

MBScopeTM
USER'S GUIDE
MBG5-PC CONTROLLER



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1. INTRODUCTION

1.1 OVERVIEW

MBScope is a Windows-based software suite of monitoring and servicing tools that interface with SKF Magnetic Bearings' controllers. **This manual contains comprehensive information on the use of MBScope for operation of the MBG5PC system.**

The servicing manual is provided in a separated document [2] for factory or expert users; it contains instructions for configuring and changing parameters inside the controller.

1.2 SOFTWARE

This user manual describes MBScope version 4.2.X.

1.3 DEFINITIONS / ABBREVIATIONS

Controller	Magnetic Bearing Controller
DSP	Digital Signal Processor (a subsystem of the controller).
MBCS	Magnetic Bearing Control System – Include the Magnetic Bearing Controller and remote monitoring system (MBScope)
Parameter	A parameter is a controller variable that is used for transferring permanent or temporary information between the controller and MBScope. A parameter may be a boolean, integer, floating-point or other value type, or a vector of such values.
Sampled Data	Analog data that is sampled by the controller at a pre-defined sample frequency.
SDR	Shutdown Request. An event causing the system to shutdown.
Snapshot	A temporal window of sampled data such as a position, current or voltage.
SPV	Supervisor Board (a subsystem of the controller).
TDC	Top Dead Center. Alias for the speed sensor in a magnetic bearing system.
Tick	A 64-bit integer representation of a date-time value in units of 1E-7 seconds.

1.4 GENERAL REQUIREMENTS

The general minimum and recommended software and hardware requirements to run MBScope are the following:

Operating System:	Windows 7, Windows Server 2008
Processor:	<i>Minimum:</i> 2 GHz Dual Core or Greater
Memory:	<i>Minimum:</i> 4 GB <i>Recommended:</i> 8 GB or Greater
Free Disk Space:	<i>Minimum:</i> 100 MB <i>Recommended (for trending):</i> 1 GB or Greater
Screen Resolution:	1280 x 1024 or Greater
Ethernet Bandwidth	<i>Minimum:</i> 100 Mbit/s

2. INSTALLATION

2.1 GENERAL

Installation and proper operation of MBScope on Windows systems requires the user to have administrative access to the local machine. If you find that you are being restricted from installing or using MBScope with warnings that indicate “you do not have permission”, please contact your local system administrator.

2.2 INSTALLATION

To begin installation of MBScope, insert the MBScope CD into the drive. An installation program should automatically run within a few moments. If the program does not run automatically, execute **MBInstaller.exe** from the drive where the CD was inserted.

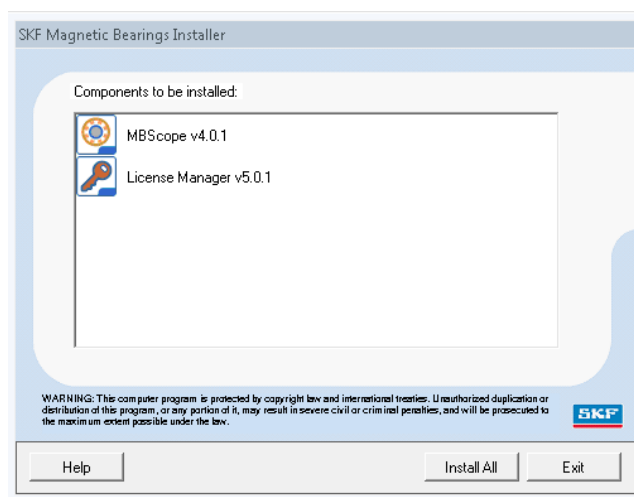


Figure 1 – SKFMB Installer

A list of all components to be installed (and already installed) is shown in the installer window. Click on the **Install All** button to begin installation. When the confirmation window appears, click **Yes** to proceed.

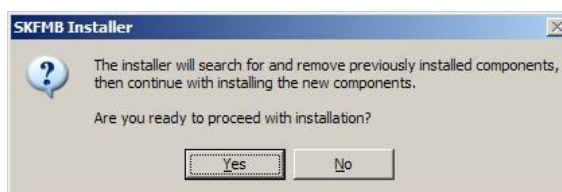


Figure 2 – SKFMB Installer : Confirmation

2.3 MBScope SOFTWARE INSTALLATION

Once MBScope. installation begins, you should see the following Setup Wizard :

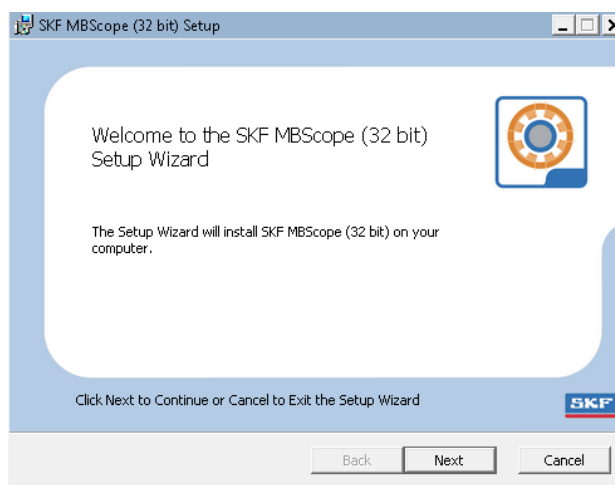


Figure 3 – MBScope Install : Setup Wizard Welcome Page

Click **Next** to proceed to the License Agreement page.

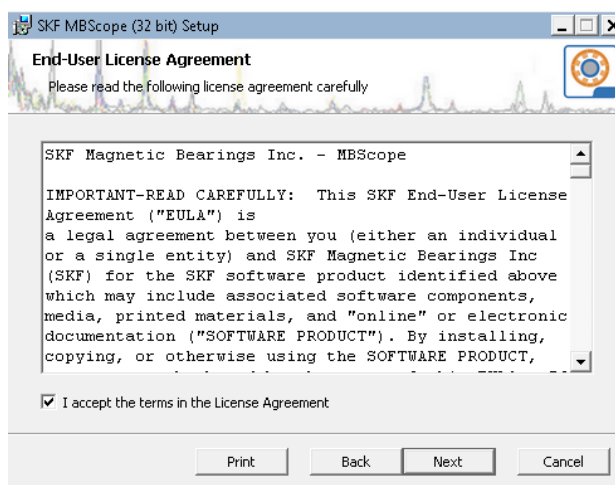


Figure 4 – MBScope Install : License Agreement

You must read and agree to the license agreement before continuing with the installation. If you agree, click **Next** to proceed to the Installation Folder page.

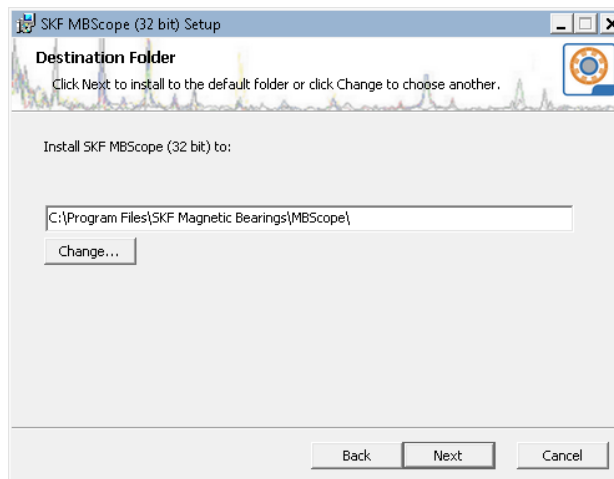


Figure 5 – MBScope Install : Installation Folder

Once you have configured the Installation Folder, click **Next** to proceed to the Confirm Installation page of the wizard.

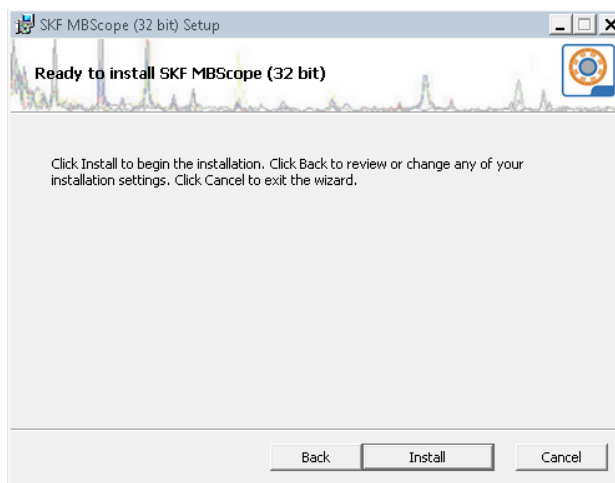


Figure 6 – MBScope Install : Confirm Installation

Click **Next** again to begin copying and installation of the files required to run MBScope.

When installation is complete, click **Close** to exit the Setup Wizard.

2.4 LICENSE MANAGER INSTALLATION

Once MBScope is installed, you may be prompted to install the License Manager. The License Manager is **required** for the operation of MBScope.

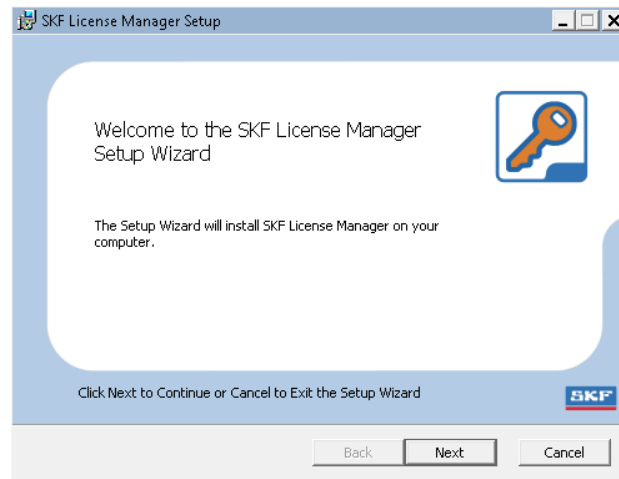


Figure 7 – License Manager Install : Setup Wizard Welcome Page

Click **Next** from the Setup Wizard Welcome page to begin installing the License Manager. The installation wizard will take you to the License Agreement page.

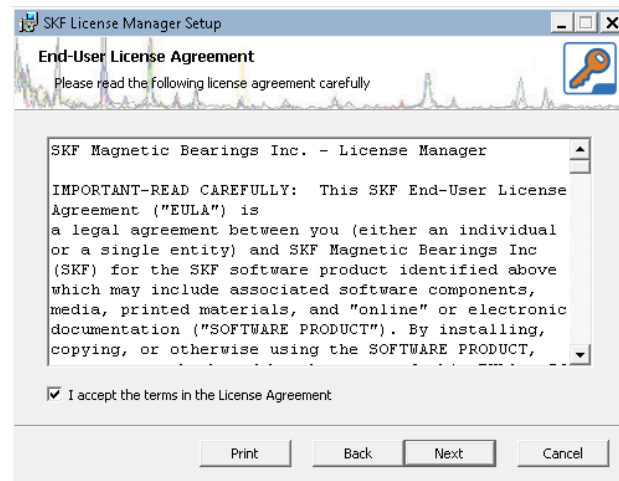


Figure 8 – License Manager Install : License Agreement Page

You must read and agree to the license agreement before continuing with the installation. If you agree, click **Next** to proceed to the Installation Folder page.

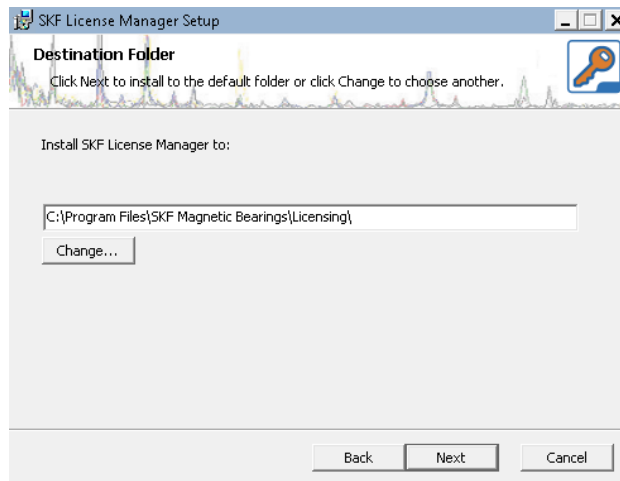


Figure 9 – License Manager Install : Installation Folder

Once you have configured the Installation Folder, click **Next** to proceed to the Confirm Installation page of the wizard.

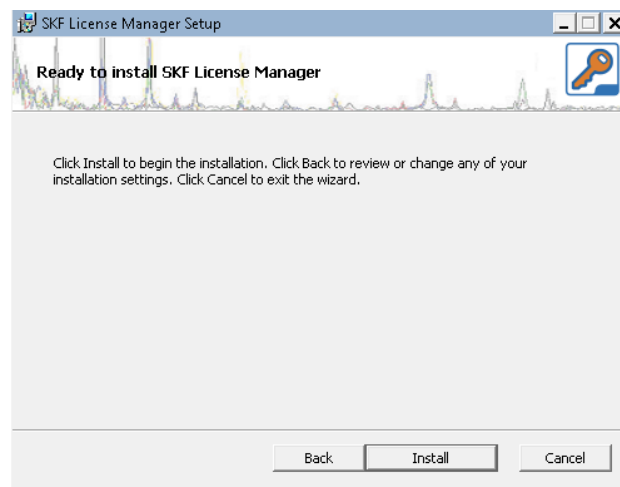


Figure 10 – License Manager Install : Confirm Installation

Click **Next** again to begin copying and installing the files required to run the SKF License Manager.

When installation is complete, click **Close** to exit the Setup Wizard.

2.5 INSTALLATION COMPLETE

At this point, MBScope should be properly installed. It is now safe to **Exit** the SKFMB Installer.

3. MBScope TOOL SUITE

3.1 OVERVIEW

MBScope consists of a number of monitoring and servicing tools that interface with SKF Magnetic Bearings' controllers.

3.2 MONITORING AND DIAGNOSTIC TOOLS

Monitoring tools are used for capturing and/or displaying sampled data and/or parameters from the controller. The following tools are provided as part of the basic MBScope suite:

Tool	Description
Control Panel	Used for basic monitoring and issuing control-command operations.
Event Viewer	Retrieves, displays and stores alarm information collected by the controller when the magnetic bearing is shutdown abnormally and the controller's event log.
Snapshots Tool	Displays real-time snapshots from the controller in the time domain, frequency domain, or as statistics in tabular form.
Orbits Tool	Displays information about the speed and orbit of the shaft in real-time.
Trending Tool	Captures real-time, transient or windowed data from the controller for post-viewing or processing.

