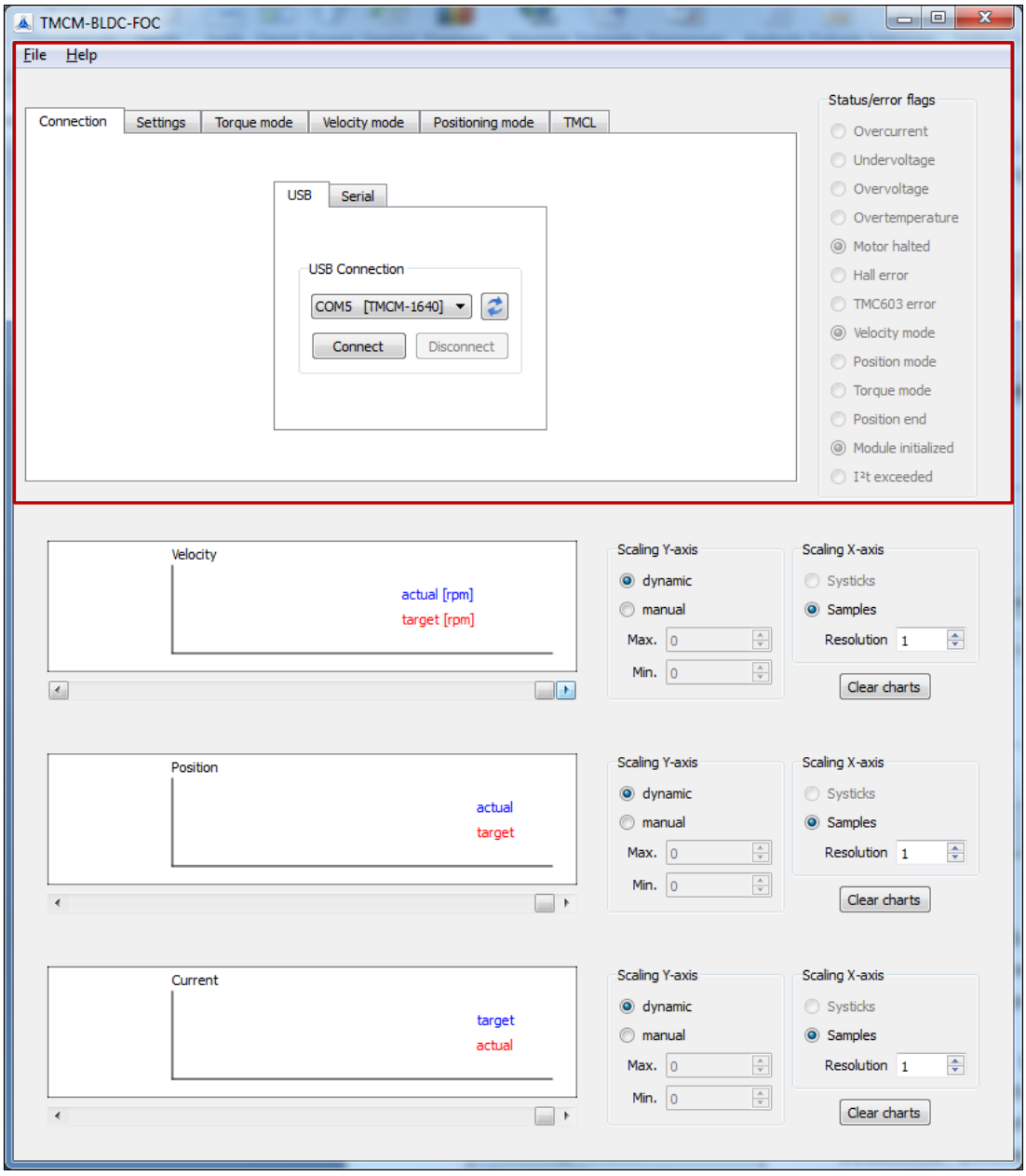

Figure 2.1 Connection tab of TMCM-BLDC

2.1 Dialogues

2.1.1 Settings

After connecting the module with the *connect* button you can choose the *settings tab* and fill in basic values: *motor settings*, *encoder settings* and *commutation mode*. All settings correspond to specific axis parameters of your module. Please refer to the firmware manual of your module for more information about setting axis parameters.