3.3 SERVICING TOOLS

Servicing tools provide the functions necessary for SKF and certified personnel to tune and configure the controller. The following servicing tools are **optionally** available as part of the MBScope suite depending on your contract agreement:

Tool	Description
Calibration Tool	Used for aid in mechanical sensor calibration, digitally calibrating position sensor offsets and sensitivities, checking machine internal clearances, and verifying alarm levels and functionality.
Firmware Loader	Used for updating controller firmware.
Parameter Loader	Used for sending and receiving parameters to and from the controller through a PVF.
Service Panel	Used to calculate the system transfer functions by injecting various frequency signals into the bearings.

4. LICENSING

4.1 OVERVIEW

MBScope use is restricted through licensing primarily to prevent failure or damage to SKF magnetic bearing systems due to misuse of the software.

There are two standard MBScope licenses available:

- Basic License
- Certified User License

Figure 11 describes the availability of each MBScope Tool based on the license granted.

4.2 LICENSE FILES

Licensing is controlled using a license file that is installed for a specific Windows User Account using the *SKF License Manager*. Restricting the license file to a particular user account allows different users on the same PC to have different MBScope privileges.

For example, ‘User A’ may be an applications engineer responsible for tuning new magnetic bearings thus requiring certified user access to MBScope, while ‘User B’ may be a technician who monitors the system from time to time but does not need to change anything, therefore requiring only minimal access to MBScope.

4.3 BASIC LICENSE

Contact SKF to receive a basic license key free of charge. In general, only basic features are permitted with a basic license.

This is the recommended privilege level if you only wish to view data from the magnetic bearings and avoid making inadvertent changes to the system.

4.4 CERTIFIED USER LICENSE

A certified user license is typically granted to OEMs capable of commissioning and servicing a magnetic bearing product purchased from SKF Magnetics Bearings.

Since the certified user license permits modification of system parameters, it is strongly recommended that this license is distributed only to individuals properly trained to tune or maintain the SKF magnetic bearing system.

4.5 LICENSE FILE INSTALLATION

If you received a license key with your copy of MBScope, then you should first install it using the SKF License Manager prior to using MBScope. *Please refer to the SKF License Manager User’s Guide (SKF# 892-0095) for information.*

4.6 ADD-ON LICENSES

Custom engineered MBScope tools may require a unique license in addition to the standard MBScope licenses. In this case the appropriate product key may be requested or purchased from SKF Magnetic Bearings.

	MBScope® Tools	Certified User	Basic
MONITORING	Orbits	✓	✓
	Snapshots	✓	✓
DIAGNOSIS	Event Viewer	✓	✓
	Trending	✓	X
COMMISSIONING & SERVICE	Control Panel	✓	X
	Firmware Loader	✓	✓
	Parameter Loader	✓	X
	Calibration	✓	X
	Service Panel (Transfer function)	✓	X

Figure 11 – MBScope License and Tool Availability

5. APPLICATION LAUNCHER

5.1 OVERVIEW

The Application Launcher provides a quick and convenient interface for launching MBScope Tools directly from the desktop or the system tray.

5.2 LAUNCHER TOOLBAR

The Launcher Toolbar provides quick and convenient interface to launch MBScope Tools directly from the desktop.

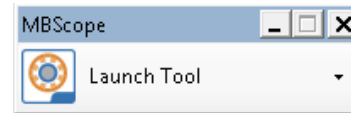



Figure 12 – Launcher Toolbar

To launch MBScope Tools from the toolbar, click on the “Launch Tool” button and select the desired tool.

To configure the toolbar or launch special features click on the  icon and select one of the menu items described below:

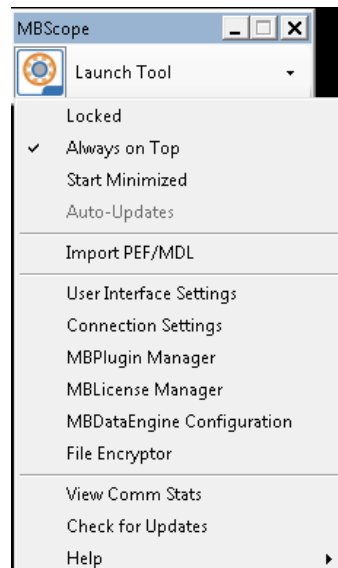


Figure 13 – Toolbar Options

- *Locked* – Prevents the toolbar from being moved
- *Always on Top* – Maintains the toolbar as the top most window
- *Start Minimized* – Starts the launcher in the system tray
- *Auto-Updates* – Enables or disables automatic checking for MBScope updates
- *Import PEF/MDL* – Allows an MBScope PEF or MDL file to be imported
- *User Interface Settings* – Launches the User Interface Connection Dialog (Section 8)
- *Connection Settings* – Launches the Communication Settings Dialog (Section 6)
- *MBPlugin Manager* – Launches the MBScope Plugin Manager
- *MBLicense Manager* – Launches the MBScope License Manager
- *MBDataEngine Configuration* – Opens a dialog for configuring the MBScope server
- *View Comm Stats* – Displays communications statistics
- *Check for Updates* – Check for MBScope updates
- *Help/About* – Shows the MBScope About Box


Note: When the Launcher Toolbar is closed, the Launcher System Tray Icon will remain available.


5.3 LAUNCHER SYSTEM TRAY ICON


The Launcher System Tray Icon provides quick and convenient interface to launch MBScope Tools directly from the system tray.



Figure 14 – System Tray Icon

To launch MBScope Tools from the system tray, **left-click** on the  system tray icon and select the desired tool.

To restore the Launcher Toolbar when it is minimized, **double-click** on the  system tray icon.

To shut down the Application Launcher, **right-click** on the  system tray icon and select **Exit**.

6. CONNECTION SETTINGS

6.1 OVERVIEW

The Connection Settings dialog allows you to configure MBScope communications. It can be launched directly from the [Application Launcher](#) or from within most MBScope tools. The dialog consists in drop down menu with each type of vendor controller architecture.

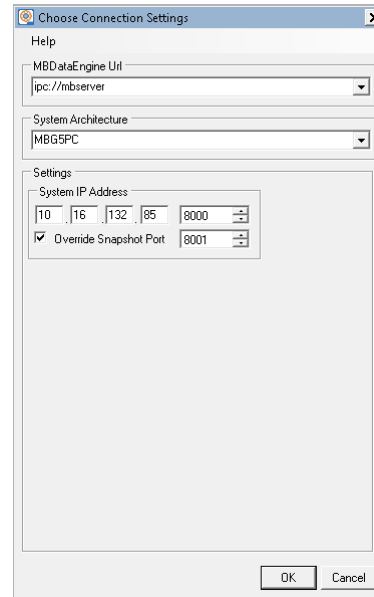


Figure 15 – Connection Settings Dialog

6.2 MBDATAENGINE URL

The MBScope Server Path is the network path on which the MBScope server resides. Normally, the MBScope server resides on the same computer as the client tools, so this should be configured to **ipc://mbserver**.

6.3 SYSTEM ARCHITECTURE

The System Architecture allows the user to connect to various SKF controller types. For use with the G5 system, this should be set to **MBG5PC**.

6.4 SETTINGS

The following communication options can be configured for MBG5 controllers:

System Connection	
System IP Address	The IP address and port of the MBG5PC
Override Snapshot Port	The port that the controller will send snapshot packets to. Leave unchecked for an automatic port.

7. COMMON MBSCOPE.NET TOOL FEATURES

7.1 OVERVIEW

This section describes features that are common to most MBScope Tools.

7.2 STANDARD USER INTERFACE

The standard MBScope user-interface may consist of a *File Drop Down Menu*, a *Toolbar*, a *Cursors* box and a *Connection Status Bar*.

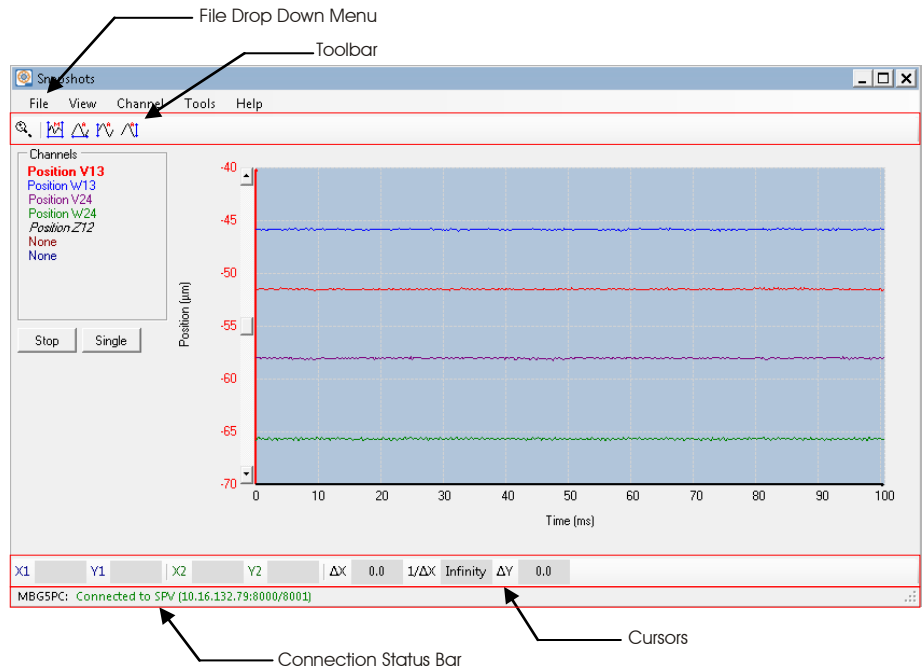


Figure 16 – Standard User Interface

7.3 CONNECTION

When a MBScope Tool is launched, it will automatically attempt to connect to the default controller.

If the connection fails, the [Connection Settings Dialog](#) will automatically open up. You can also open up the [Connection Settings Dialog](#) by selecting the **File | Connect** menu option.

The *Connection Status Bar* located at the bottom of the window indicates the connection status of the MBScope Tool.

7.4 AUTO SCALE

The *Auto Scale* tools allow you to automatically scale a graph for best-fit based on the displayed data. The exact outcome of auto-scaling may vary slightly depending on the MBScope Tool being used. The *Auto Scale* tools can be accessed from the

Tools menu or by clicking one of the or toolbar icons.

7.5 SET SCALES

The *Set Scales* dialog allows you to manually change the extents of a graph. It can be accessed from the **Tools** menu, by clicking the or toolbar icons, or by right-clicking an axis line on the graph.

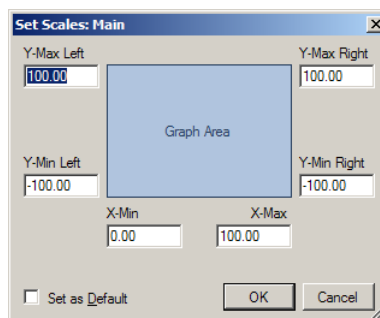


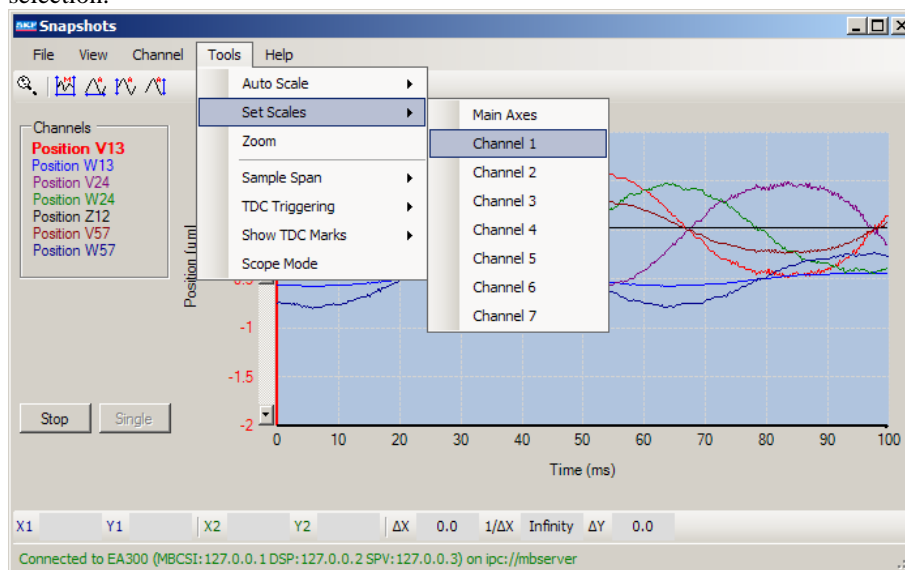
Figure 17 – Set Scales Dialog

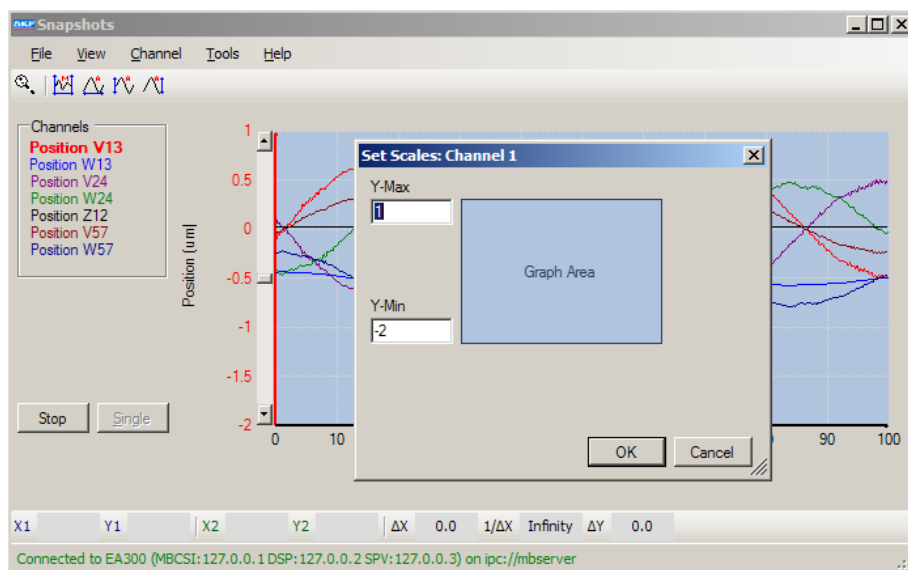
Some tools (ie. Snapshots) allow you to define a different Y-axis scale per-channel from the **Tools | Set Scales | Main Axes** menu option.

You can change the default scale for a particular type of channel by checking the “Set as Default” checkbox. The default scales for each applicable MBScope Tool are saved to disk and restored each time you use the tool.

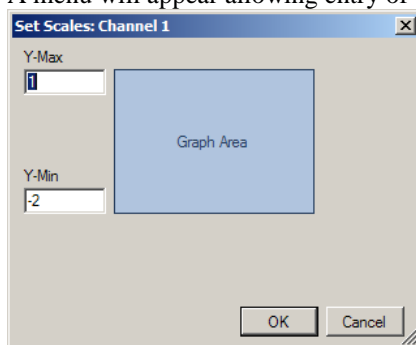
7.6 SETTING SCALES FOR INDIVIDUAL CHANNELS

To set scales of individual channels, select the **Tools | Set Scales | Channel x** selection.





A menu will appear allowing entry of the Y scale for the selected axis.



7.7 PANNING

You can pan a graph by sliding the horizontal or vertical scrolls bars located at the edges of the graph.

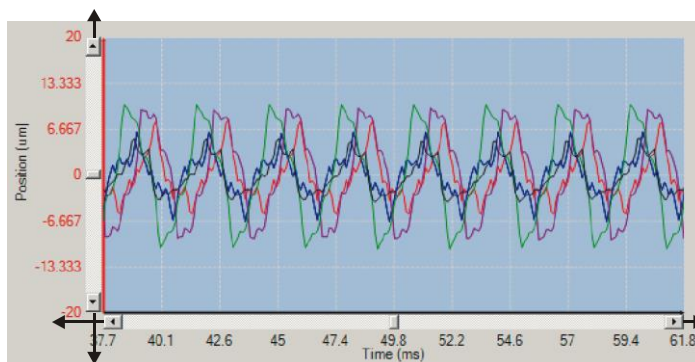



Figure 18 – Panning

7.8 ZOOMING

For MBScope Tools supporting zooming, you can enter zoom mode from the **Tools** menu, by clicking the  toolbar icon or by pressing 'z' on the keyboard. Once in zoom mode, zooming is achieved using click-once or drag-and-drop zooming.

7.8.1 CLICK-ONCE ZOOMING

For *Click-Once Zooming*,

- Left-click on a point within the graph to zoom 2x toward that location.
- Right-click on a point within the graph to zoom out 2x from that location.

7.8.2 DRAG-AND-DROP ZOOMING

For *Drag-And-Drop Zooming*,

- To zoom in to a specific area on the graph, left-click and drag the magnifying glass from the top of the desired area to the bottom of the desired area.
- To zoom out from a specific area on the plotter, left-click and drag the mouse from the bottom of the desired area to the top of the desired area.

7.9 CURSORS

Cursors are used to capture coordinate data from a graph when data collection is stopped.

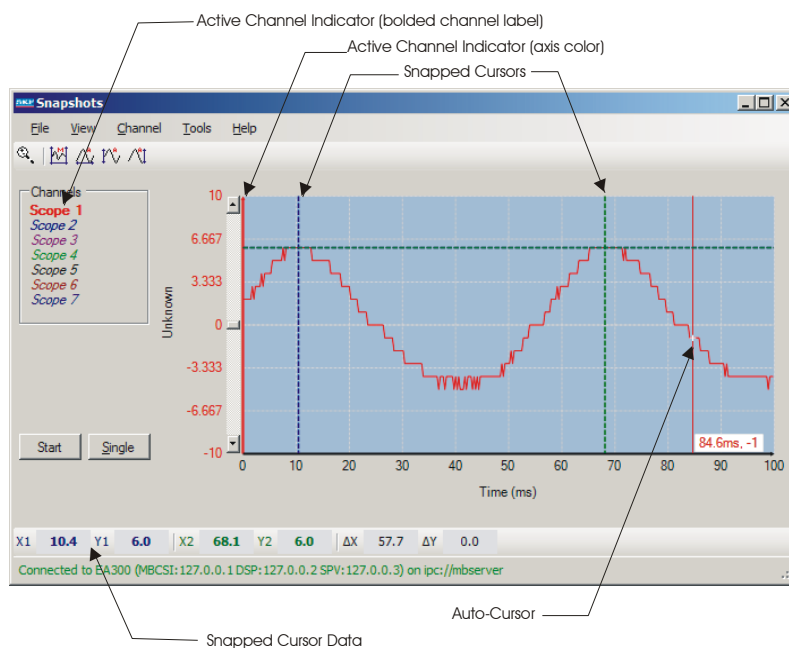


Figure 19 – Cursors

7.9.1 ACTIVE CHANNEL

The *Active Channel* is the channel whose data values are represented by the cursors. The *Active Channel* can be changed by left-clicking the associated channel label or the channel plot within the graph. It is indicated primarily by the color of the vertical axis within the graph (or sometimes by a bolded label) as per Figure 19.

7.9.2 AUTO CURSOR

The *Auto-Cursor* automatically locks onto the data coordinates closest to the mouse position of the *Active Channel*. For clarity, the color of the *Auto-Cursor* is the same as the *Active Channel* color.

7.9.3 SNAPPED CURSOR

There are two available *Snapped Cursors* (blue and green) that can be manually snapped to data coordinates. To snap a cursor in place:

1. Move the *Auto-Cursor* to the desired location
2. Click the right-mouse button to bring up the cursors pop-up menu
3. Select the desired cursor to snap to the selected coordinates of the *Active Channel*.

Once a cursor is snapped in place, the cursor's coordinates are displayed in the cursors Box.

7.10 CLEARANCE LIMITS

The following MBScope tools allow the ISO vibration limits and/or API clearance limits to be displayed:

- Calibration
- Snapshots
- Trending
- Orbits

The limits can be enabled and disabled from the Tools menu of each MBScope program.

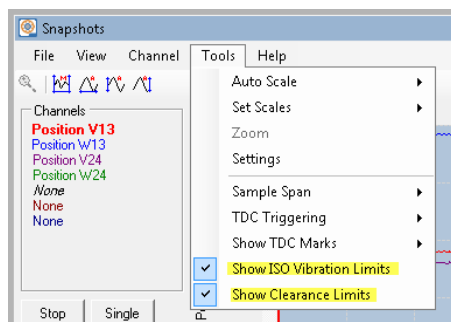


Figure 20 – ISO/API Limits in Tools Menu

8. MBScope.NET USER INTERFACE SETTINGS

8.1 OVERVIEW

This section describes the configurable User Interface Settings available to the MBScope Tools.

These options are brought up in each MBScope Tool, by selecting the 'Setting' options in the 'Tools' menu, or in the Launcher.

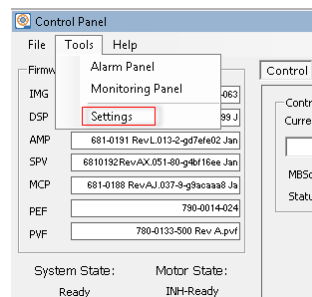


Figure 21 – User Interface Settings : Location in MBScope Tools

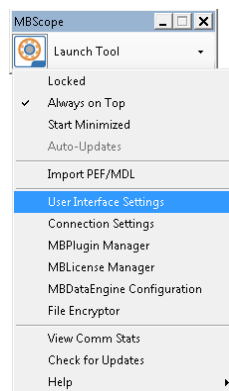


Figure 22 – User Interface Settings : Location in MBScope Launcher

8.2 LANGUAGE



Figure 23 – User Interface Settings : Language Options

This menu will allow the user to select the language that MBScope will use to display messages to the user.

8.3 STATUS BAR

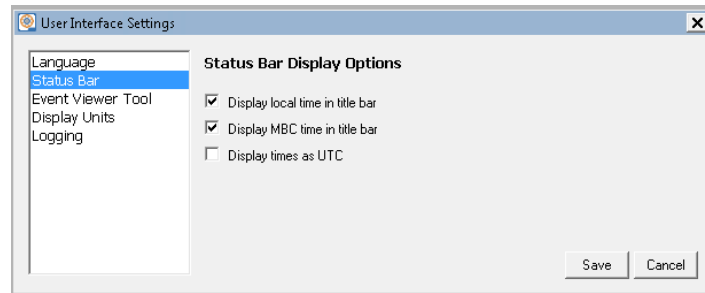


Figure 24 – User Interface Settings : Status Bar Options

This menu will select what information will be provided on the status bar of each MBScope Tool.

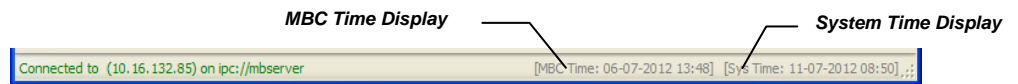


Figure 25 – User Interface Settings : Status Bar Options Example

UTC stands for 'Coordinated Universal Time', and is a time-zone independent value.

8.4 EVENT VIEWER TOOL

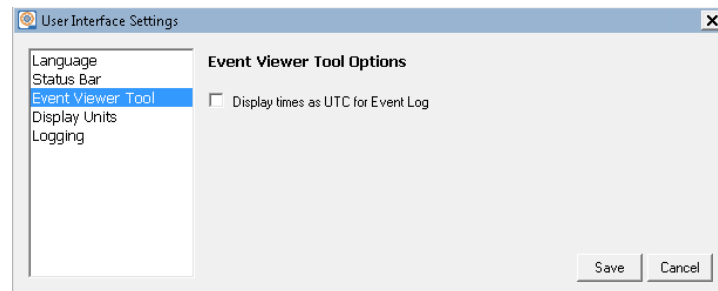


Figure 26 – User Interface Settings : Event Viewer Tool

This menu provides the option of displaying the Event Log times in UTC format.

9. CONTROL PANEL

9.1 RESTRICTIONS

This tool is subject to licensing restrictions. See the section on [licensing](#) for more information.

9.2 OVERVIEW

The Control Panel is a basic system monitoring and control command tool. It allows the user to command the system, and to configure analog outputs for debugging / monitoring.

The user can monitor the following system status parameters and registers through this main panel:

- **Firmware Version:** The firmware version currently installed.
- **System State:** The levitation state of the system.
- **Motor State:** The rotation state of the system.
- **Motor Control:** Control buttons for Levitation and Rotation
- **Alarm Log:** A list of system alarms
- **Control Mode:** The current control mode of the controller
- **Store Parameters to Permanent Memory:** Allows parameters to be written to the controller's permanent memory

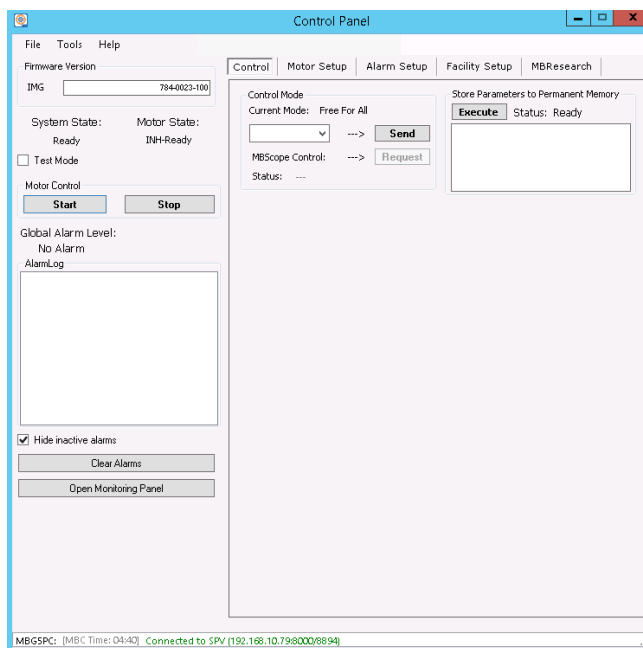


Figure 27 – Control Panel(Certified User)

9.3 CONTROL COMMANDS (Certified Feature)

The Control Panel allows the user to issue the following Control Command requests to the controller:



- **Motor Control:** Levitate / de-levitate the rotor and start the motor.
- **Clear Alarms:** Clear latched alarms.
- **Test Mode:** Place the controller into test mode (rotation inhibited)

In addition, the Control Panel will allow the user to set the *Control Mode*. Valid selections are:

- **Hardwire:** Control is made by MBScope
- **Request:** Control must be requested by MBScope or the controller panel
- **Free For All:** Control is made by both MBScope and the controller panel

Note that monitoring information is always available while in any mode.

9.4 MBRESEARCH

The 'MBResearch' tab of the Control Panel allows the user to select and configure the DAC outputs that are available on the optional MBResearch component.

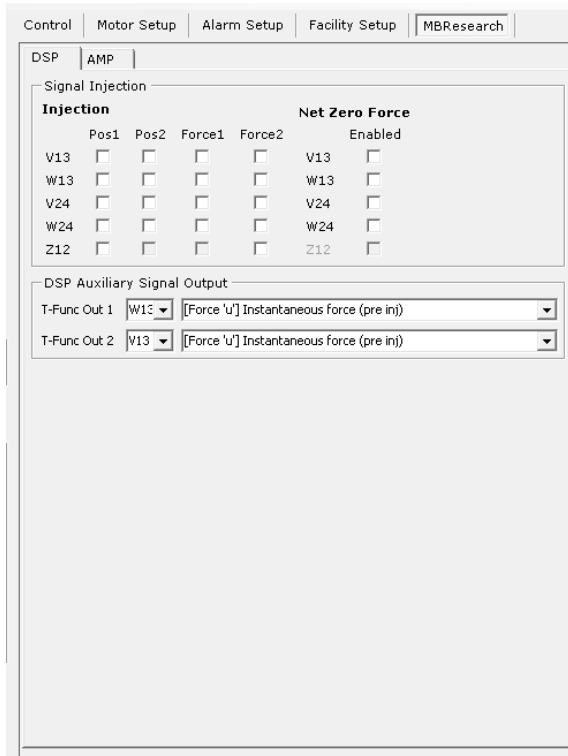


Figure 28 – Control Panel : MBResearch Tab

9.5 TOOLS

There are several Tool options available in the Control Panel:

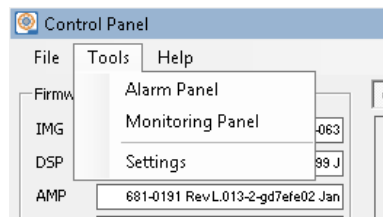


Figure 29 – Control Panel : Tools Menu

Alarm Panel:

Opens the Alarm Panel window

Monitoring Panel:

Opens the Monitoring Panel window

Settings:

The 'Settings' Menu Option will bring up the User Interface Dialog box, as described in Section 8.