The *trace controller* has to be started for displaying the curves on the diagrams below. Clicking the *start* button of the trace controller enables the status/error flags, too.

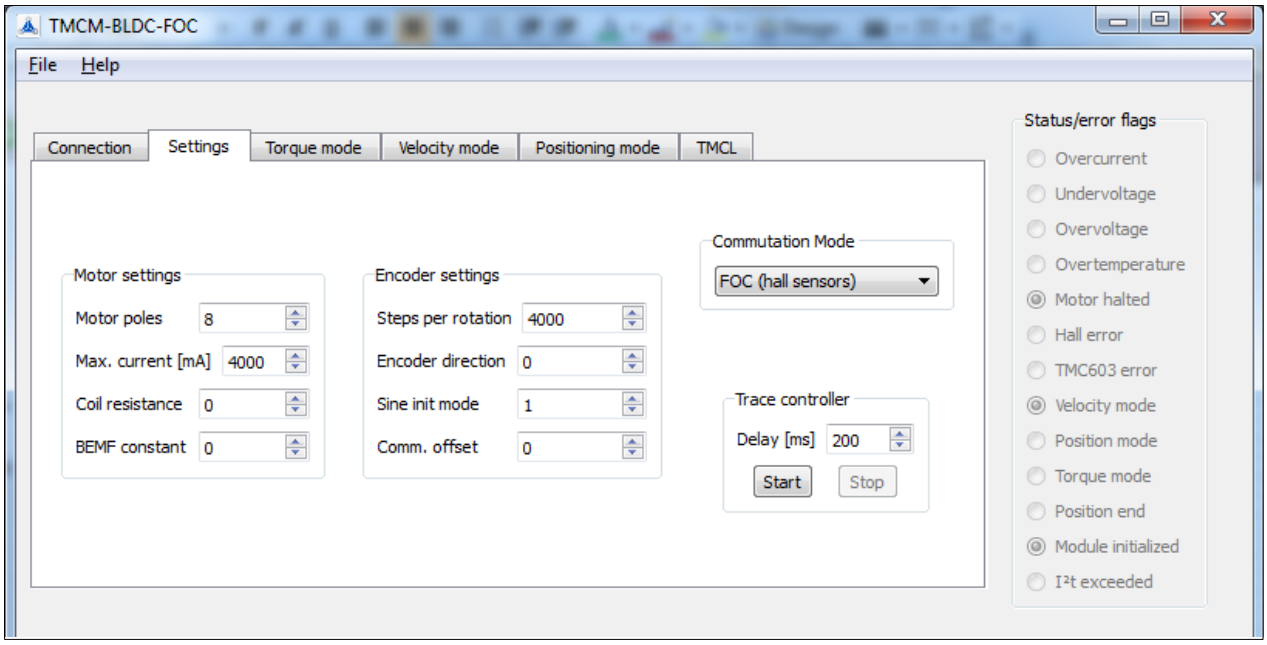

Figure 2.2 Settings tab of TMCM-BLDC

2.1.2 Torque Mode

The *torque mode tab* offers the possibility to test different current settings and to evaluate the *current PI control* by choosing values for the P and I parameters.

The drive can be started (in positive and negative direction) and stopped with the buttons in the *current control* field. The values can be calibrated on the fly while the drive is still active. The results will be shown immediately on the diagrams below.