9.6 MONITORING

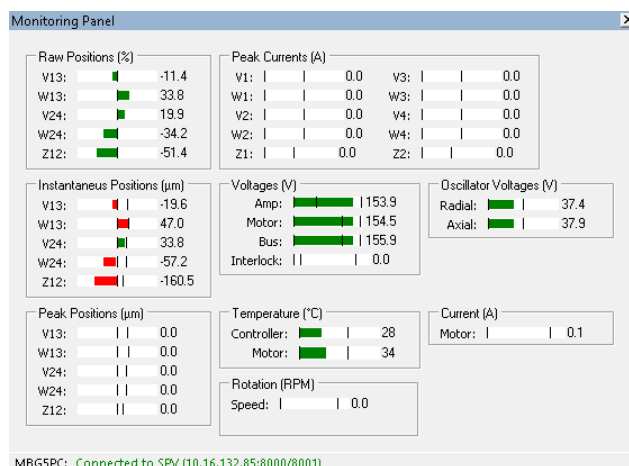


Figure 30 – Control Panel : Monitoring

The Monitoring Panel is used to observe the following analog values, at a refresh rate of about 1Hz:

- **Raw Positions:** Rotor positions as a percentage of their full scale value
- **Instantaneous Positions:** Rotor positions measured in micrometers
- **Peak Positions:** Peak rotor positions (over the last 2 seconds)
- **Peak Currents:** Peak amplifier currents (over the last 2 seconds)
- **Voltages:** Amplifier, motor, bus, and analog interlock voltage
- **Oscillator Voltages:** Oscillator voltage
- **Current:** Motor Drive current
- **Temperature:** Controller and motor temperature
- **Rotation:** Rotating speed of the rotor

9.7 ALARMS

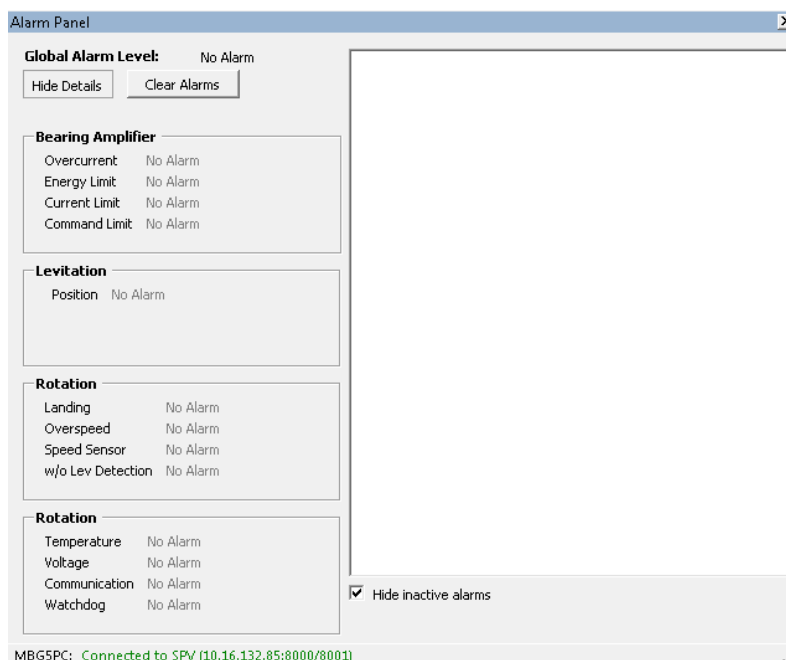


Figure 31 – Control Panel : Alarms

The Alarm Panel is used to observe the following fault information from the MBC. It

is updated at a refresh rate of about 1Hz.

- **Bearing Amplifier – Overcurrent:** The amplifier is experiencing a short circuit event that is causing the output of the amplifier to exceed a hardware shutdown limit.
- **Bearing Amplifier – Energy Limit:** The amplifier output has exceeded the maximum energy design limits and is now actively being limited.
- **Bearing Amplifier – Current Limit:** The amplifier has reached the maximum designed current output and is now actively being limited.
- **Bearing Amplifier – Command Limit:** The amplifier has reached the maximum command current (no action is taken)

- **Levitation – Position:** The shaft has exceeded the maximum position deviation criteria at nominal (running speed) frequency.

- **Rotation – Landing:** The shaft has exceeded the position threshold during a pre defined time.
- **Rotation – Overspeed:** The speed of the rotor has exceeded the maximum designed speed.
- **Rotation – Speed Sensor:** Rotation information status has been sent by the PLC or MBScope, but the speed sensor does not detect rotation.
- **Rotation – w/o Lev Detection:** Rotation of the shaft has been detected by the DSP or SPV without being levitated.

- **Interlocks – External Fault:** The external fault input has been triggered.

- **System - Temperature:** The indicated temperature (AMB1, AMB2, or PCB) has exceeded the specified limits. It may also indicate that the temperature switch in the machine has triggered.
- **System – Voltage:** This indicates if the main voltage is within the specified limits.
- **System – Communication:** The SPV is unable to communicate with either the amplifier DSP or the position control loop DSP
- **System – Watchdog:** A watchdog alarm has occurred and the corresponding DSP has been reset.

10. EVENT VIEWER

10.1 OVERVIEW

The Event Viewer Tool is used to download and display Alarm Snapshot events (generated by the MBC), and to view the event logs of the MBC in real time.

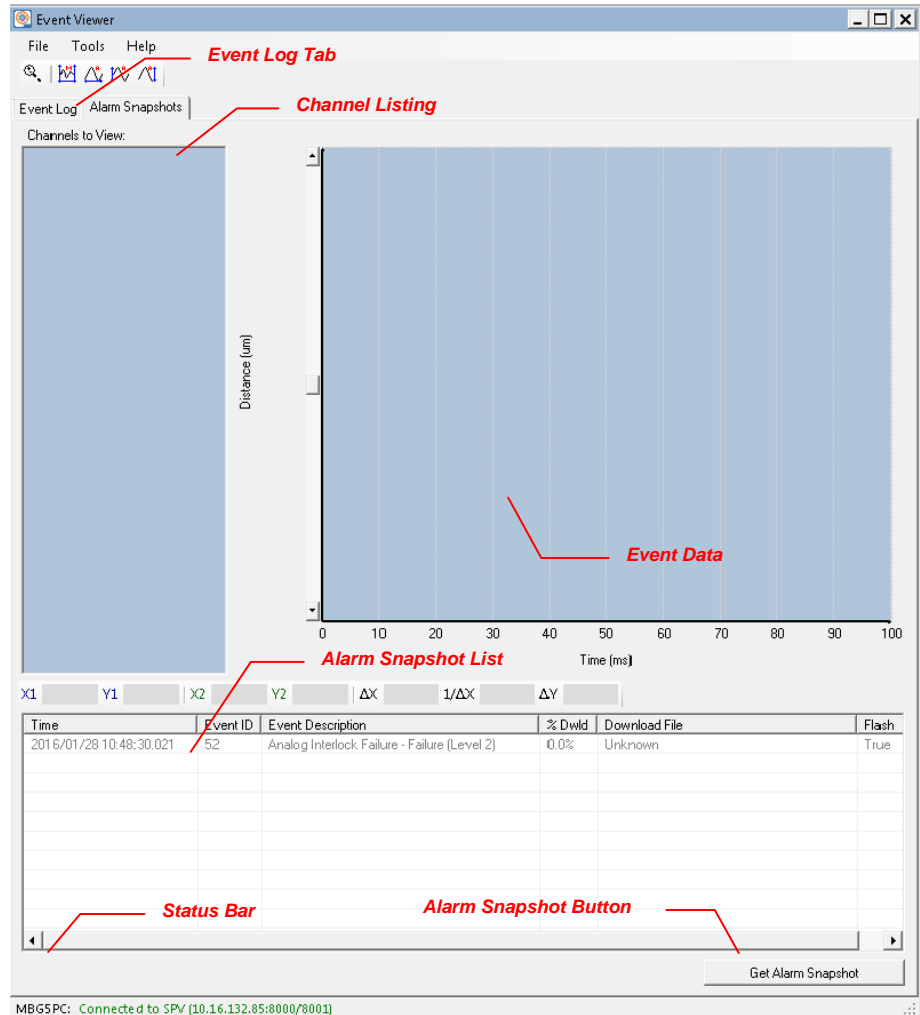


Figure 32 – Event Viewer

10.2 ALARM SNAPSHOT FEATURES

The Alarm Snapshot display is used to show the state of the MBC during an alarm event. These alarm events are generated when a Level 3 alarm is triggered. One alarm snapshot may be stored in the MBC at a given time.

To view a particular alarm snapshot, first click on the desired event, and then click the 'Get Alarm Snapshot' button. This will download the event from the MBC.

Time	Tag ID	Tag Description	Event ID	Event Description	% Loaded
2012/07/03 02:47:00.137	3	Trip (Level 3)	37	Bearing Temperature Z1	3%
2012/07/03 02:48:00.149	3	Trip (Level 3)	37	Bearing Temperature Z1	3%
2012/07/03 02:49:00.142	3	Trip (Level 3)	37	Bearing Temperature Z1	3%
2012/07/03 02:51:00.161	3	Trip (Level 3)	37	Bearing Temperature Z1	3%
2012/07/03 02:54:00.209	3	Trip (Level 3)	37	Bearing Temperature Z1	100%
2012/07/03 02:54:00.186	3	Trip (Level 3)	37	Bearing Temperature Z1	3%
2012/07/03 02:59:00.028	3	Trip (Level 3)	37	Bearing Temperature Z1	3%
2012/07/03 03:00:00.121	3	Trip (Level 3)	37	Bearing Temperature Z1	3%

Figure 33 – Event Viewer : Alarm Snapshot Selection

The data is then shown in the graph, defaulting to showing the position values. Additional channels can be selected from the channel listing on the left.

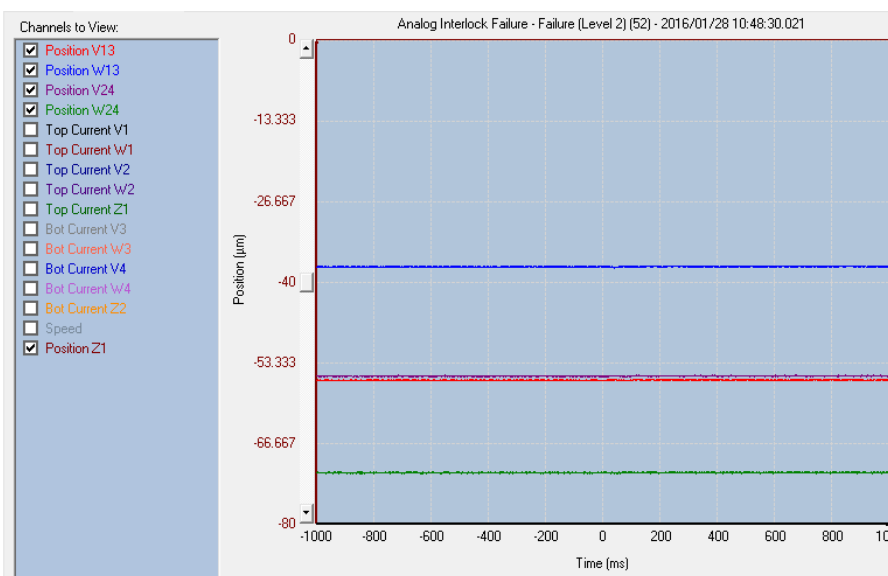


Figure 34 – Event Viewer : Alarm Snapshot Data

This information can then be saved for off-line viewing or for sending to a third party via the ‘Save Snapshot As...’ File Menu Option as shown below.

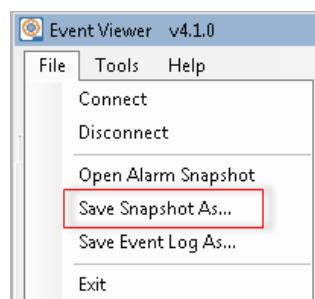


Figure 35 – Event Viewer : Save Snapshot

10.3 EVENT LOG FEATURES

The Event Log displays the events that are happening in the MBC. There are several features that control the way the tool interacts with the controller.

Seq	Time	Type	Event Description	Status Description
0346	2016/01/27 11:26:10.816	Alarm	Comm Fault: SPV-AMP	Failure (Level 2)
0347	2016/01/27 11:26:10.716	Alarm	Comm Fault: SPV-MCP	Failure (Level 2)
0348	2016/01/27 11:26:10.416	Alarm	Comm Fault: SPV-DSP	Failure (Level 2)
0349	2016/01/27 11:22:21.596	Alarm	Reference Input Loss	Warning (Level 1)
0350	2016/01/27 11:22:21.596	Alarm	Motor Temperature	Warning (Level 1)
0351	2016/01/27 11:22:21.596	Alarm	Motor bus: Over Current	Warning (Level 1)
0352	2016/01/27 11:22:21.288	ControlCmd	Clear all Warning/Trip/Trip Plus Alarms - Local (Front Panel)	Action Complete
0353	2016/01/27 11:21:07.306	Alarm	Overspeed	Failure (Level 2)
0354	2016/01/27 11:21:07.306	Alarm	Reference Input Loss	Warning (Level 1)
0355	2016/01/27 11:21:04.785	ControlCmd	Coast Off command	Action Complete
0356	2016/01/27 11:21:04.605	Alarm	Motor Temperature	Warning (Level 1)
0357	2016/01/27 11:21:04.605	Alarm	Motor bus: Over Current	Warning (Level 1)
0358	2016/01/27 11:21:04.605	Alarm	MCP Checksum Err	Failure (Level 2)
0359	2016/01/27 11:21:02.895	ControlCmd	Firmware download mode off (global)	Action Complete
0360	2016/01/27 11:21:02.535	Information	Power Up	N/A
0361	2016/01/27 11:20:53.313	Information	Power Down	N/A
0362	2016/01/27 11:20:53.083	Alarm	Comm Fault: SPV-MCP	Failure (Level 2)
0363	2016/01/27 11:18:41.740	Alarm	Overspeed	Failure (Level 2)
0364	2016/01/27 11:18:41.740	Alarm	Reference Input Loss	Warning (Level 1)
0365	2016/01/27 11:18:39.220	ControlCmd	Coast Off command	Action Complete
0366	2016/01/27 11:18:39.040	Alarm	Motor Temperature	Warning (Level 1)
0367	2016/01/27 11:18:39.040	Alarm	Motor bus: Over Current	Warning (Level 1)
0368	2016/01/27 11:18:39.040	Alarm	MCP Checksum Err	Failure (Level 2)
0369	2016/01/27 11:18:37.329	ControlCmd	Firmware download mode off (global)	Action Complete
0370	2016/01/27 11:18:36.969	Information	Power Up	N/A
0371	2016/01/27 10:12:10.939	Information	Power Down	N/A
0372	2016/01/27 10:12:10.901	Alarm	AMP bus: Under Volt	Failure (Level 2)
0373	2016/01/27 10:12:10.760	Alarm	Comm Fault: SPV-MCP	Failure (Level 2)
0374	2016/01/27 10:12:06.647	ControlCmd	Run On command - Local (Front Panel)	Action Complete
0375	2016/01/27 10:12:05.762	Alarm	Motor is Inhibited	Warning (Level 1)
0376	2016/01/27 10:12:05.337	ControlCmd	Run Off command - Local (Front Panel)	Action Failed
0377	2016/01/27 10:12:04.542	Alarm	Rotation Detection - DSP	Warning (Level 1)
0378	2016/01/27 10:12:04.224	ControlCmd	Clear all Warning/Trip/Trip Plus Alarms - Local (Front Panel)	Action Complete
0379	2016/01/27 10:12:00.561	Alarm	Rotation Detection - DSP	Warning (Level 1)
0380	2016/01/27 10:11:56.245	ControlCmd	Run Off command - Local (Front Panel)	Action Failed
0381	2016/01/27 10:11:56.160	Alarm	Rotation Detection - SPV	Warning (Level 1)
0382	2016/01/27 10:11:38.736	ControlCmd	Run On command - Local (Front Panel)	Action Complete

Figure 36 – Event Viewer : Event Log

Commands

- **Auto Refresh:** Checks for new events from the MBC, about once per second. Any new events are automatically appended to the end of the log.
- **Get Event Log:** Instead of waiting for an update, force a download of any new events from the MBC.
- **Clear Displayed Events:** Clears all events currently displayed in the event log.
- **Re-Download All Events:** Will re-download all events currently stored on the MBC. It is recommended to clear the event log view before re-downloading all events; otherwise duplicates may appear in the list.

Menu Options

- **File -> Save Event Log As...:** This will save the event log in ASCII text format, consistent with SKF MBScope documentation 994-0118-002.

11. SNAPSHOTS

11.1 OVERVIEW

The Snapshots Tool displays windowed data from the magnetic bearing system in real-time. Signals can be viewed in the time domain, in the frequency domain, or as statistics in tabular form.

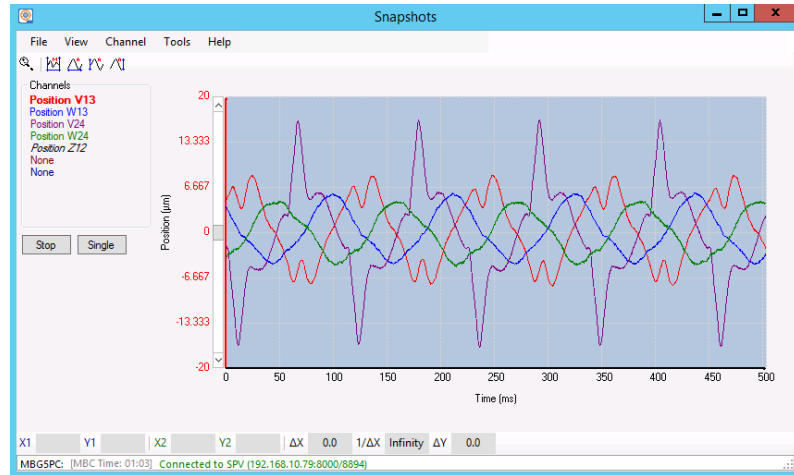


Figure 37 – Snapshots Tool

11.2 COMMON FEATURES

Please refer to the section on [Common Features](#) for more information on cursors, panning, scaling and zooming.

11.3 VIEW MENU

To select the type of graph to be viewed, select the **View** menu. Select **Snapshots** for the time domain, **Spectrum** for the frequency domain, or **Statistics** for data on the selected channels in tabular form.

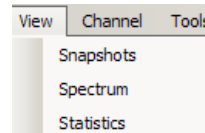


Figure 38 – Snapshots View Menu

11.4 CHANNEL SELECTION

There are two ways to select the desired channels to view.

11.4.1 CHANNEL TYPE SELECTION

A channel type (ie. positions, top currents and bottom currents, etc.) can be selected from the **Channel** menu. Once a type selection is made, all snapshot channels will change to display the selected channel type.

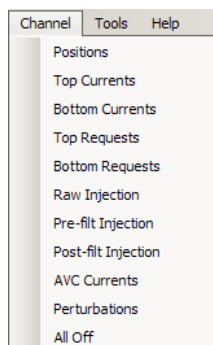


Figure 39 – Channel Type Selection

11.4.2 DETAILED CHANNEL SELECTION

Each channel can also be changed individually by right-clicking the channel that you want to change and selecting a new channel type and axis from the context-menu. Only two unit types (um, A, V, etc.) can be displayed at any given time.

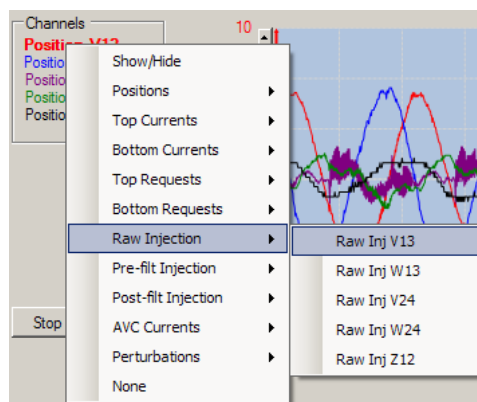


Figure 40 – Detailed Orbit Selection

11.4.3 SHOWING/HIDING CHANNELS

You can show or hide a channel from view by clicking the middle-mouse button on the channel label or by right-clicking on the channel label and selecting the **Show/Hide** menu option. If a particular channel has been hidden, MBScope will continue to collect data for that channel but will not display it on the screen.

11.4.4 DISABLING CHANNELS

You can disable all channels by selecting the **Channels | All Off** menu option or an individual channel by selecting **None** from the right-click context-menu. When a channel has been disabled, MBScope will stop collecting data for that channel.

11.5 SNAPSHOTS VIEW

In Snapshots View, signals are displayed in a time-domain window.

11.6 SPECTRAL VIEW

In Spectral View, signals are displayed in the frequency domain

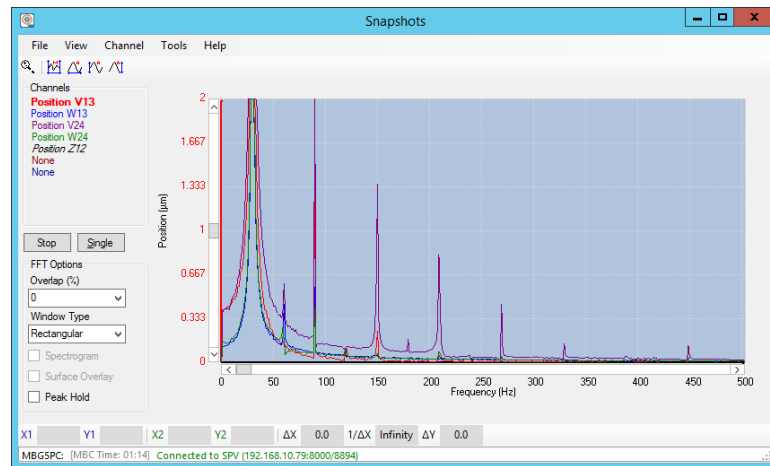


Figure 41 – Snapshots - Spectral View

The spectral resolution can be adjusted using the **Tools | Spectral Resolution** menu option.

Note: At 1 Hz spectral resolutions, the maximum number of channels that can be displayed may be limited.

Note: Due to constraints of the controller's sampling frequency and the FFT algorithm, the displayed spectral resolution will not always match the selected resolution exactly.

11.7 STATISTICS VIEW

In statistics view, statistical functions are applied to the sample window and the resulting mean, standard deviation and peak to peak values for each axis are displayed in tabular form.

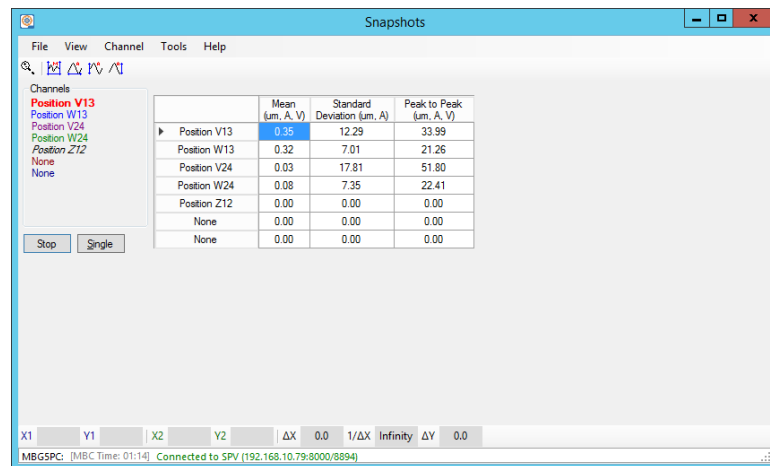


Figure 42 – Snapshots - Statistics View

11.8 TDC VIEWING AND TRIGGERING

TDC Viewing and Triggering can be toggled on or off using the **Tools | Show TDC Marks** and **Tools | TDC Trigger** menu options.

When **Show TDC Marks** is toggled on, the TDC marks are displayed on the graph.

Enabling *TDC triggering* will synchronize the snapshots with the TDC marks.

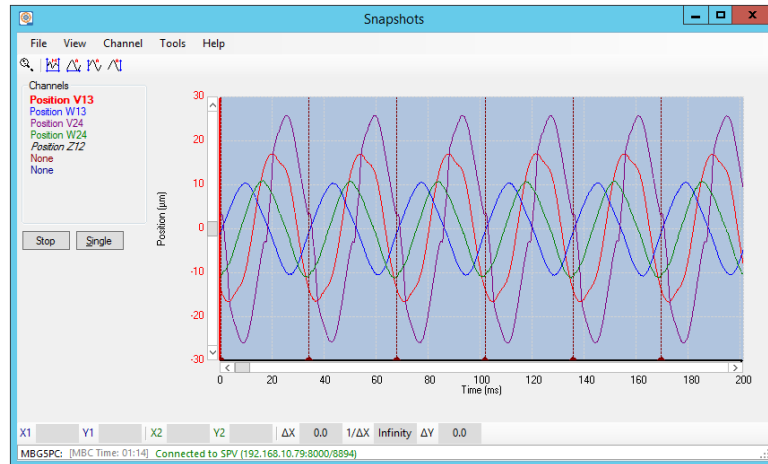


Figure 43 – Snapshots with TDC triggering

These options are only available in the *Snapshots* view.

12. ORBITS

12.1 OVERVIEW

The Orbits tool displays information about the speed and orbit of the shaft in real-time.

Screenshot:

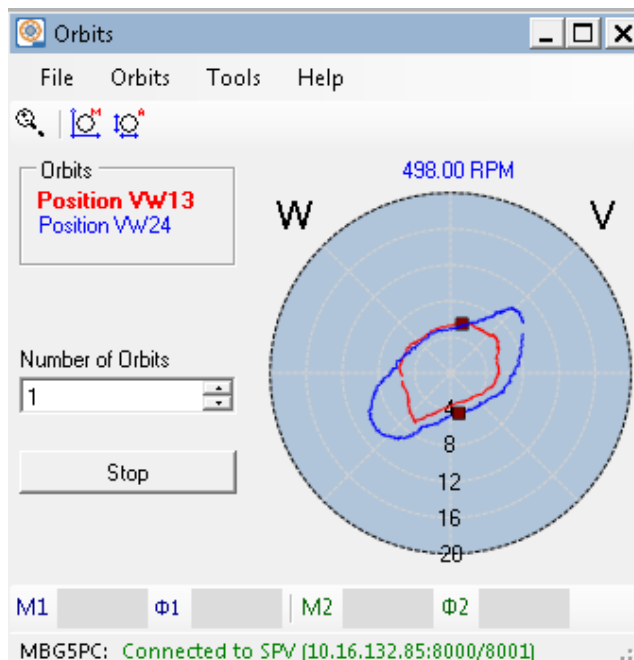


Figure 44 – Orbits Tool

12.2 NUMBER OF ORBITS

The **Number of Orbits** can be specified in the tool. This setting changes the *persistence*, or number of orbits that are drawn at the same time.

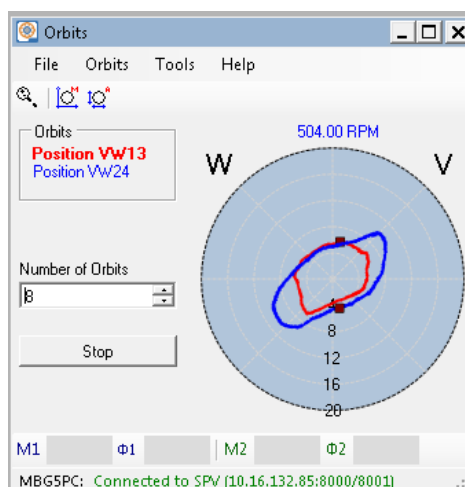


Figure 45 – Orbits: Multiple Orbits

12.3 TOOLS MENU

The Tools menu allows filtering, AC coupling, and the display of ISO Vibration and clearance limits to be enabled.

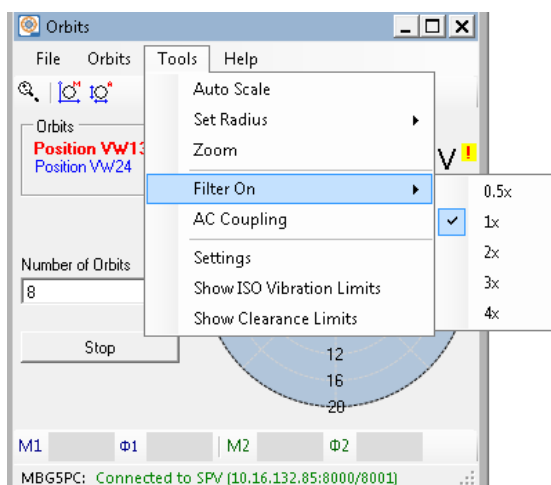


Figure 46 – Orbits Tools Menu

12.4 COMMON FEATURES

Please refer to the section on [Common Features](#) for more information on cursors, panning, scaling and zooming.

13. TRENDING TOOL

13.1 OVERVIEW

Trending is a powerful and easy-to-use data acquisition and viewing tool.

Data gathered by the controller can be trended in several ways, known as High-speed trending, Transient Capture, and Low-speed trending.

Previously collected data can be viewed in the [Data Collection Viewer](#).

13.2 COMMON FEATURES

Please refer to the section on [Common Features](#) for more information on cursors, panning, scaling and zooming.

13.3 TREND FILE INFORMATION

The *Trend File Information* box allows you configure the trend file and related options.

Figure 47 – Trend Information Box

13.3.1 TREND FILES

Trend files are generated automatically when the trend data size exceeds **500 MB** or when a trend is complete. Each trend file is named following the convention `<DataFolder>\<FilePrefix>yyyyMMdd-HHmms.tsd` where

yyyy= Year including century
MM = Month
dd = Day
HH = Hour in 24 hour time format
mm = Minutes and
ss = Seconds.

The format of a trend file can be found in the Trending Snapshot Data File Format document, (SKF# 994-0118-001).

13.3.2 DATA FOLDER

The Data Folder defines the repository where all trend files will be saved. Enter the path of the data folder directly into the **Data Folder** text box or by using the **Browse...** button.

13.3.3 FILE PREFIX

All Trend Files are prefixed with the File Prefix defined.

13.3.4 TREND DURATION

The Trend Duration box allows you to change the duration of the trend.

13.3.5 FILE SIZE

Once all trend parameters are configured, the estimated total trend file size is displayed next to the file name.

13.3.6 SAMPLING TYPE

The sampling type can be set to either High Speed ([Real-Time Trending](#)), or Low Speed ([Low Speed Trending](#)).

13.4 CHANNEL COLLECTION SETUP

Channels to be trended are selected using the **Channel Collection Setup** box.