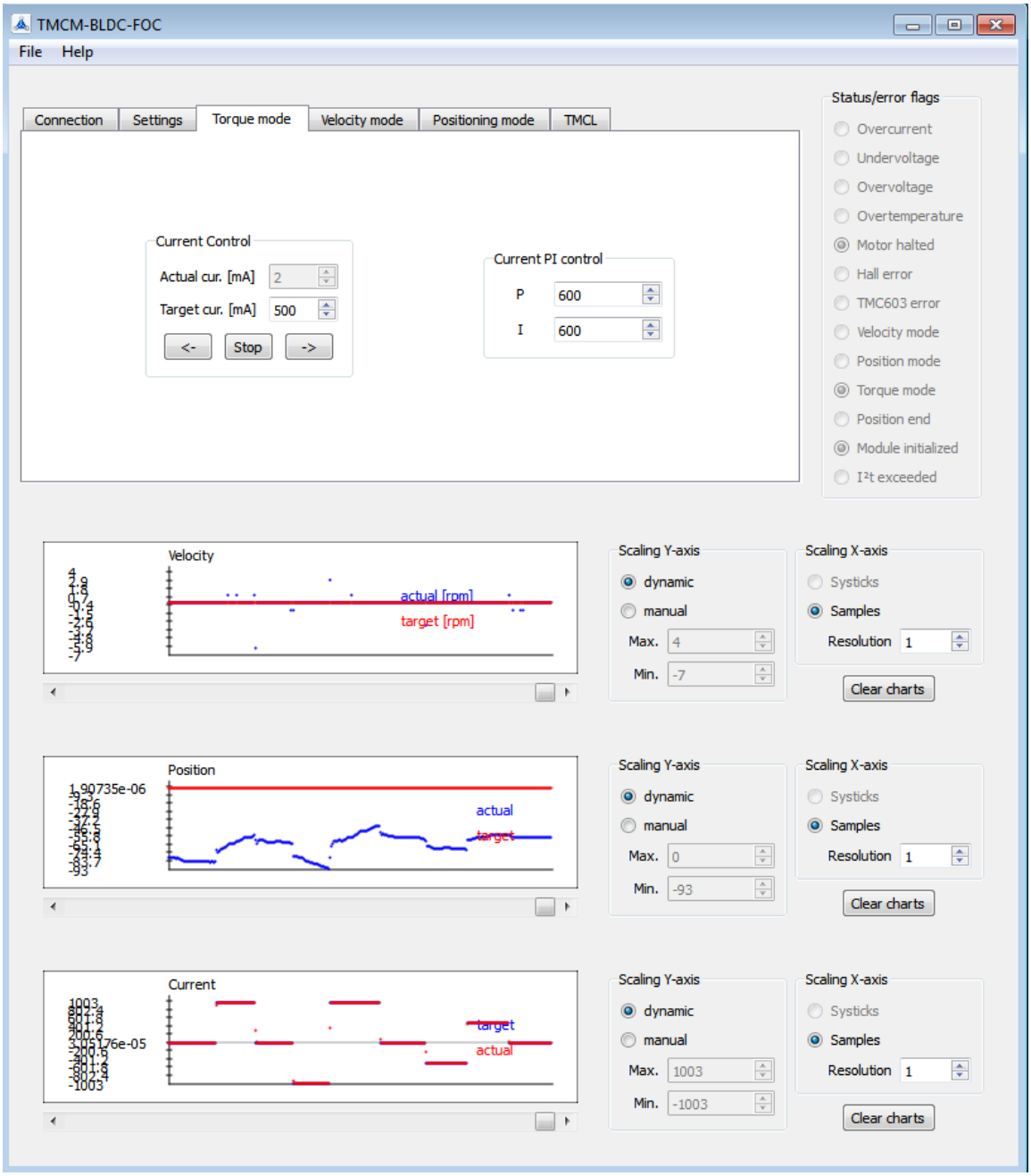

Figure 2.3 Torque mode tab of TMCM-BLDC

2.1.3 Velocity Mode

The input area of the *velocity mode tab* has three parts: the *velocity ramp control*, the *velocity control* and the *velocity PI control*. In the middle of the input area is the *velocity control*, which is used to start the drive (in positive and negative direction) in velocity mode with a chosen speed [rpm] or stop it.

The *velocity ramp control* is needed for setting the maximum velocity [rpm] and the acceleration [rpm/s]. Further, the velocity ramp can be enabled by ticking the appropriate field. Disabling the velocity ramp leads to a hard stop.

On the right side is the *velocity PI control*. Here, the P and I parameter values can be set. The values can be calibrated on the fly while the drive is still active. The results will be shown immediately on the diagrams.

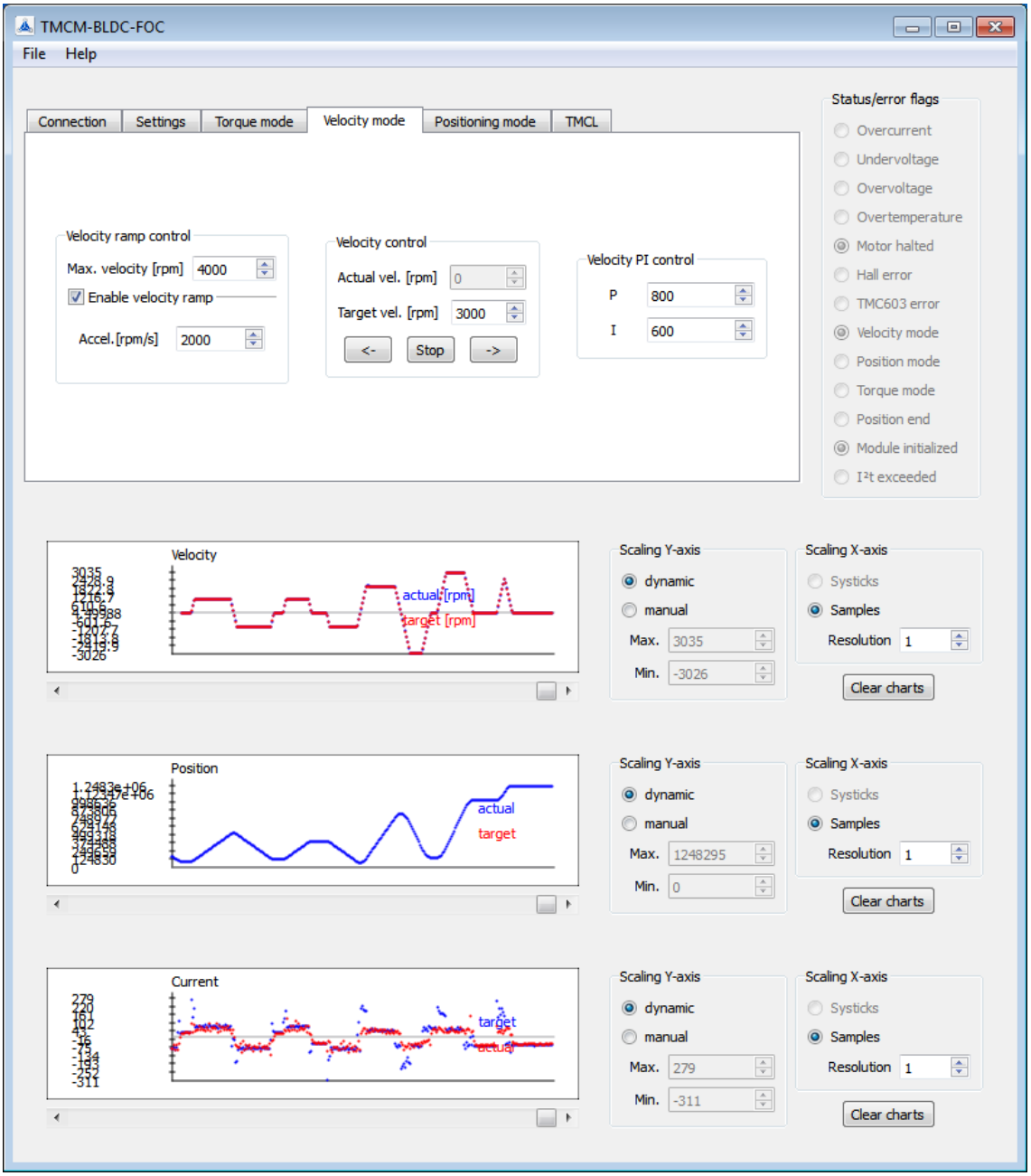

Figure 2.4 Velocity mode tab of TMCM-BLDC

2.1.4 Positioning Mode

The input area of the *positioning mode tab* has three parts: the *velocity ramp control*, the *positioning control*, and the *position P control*.