Figure 48 – Channel Collection Setup

The tree structure on the left is used to navigate through all available channels. Clicking on a [+] will expand the tree showing the signals available for that category. To add a channel (or channel group), either double-click on the channel name (or channel group), or highlight and click the **Add->** button. Once added, the selected channel(s) will appear in the **Triggered / Collected** box. To remove a channel, highlight and click the **<-Remove** button. You can also add or clear all channels by clicking the **Add All** or **Clear** buttons.

Note: Warnings may be given if you exceed the recommended maximum number of channels. Ignoring these warnings may result in lost packets during the data trend.

13.5 SAMPLE FREQUENCY

The Sample Frequency selection determines how often the data is acquired. It is not available in the High Speed sampling mode.

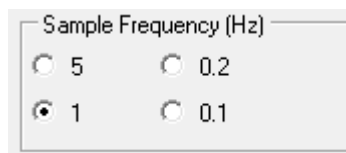


Figure 49 – Sample Frequency

13.6 HIGH SPEED TRENDING

High Speed trending allows you to capture data at the highest resolution permissible by the controller. It is generally used for capturing a segment of high frequency data.

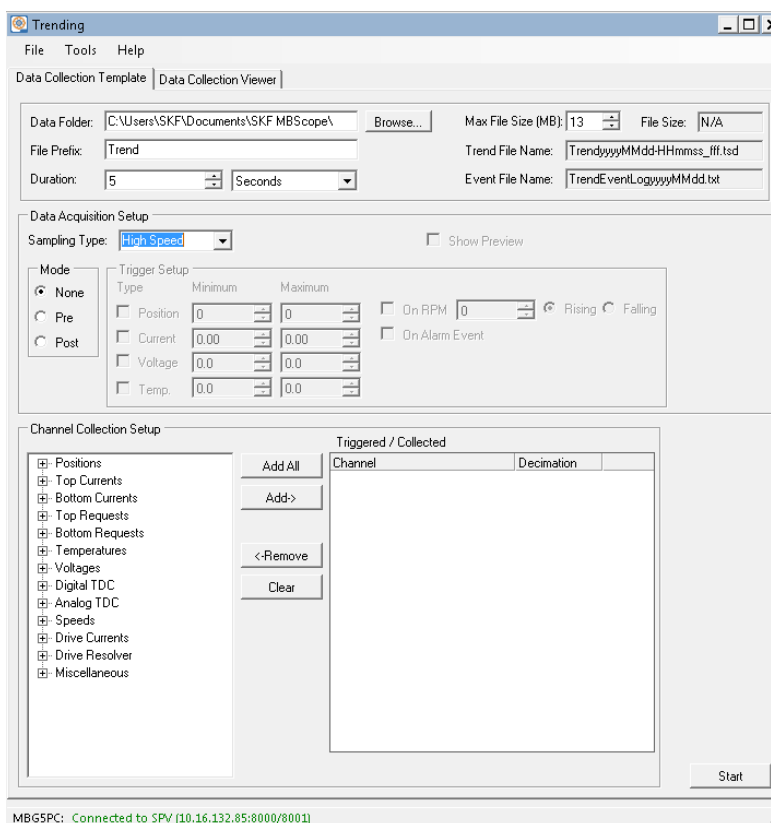


Figure 50 – High Speed Trending Setup

The maximum number of channels that can be collected in real-time trending mode is controller dependent. On a MBG5 controller, up to twenty (20) channels can be collected for an indeterminate amount of time.

To set up a *high speed trend*, first enter relevant information in the [Trend File Information box](#).

Next, choose a set of signals to collect using the [Channel Collection Setup box](#) and set the [Sample Frequency](#) to MAX.

To begin trending, press the **Start** button. A monitoring window will appear until trending is complete.

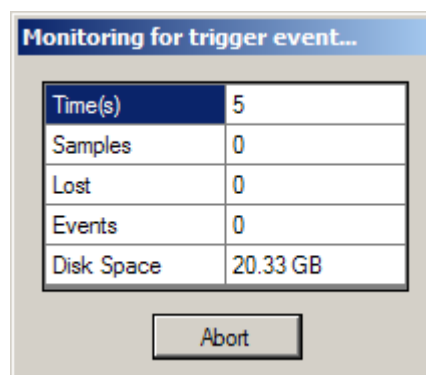


Figure 51 – Monitoring for Trigger Conditions

Once trending is complete, the trend data is automatically saved to disk and can be viewed using the [Data Collection Viewer](#) screen.

Note: If lost packets occur during trending, you will see strings of zero data intermixed with the data you have trended. The zeroes represent instances where data packets were lost between the controller and MBScope.

13.7 TRANSIENT CAPTURE

In order to capture transient events, MBScope provides some powerful triggering options. For example, the trending tool can be configured to monitor data indefinitely until a selected position or current deviation is detected, at which time the data surrounding the transient event would be collected and recorded for future analysis. *Transient capture* is similar to [Real-Time Trending](#) except the trend begins only if some trigger condition is met.

To set up a *transient capture* first enter relevant information in the [Trend File Information box](#).

Next, choose a set of signals to collect using the [Channel Collection Setup box](#) and set the [Sample Frequency](#) to MAX. Enable triggering on the individual channels that you wish to use as a [Minimum / Maximum Trigger](#) by selecting the **Triggered / Collected** box next to the channel name.

Finally, setup trigger conditions as per the following instructions using the **Trigger Setup** box.

Type	Minimum	Maximum
<input type="checkbox"/> Position	0	0
<input type="checkbox"/> Current	0.00	0.00
<input type="checkbox"/> Voltage	0.0	0.0
<input type="checkbox"/> Temp.	0.0	0.0

☐ On RPM ☒ Rising ☐ Falling
☐ On Alarm Event

Figure 52 – Trigger Condition Setup

13.7.1 TRIGGER MODES

Transient events can be collected in three modes:

- If *none* is selected, all data will be recorded.
- If *pre* triggering is selected, all data is recorded after a trigger condition is found. This means that once a trigger event occurs, the trending process will continue for the length of the test duration time.
- If *post* triggering is selected, all of the data is recorded before and up to when the trigger condition is found. This means that the trend process must run for the entire test duration before a trigger condition occurs. Once a trigger event occurs, the trending process is complete.

13.7.2 TRIGGER TYPES

There are two trigger types available:

- *Minimum / Maximum Triggers* – A trigger event occurs if one of the triggered channels exceeds the minimum and maximum range defined for its corresponding channel type (position, current or voltage).

- *Event Triggers* – A trigger event occurs if any of the selected events take place.

The Trending Tool allows you to choose multiple trigger conditions that are combined with a logical “OR”.

For example, to set up a condition that triggers when the rotational speed falls below 1000, or when the position deviates more than ± 80 μm , the parameters should be entered as such:

Figure 53 – Example Trigger Condition

To begin transient capture, press the **Start** button. A monitoring window will appear until the trigger condition is met and trending is complete.

Time(s)	5
Samples	0
Lost	0
Events	0
Disk Space	20.33 GB

Figure 54 – Monitoring for Trigger Conditions

Once the transient capture is complete, the captured data is automatically saved to disk and can be viewed using the [Data Collection Viewer](#) screen.

Note: If lost packets occur during trending, you will see strings of zero data intermixed with the data you have trended. The zeroes represent instances where data packets were lost between the controller and MBScope.

13.8 LOW SPEED TRENDING

Low Speed Trending allows the user to record statistics on a magnetic bearing system over extended periods of time, typically for monitoring long-term performance or system changes.

Low Speed Trending works by sampling a window of data (a series of consecutive values) at regular intervals. After each window is collected, a user selectable statistic function (ie. mean, standard deviation or peak to peak) is applied. The resulting sample value is stored to a file.

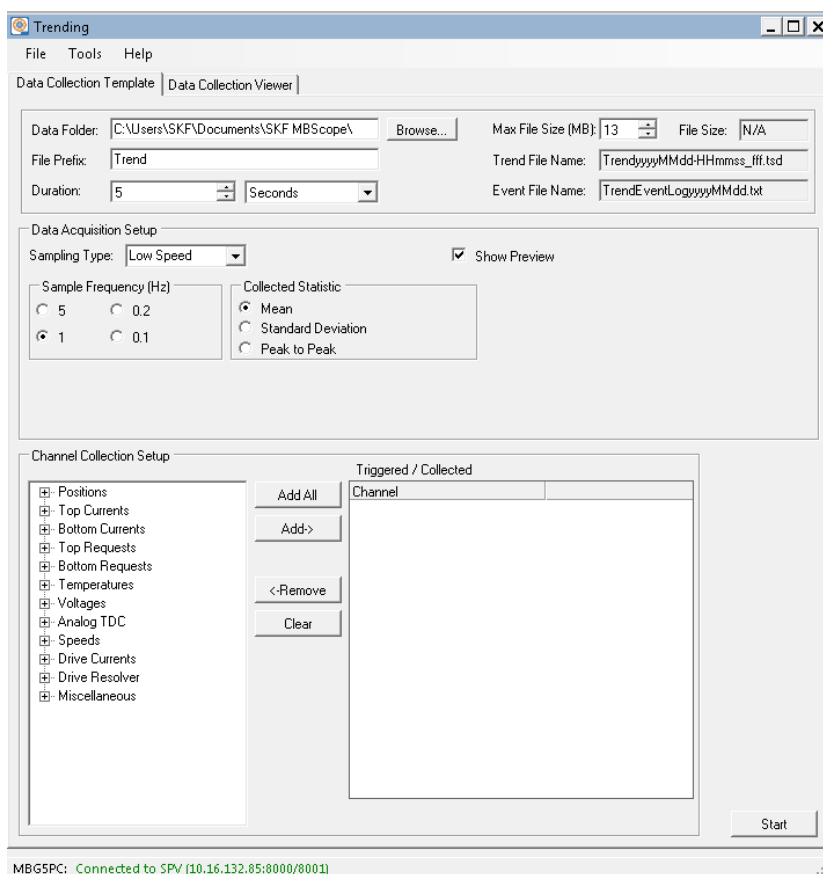


Figure 55 – Windowed Trending

To set up a *low speed trend*, first enter the relevant information in the [Trend File Information box](#).

Next, choose a set of signals to collect using the [Channel Collection Setup box](#).

Next, configure the *low speed trending* parameters.

13.8.1 WINDOWED TRENDING PARAMETERS

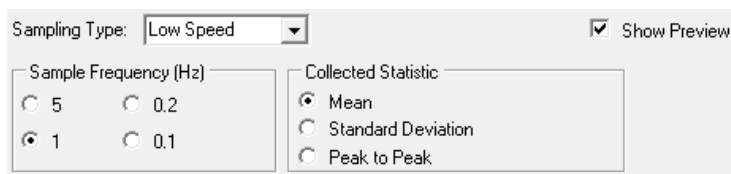


Figure 56 – Low Speed Trending Parameters

The *sample frequency* specifies how often a window of data is sampled. Select a value other than MAX.

The *Collected Statistic* specifies the statistical function (mean, standard deviation, or peak to peak) that is applied to each window of data to form a sample value.

Select *Show Preview* to graphically display the trend as it progresses.

To begin trending, click the **Start** button.

Trending will continue until the time remaining runs down to zero, or until the **Stop Trending** button is pressed. In both cases, trended data will automatically be saved to disk.

Note: If lost packets occur you will occasionally see unusually large spaces between sample points.

13.9 TRENDING PREVIEW

The trending preview dialog displays [Low Speed Trending](#) data as it is collected from the controller.

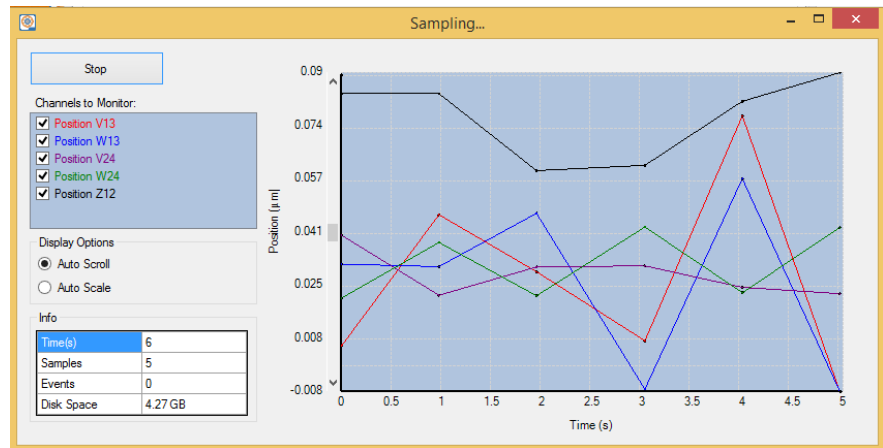


Figure 57 – Trending Preview

While monitoring the trend, you can choose between two views.

- **Auto Scroll** – Continuously scrolls a limited amount of the most recently sampled data points.
- **Auto Scale** – Shows all points, up until the internal view buffer is full, at which point the oldest values are discarded (though they remain in the file).

Individual channels can be toggled on and off from the **Channels to Monitor** box by toggling the check box next to each channel name.

13.10 DATA COLLECTION VIEWER

The **Data Collection Viewer** allows you to display previously captured trend files. To access the **Data Collection Viewer**, click on the Data Collection Viewer tab.

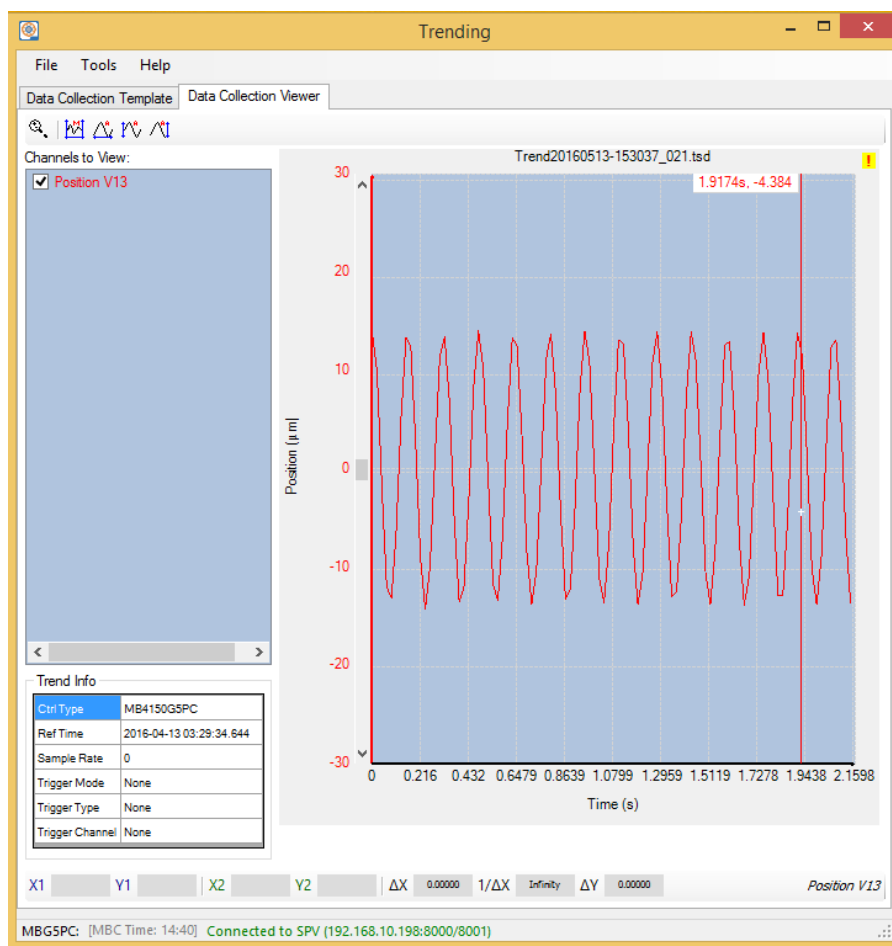


Figure 58 – Data Collection Result

13.10.1 LOADING FILES

A trended snapshot data (.tsd) file can be loaded using the **File | Open Data File** menu option. When loading large files, you may be asked to configure the display options shown in Figure 59.

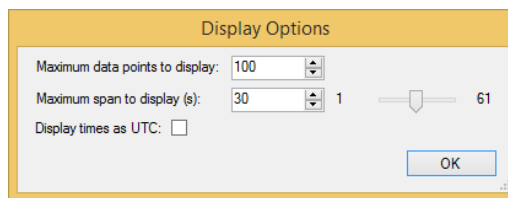


Figure 59 – Trending Display Options

13.10.2 MAXIMUM DATA POINTS TO DISPLAY

The maximum data points to display limits the number of points that can be drawn on the graph. Increasing this value will improve data resolution at the cost of performance. Decreasing this value will improve performance but reduce data resolution. Typically a value between 10000 to 50000 is suitable for viewing magnetic bearing data.

Once a .tsd file has been loaded, the display span can be changed at any time using the **Tools | Change Display Span** menu option.

13.10.3 DISPLAY SPAN

The *display span* defines the maximum X-Axis span to be loaded into memory at any given moment. A smaller *display span* will increase the responsiveness of the application but limit the number of samples that can be displayed at any given time. A larger *display span* will allow you to view more samples but the application may become less responsive due to more graphic activity on the CPU.

Once a .tsd file has been loaded, the display span can be changed at any time using the **Tools | Change Display Span** menu option.

When the display span is less than the total span of a data file, a horizontal scroll bar will appear below the graph. Scrolling this bar will load the next or previous segment of data from the file.

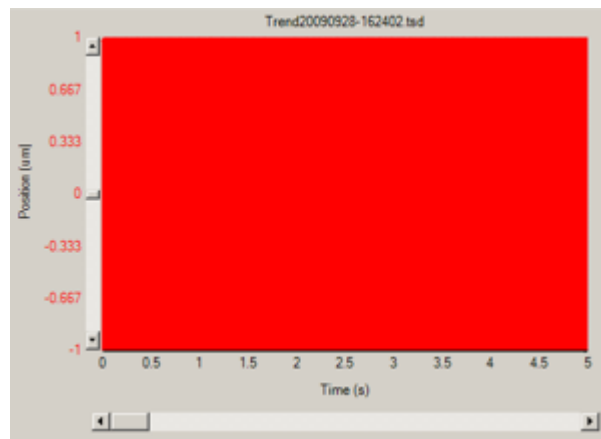


Figure 60 – Trend Data Scroll Bar

13.10.4 TREND INFORMATION

The **Trend Information** box shows important information about the currently loaded trend.

Trend Info	
Ctrl Type	MB4150G5PC
Ref Time	2016-06-04 08:45:47.797
Sample Rate	0
Trigger Mode	Post
Trigger Type	MinMax
Trigger Channel	Position V13

Figure 61- Trend Information Box

- **Ctrl Type:** The controller type from which the trend was generated
- **Ref Time:** The reference (start) time of the trend. This value can be in controller hours or real-time.
- **Sample Rate:** The trending sample rate. For real-time trends, this value will be

Infinity. For windowed trends, this value will be the trending sample rate.

- **Trigger Mode:** As defined in section 13.6.
- **Trigger Type:** As defined in section 13.6.
- **Trigger Channel:** The channel that triggered the trend.

13.10.5 CHANNEL SELECTION

The **Channels to View** box lists all of the collected channels. Each channel can be toggled on or off by clicking the checkbox next to the channel name.

14. PARAMETER LOADER

14.1 RESTRICTIONS

This tool is subject to licensing restrictions. See the section on [licensing](#) for more information.

14.2 OVERVIEW

The Parameter Loader facilitates the sending and receiving of parameters to and from the controller using Parameter Value Files (PVF).

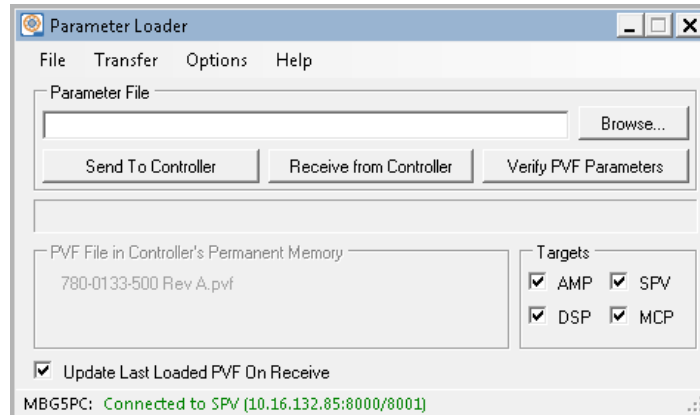


Figure 62 – Parameter Loader

14.3 PARAMETER VALUE FILE (PVF)

A Parameter Value File (PVF) is a text file containing information about one or more controller parameters.

Enter the path and filename of the PVF from the **Parameter File** textbox or by searching for the file using the **Browse...** button.

14.4 READING PARAMETERS FROM THE CONTROLLER

Click the **Receive from Controller** button to download the parameters from the controller to the PVF.

14.5 SENDING PARAMETERS TO THE CONTROLLER'S RAM

Click the **Send to Controller** button to send the parameter set from the PVF to the controller's random access memory (RAM).

Note: Parameters sent to RAM will be lost when the controller is powered off.

14.6 VERIFYING PVF PARAMETERS

Click the **Verify PVF Parameters** button to compare the selected PVF file with the parameter set in the controller's RAM. Once this process is complete, any differences between the two PVF files are displayed.

14.7 TARGET SPECIFICATION

The checkboxes in the **Targets** section allow the selection of which processors will receive the parameters in the PVF file.

Note: In order for the controller to perform correctly, all processors should receive the parameters within a PVF file.

14.8 UPDATE LAST LOADED PVF ON RECEIVE

Check this box to update the controller's "*Last Loaded PVF*" parameter when a new PVF file is sent. This is automatically updated to the currently selected PVF filename when specified.

**14.9 STORE PARAMETERS
TO CONTROLLER'S
PERMANENT MEMORY**

When the Parameter Loader is closed, a prompt will be displayed asking to store the loaded parameters to the controller's permanent memory. Selecting "yes" in this dialog will write the parameters to the controller's memory so they will not be lost when power is cycled.

15. FIRMWARE LOADER

15.1 RESTRICTIONS

This tool is subject to licensing restrictions. See the section on [licensing](#) for more information.

15.2 OVERVIEW

The Firmware Loader tool is used to upgrade controller firmware.

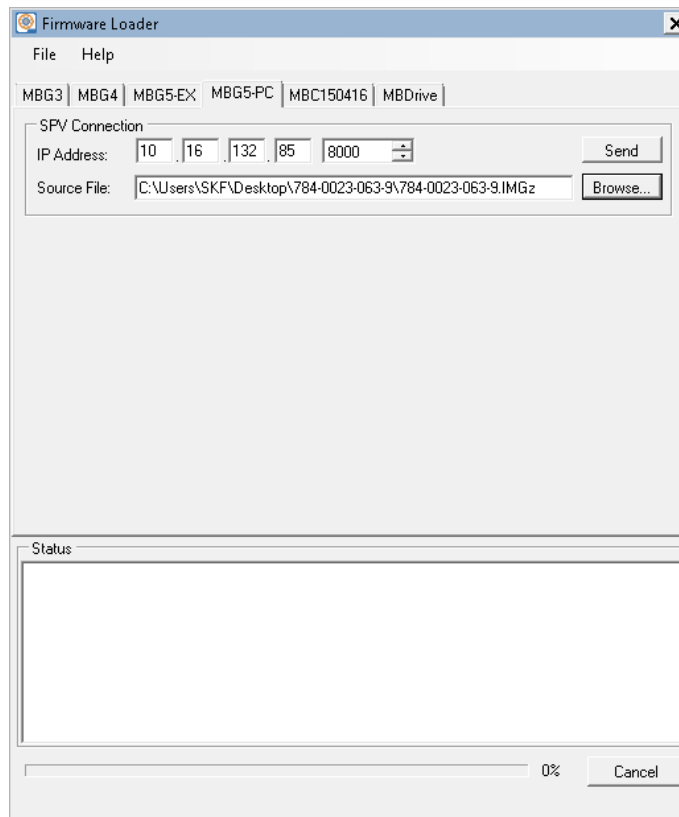


Figure 63 – Firmware Loader

15.3 PARAMETER BACKUP

Back up the controller parameters before loading firmware. After the firmware upgrade is complete, reload the parameters to the controller's permanent memory.

15.4 FIRMWARE UPGRADE PROCESS

A firmware upgrade is done by simply selecting the file to send, entering in the controllers IP address and port, and pressing the 'Send' button.

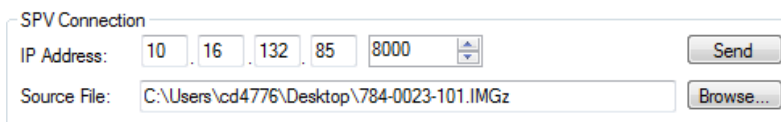


Figure 64 Firmware Loader IP/Port Settings

Status information will be shown in the status window. This window will indicate if the firmware upgrade process was successful or not.

16. CALIBRATION

16.1 OVERVIEW

The calibration tool provides an interface to calibrate the radial and axial position of the shaft.

To ensure proper calibration of your machine, please refer to the MBG5-PC controller user guide (SKF#892-0117), section **3.6.8**, for a detailed calibration procedure.

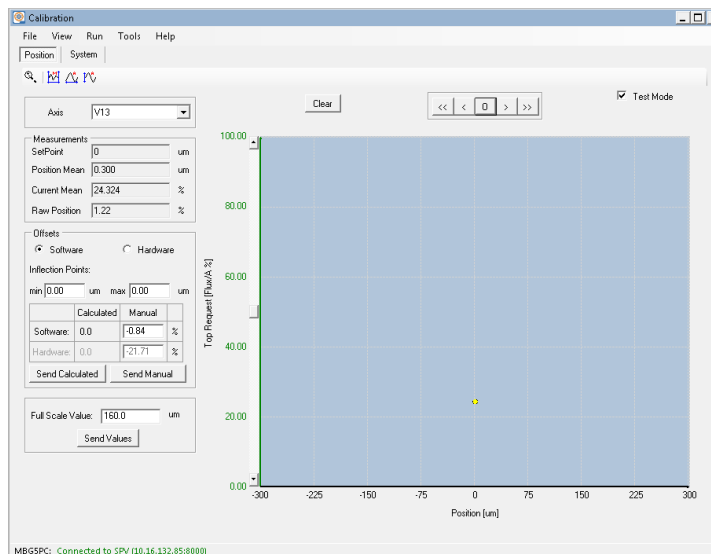


Figure 65 – Calibration Tool

The axis selector allows the individual bearing axes to be isolated so that commands are executed on a single axis at a time.

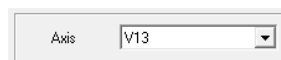


Figure 66 – Calibration Axis selector

16.2 CALIBRATION CONTROLS

The calibration controls allow the shaft to be moved. This provides a method for calibrating the shaft's position.

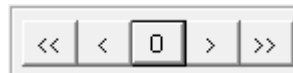


Figure 67 – Calibration Controls

The left step button (<) will move the shaft one step to the left.

The left auto-step button (<<) will automatically step the shaft to the left until the inflection point is determined.

The center button (0) will return the shaft back to its center position.

The clear button (Clear) will clear the most recent calibration results. It will not

reset and values which have already been sent to the controller.

16.3 MEASUREMENTS AND OFFSETS

The measurements section displays information about the instantaneous position of the shaft.

Measurements		
SetPoint	0	um
Position Mean	0.330	um
Current Mean	24.301	%
Raw Position	1.03	%

Figure 68 – Calibration Measurements

The offsets section allows the hardware and software offsets to be sent to the controller after they have been manually entered or calculated by the calibration tool.

Offsets

☒ Software
 ☐ Hardware

Inflection Points:

min 0.00 um max 0.00 um

	Calculated	Manual	
Software:	0.0	-0.84	%
Hardware:	0.0	-21.71	%

Full Scale Value: 160.0 um

Figure 69 – Calibration Offsets

16.4 COMMON FEATURES

Please refer to the section on [Common Features](#) for more information on cursors, panning, scaling and zooming.

17. SERVICE PANEL

17.1 RESTRICTIONS

This tool is subject to licensing restrictions. See the section on [licensing](#) for more information.

17.2 TRANSFER FUNCTION OVERVIEW

The Service Panel tool allows for the system transfer functions to be calculated by exciting the system and monitoring the response.

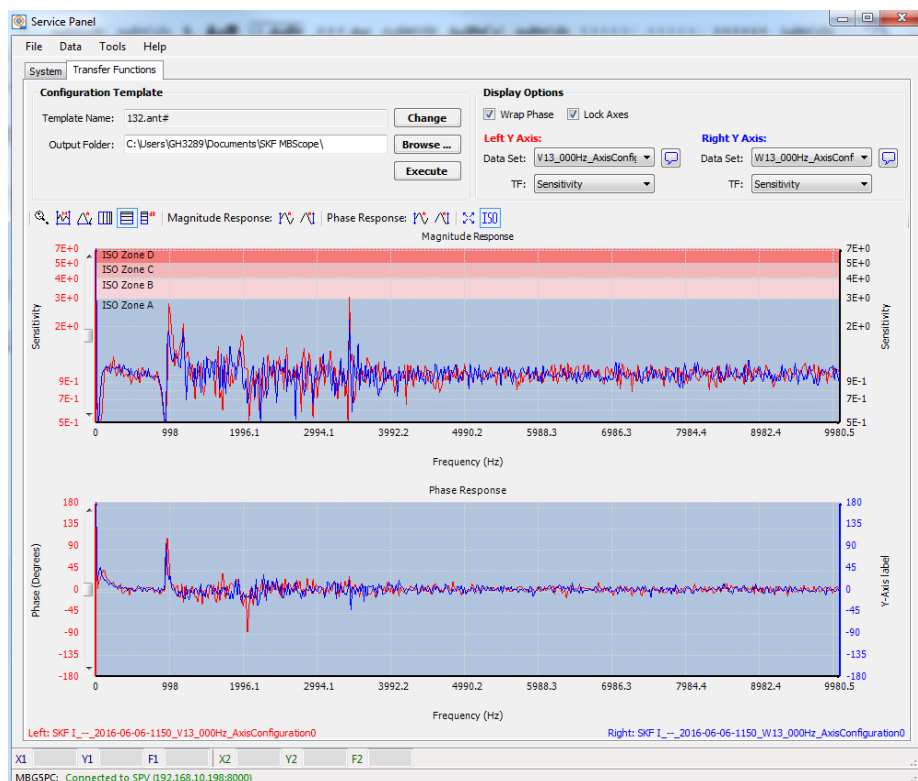


Figure 70 – Service Panel

17.3 SYSTEM INFORMATION

The System Information Tab provides information about the controller. This tab will only be shown if the controller firmware supports the parameters.