The *velocity ramp control* is the same as on the velocity mode tab. Maximum velocity and acceleration can be chosen and the velocity ramp can be enabled or disabled. In the middle of the positioning mode input area is the *positioning control* field. This is adequate designed to the TMCL command MVP (*move to position*). There are two possibilities to move in positive or negative direction: move absolutely or relatively to the actual position. Units for different commutation modes are as follows:

- The unit of the target position for positioning with encoder is *encoder steps per motor rotation*.
- The unit for positioning with hall sensors is $\frac{6 \times motorpoles}{2}$ *steps per motor rotation*.

The button *clear* sets the counter for positioning to zero. *Clear on NULL* is used with encoder. The actual position is set to zero when crossing the next N channel.

On the right side of the positioning mode tab input area is the *position P control*. Here, values of the P parameter can be set. Values can be calibrated on the fly while the drive is still active. The results will be shown immediately on the diagrams.

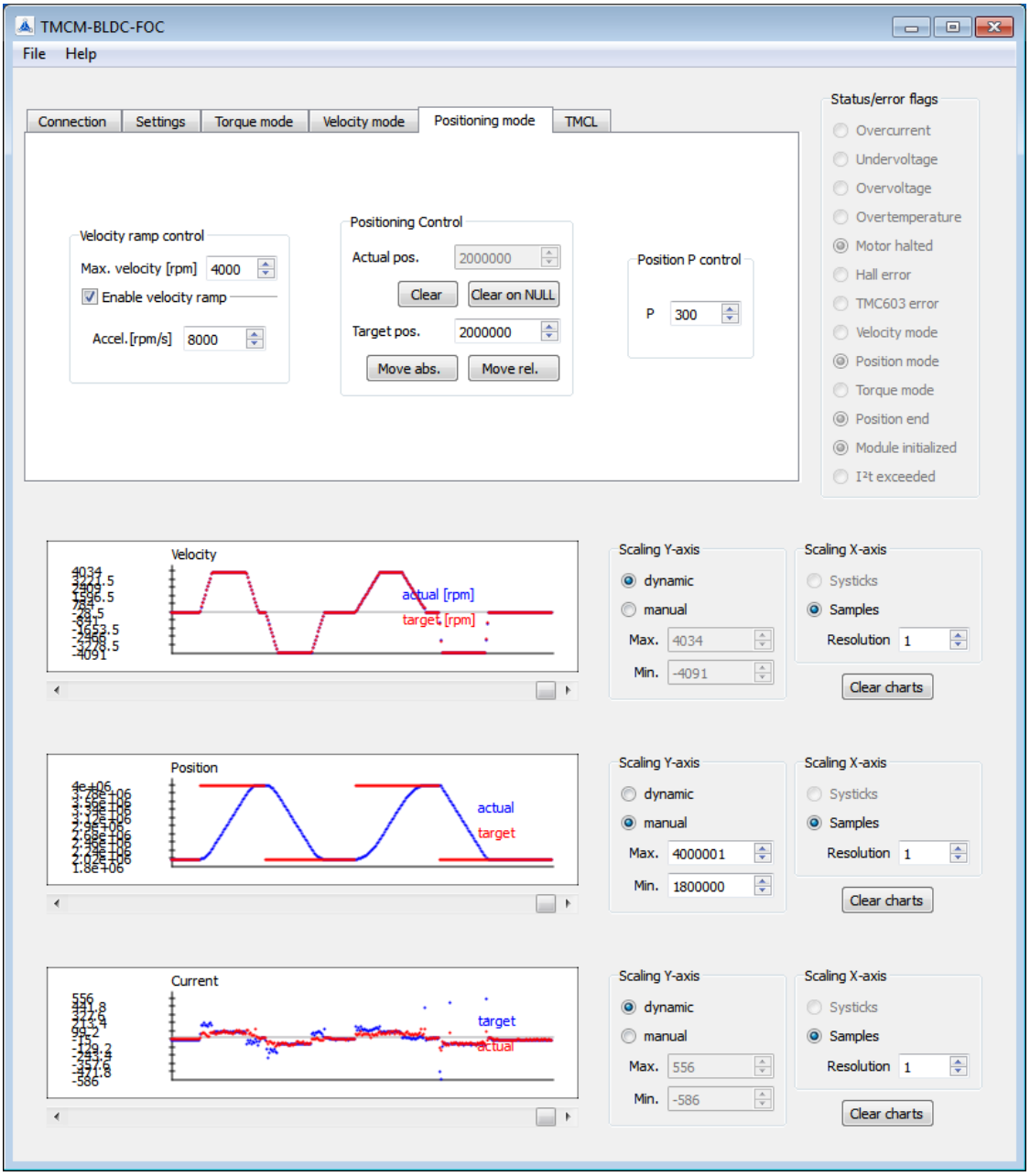

Figure 2.5 Positioning mode tab of TMCM-BLDC

2.1.5 TMCL

The input area of the TMCL tab has the same structure as the appropriate window for *TMCL direct mode* of the TMCL-IDE. *Command number*, *type*, *motor/bank* and a chosen *value* can be set. By clicking the *send* button the request will be sent to the module. Immediately the reply of the module will be displayed in the *reply* field.

Please refer to the complete lists of axis parameters and global parameters of your module in the appropriate firmware manual, too.

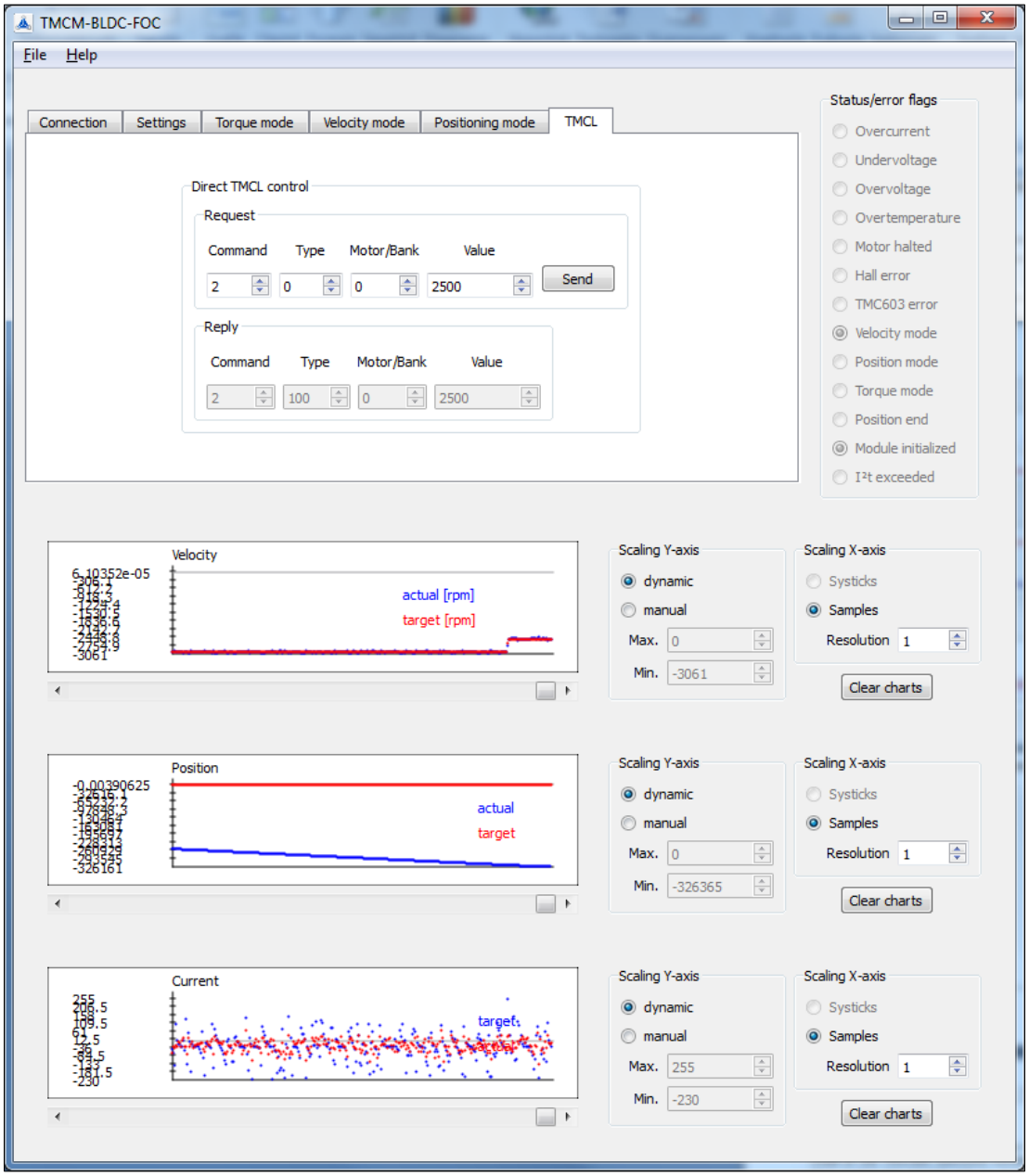

Figure 2.6 TMCL tab of TMCM-BLD

2.2 File Menu of TMCM-BLDC

The file menu of the TMCM-BLDC offers the possibility to import and to export settings. This is useful for transferring settings from one module to another. Settings can be exported (*Export settings to *.ini*) and afterwards imported to another module with the command *Import settings from *.ini*.

Further, it is useful to export evaluated adjustments of the TMCM-BLDC program to a TMCL script used later in the TMCL-IDE. Therefore choose *Export settings to TMCL*.

Certainly actual values can be stored and restored on the module.

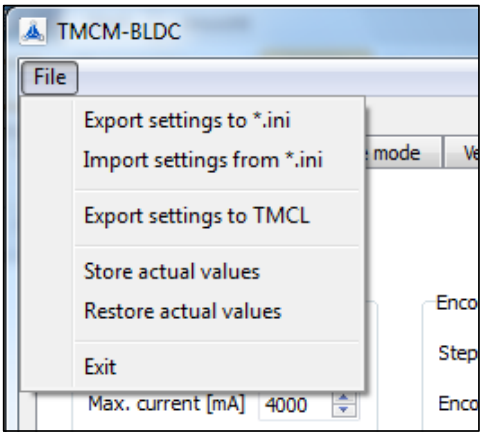

Figure 2.7 File menu of TMCM-BLDC

3 Life Support Policy

TRINAMIC Motion Control GmbH & Co. KG does not authorize or warrant any of its products for use in life support systems, without the specific written consent of TRINAMIC Motion Control GmbH & Co. KG.

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Information given in this data sheet is believed to be accurate and reliable. However neither responsibility is assumed for the consequences of its use nor for any infringement of patents or other rights of third parties, which may result from its use.

Specifications are subject to change without notice.

4 Revision History

Version	Date	Author SD – Sonja Dwersteg	Description
1.00	2011-NOV-08	SD	Initial release
1.01	2011-NOV-09	SD	Minor changes
1.02	2011-DEC-07	SD	Minor changes
2.00	2012-AUG-06	SD	New version for FOC-firmware

Table 4.1: Document revision

5 References

[TMCL-IDE] TMCL-IDE User Manual (www.trinamic.com)

Please refer to the hardware and the firmware manuals of your module, too.