Figure 71 – System Information

The send to controller button will send any updated information to the controller.

If any of the text is red, it means there are changes that must be sent to the controller.

SKF Asset ID SKF ID 1234

17.4 DATA MENU DESCRIPTION

The Data Menu provides several functions

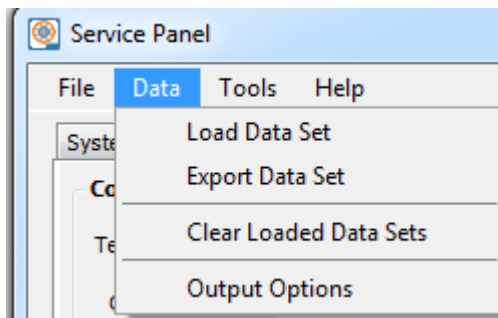


Figure 72 –Data Menu

- **Load Data Set**
Will load a Data Set file and display the data on the Magnitude and Phase plots.
- **Export Data Set**
Will export the currently displayed Data Sets to a selected folder.
- **Clear Loaded Data Sets**
Will clear any loaded Data Sets.
- **Output Options**
Will open the Output Options dialog. (See Section 17.8)

17.5 TEMPLATE EDITOR

The Transfer Function Tool uses Configuration Templates to determine the axes to be swept and the settings for each axis.

Templates can be configured directly by using the Sweep Configuration Dialog, or preexisting Templates can be moved to the folder by using the Import Button. The Sweep Configuration Dialog is opened from the Transfer Function Tab, and clicking on the (Change) button.

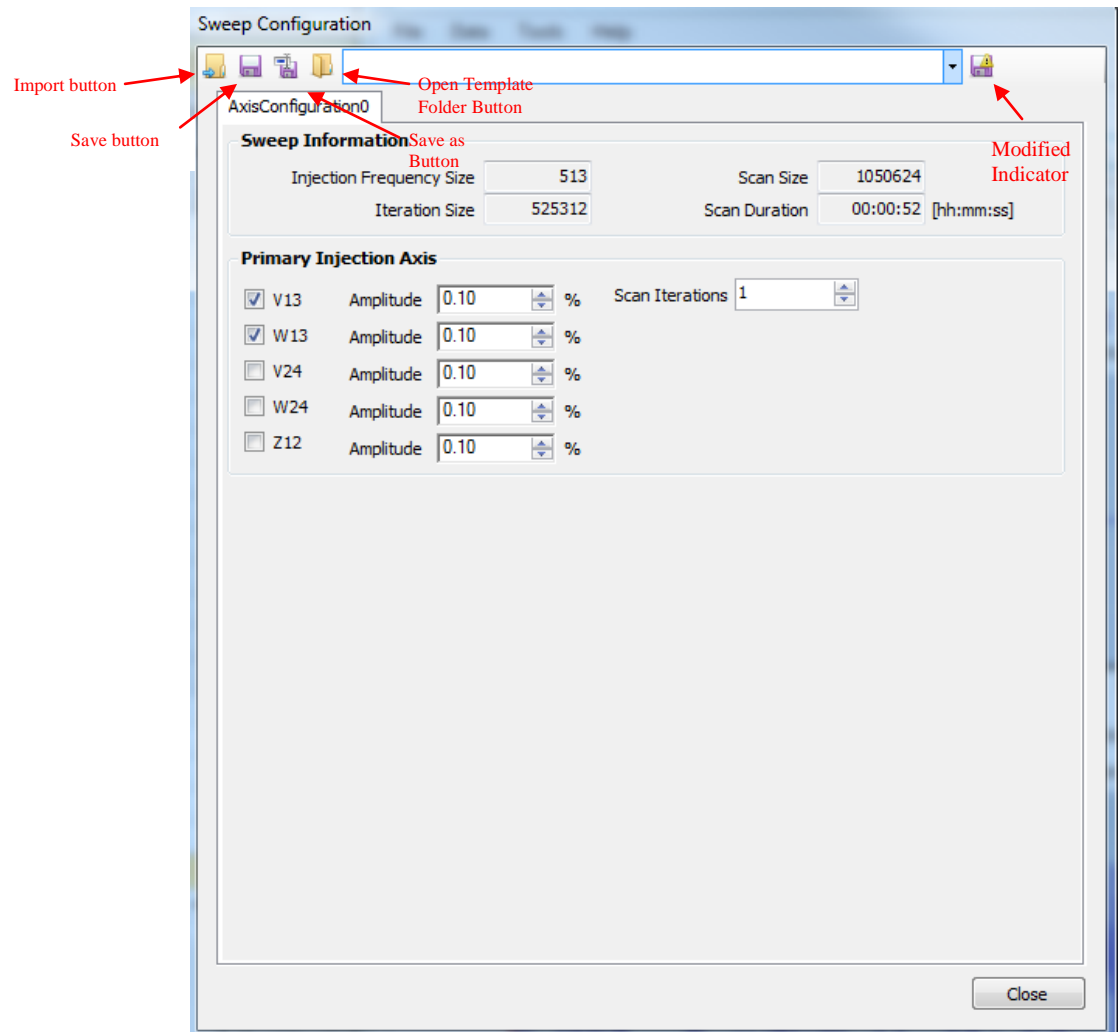


Figure 73 – Sweep Configuration

- **Import Button:** Will open a 'Browse File' dialog to copy a template into the MBScope template Directory.
- **Save Button:** Will save the currently configured template.
- **Save As Button:** Will open a 'Browse File' dialog that allows saving the template as a new file.
- **Open Template Folder Button:** Will open the template folder in a file browser, this will allow manual moving of the templates to and from the folder.
- **'Modified' Indicator:** If the following icon is showing, it means that the current template is modified but the changes have not been saved.

17.6 TRANSFER FUNCTION TOOL

The Transfer Function Tool provides a one click method to collect a complete set of machine data along with displaying the machine data.

In order to open Data to view on the Transfer Function tool. Go to **Data | Load Data Set** from the menu bar.

Several display options can be selected.



Figure 74 – Display Options

- **Wrap Phase**
This will keep the Phase Plot with a maximum of 180° and a minimum of 180°, any high or lower Phases will be wrapped around.
- **Lock Axes**
This setting will prevent auto scaling of the axes when a different data set is displayed.
- **TF Selection List**
Displays a list of the transfer functions available in the dataset.
- **Sweep notes Button** (🗒)
This will open the ‘Sweep Notes’ for the currently selected dataset. If notes have been saved with the dataset, the icon will turn yellow. (🟡🗒)

17.7 EXECUTE

The Execute Button will perform the sweep based of the settings of the selected template.

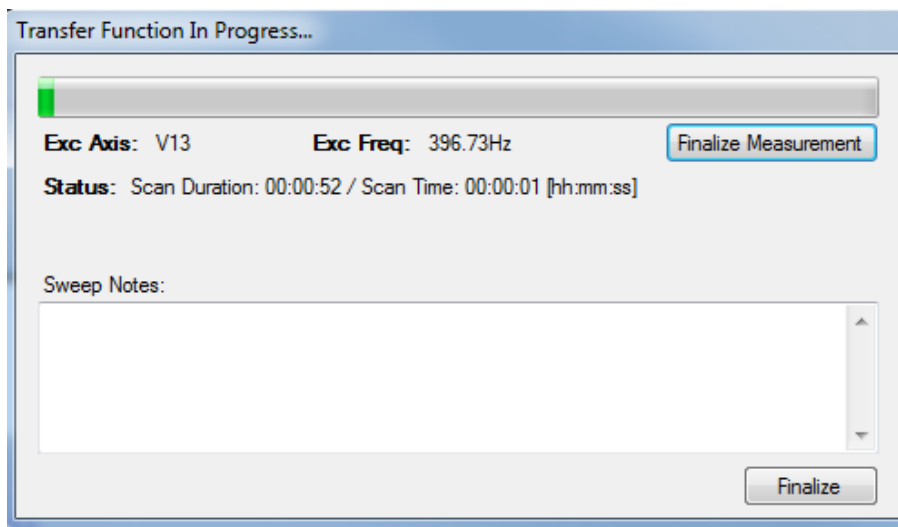


Figure 75 – Transfer Function Execution Status

- **Finalize Measurement:**

This will close off the currently executing data set capture and start the next data set capture

- **Finalize:**

This will finish off the currently executing data set capture and then stop the process

17.8 OUTPUT OPTIONS

Output Options allows different settings to be used. By default all settings will be on.

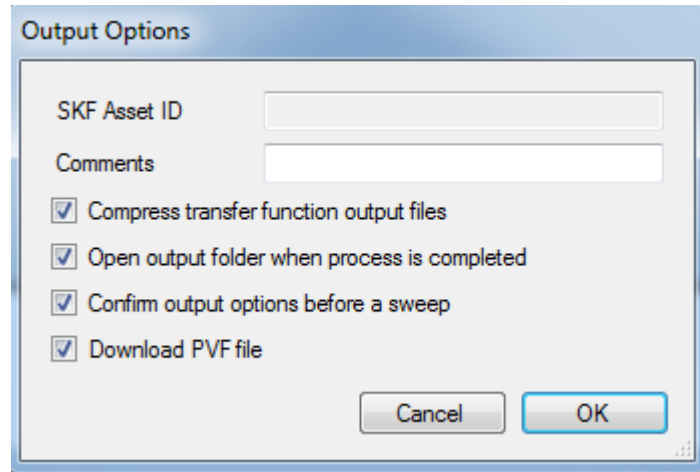


Figure 76 – Output options

- **Compress transfer function output files**

This setting will create a .zip file of the folder containing all of the captured data sets.

- **Open output folder when process is completed**

This will open the output folder when the sweep is completed.

- **Confirm output options before a sweep**

This will open this Output Options dialog before the measurements begin.

- **Download PVF file**

This will download the PVF and put it into the output folder.

- **Comments**

A short description of the measurements being taken.

18. TROUBLESHOOTING

18.1.1 GENERAL

MBScope relies heavily on communications, and is sensitive to noise, computer processes and system configuration. Always follow configuration recommendations in this guide to ensure reliable operation. When modifying connections, cables, settings or installing third party utilities on computers with MBScope installed, it is always a good idea to perform the modification in stages, test and check the functionality before continuing.

When using MBScope, it is recommended that you close other applications that may inadvertently affect communications, memory or processor cycles.

18.1.2 WON'T COMMUNICATE.

1) Is the controller powered? Yes.	No. Turn on controller and wait three minutes. Go to next step.
2) Are all servicing related Ethernet cables connected? Yes.	No. Connect all servicing related Ethernet cables Go to next step.
3) Is the computer able to establish TCP/IP connection to the controller? Yes.	No. Contact your local administrator to correct this problem. Go to next step.
4) Are you still unable to communicate? Yes. Go to next step.	No. Continue with operation.
5) Contact SKF Magnetic Bearings for assistance.	

18.1.3 CANNOT OPEN XXX.PEF FILE.

1) Is there a PEF file installed on your hard drive? PEF files are typically installed in the folder 'c:\ProgramData\SKF Magnetic Bearings\MBScope\PEF'. Yes.	No. Load the correct PEF file from the MBScope Tool menu as illustrated in Section 5.2. Go to next step.
2) Is the software still unable to find PEF file? Yes. Re-install MBScope	No. Continue with operation.
3) Is the software still unable to find PEF file? Yes. Go to next step.	No. Continue with operation.
3) Contact SKF Magnetic Bearings for assistance.	

18.2 EXECUTION

18.2.1 MBScope IS OPERATING SLOWLY.

1) Is MBScope the only program running on your computer? Yes.	No. Close all programs except MBScope. Go to next step.
2) Are all servicing related Ethernet cables connected securely? Yes.	No. Re-connect all servicing related Ethernet cables. Go to next step.
3) Have you closed down any unnecessary MBScope tools? Yes.	No. Close down any unnecessary screens. Go to next step.
4) Is the computer still running slowly? Yes.	No. Continue with operation.
5) Close down <i>all</i> MBScope Tools, wait for the computer to become idle and then load only essential screens. Is the computer still running slowly? Yes.	No. Continue with operation
6) Shutdown the computer and re-start. Is the computer still running slowly? Yes. Go to next step.	No. Continue operation
7) Contact SKF Magnetic Bearings for assistance.	

18.2.2 TEXT APPEARS CUT-OFF

1) Is your operating system set to use a “normal” font size? (Check your Display Properties). Yes.	No. Set the font size to “normal”. Go to step 2.
2) Is the text still cut-off? Yes. Go to next step.	No. Continue operation.
3) Contact SKF Magnetic Bearings for assistance.	

19. PERFORMANCE TIPS

If MBScope appears to be operating slower than normal, the following tips may help enhance performance.

- Do not view too many live snapshot channels at any given time. In the Snapshots and Orbits Tools, keep unnecessary channels set to **None**.
- Always stop or close unnecessary tools.
- Ensure that the cabling is of good quality. Use of bad cabling can slow down or halt communications entirely.
- Avoid using communications port monitors or other non-MBScope statistics-collecting applications while MBScope is in operation.

20. APPENDIX A: AXIS ORIENTATION

The notations V_{13} , W_{13} , V_{24} , W_{24} , and Z_{12} are used to refer to the five axes of control.

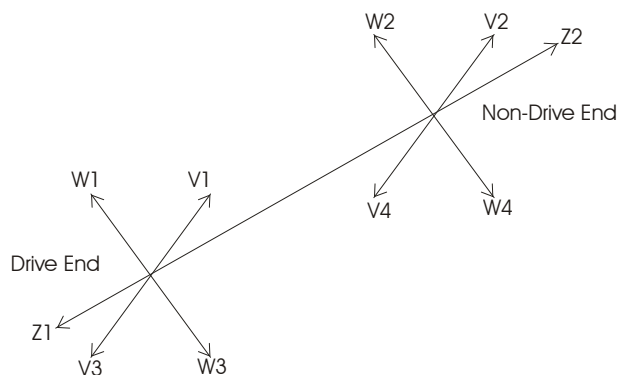


Figure 77 – Axis Orientation

If the housing is rotated 180 degrees, the V and W axis orientations are inverted.