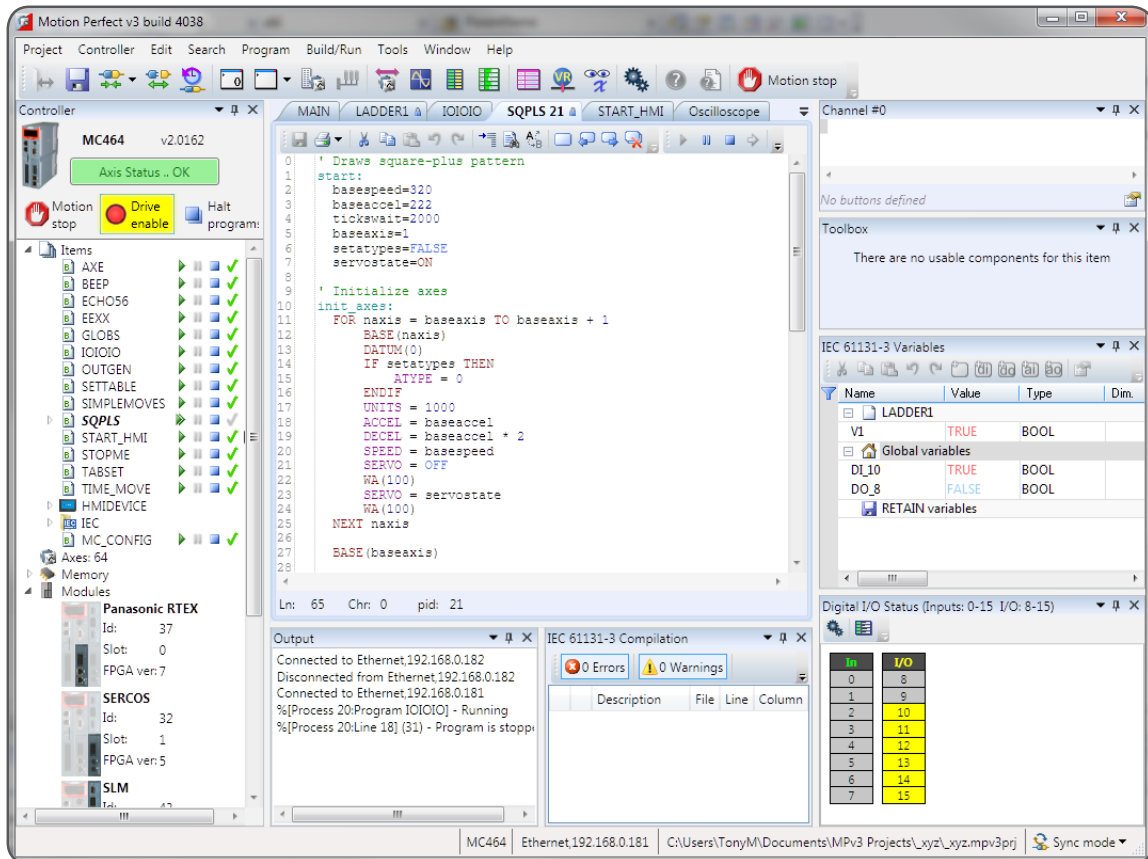


MOTION PERFECT V3

4

Introduction to *Motion Perfect 3*

Motion Perfect 3 is an Microsoft Windows™ based application for the PC, designed to be used in conjunction with Trio Motion Technology's Series 4 *Motion Coordinator* range of multi-tasking motion controllers.



Motion Perfect 3 provides the user with an easy to use Windows based interface for controller configuration, rapid application development, and run-time diagnostics of processes running on the *Motion Coordinator*.

System Requirements

PC

A PC with the following specifications is required to run *Motion Perfect 3*:

	Minimum	Recommended
Operating System	Windows XP, SP 3	Windows 7
.NET Library	3.5	3.5
Processor		
RAM	2MBytes	4MBytes
Hard Disk Space	50MBytes + space for projects	200MBytes



Due to limitations in some of the third party libraries used, *Motion Perfect 3* is only available as a 32 bit application. This will however run on 64 bit Microsoft Windows™.



It is recommended that your copy of Microsoft Windows™ has all current service packs and updates applied.

CONTROLLER

The requirements for a controller are different depending on the mode of connection.

DIRECT MODE

To connect in Direct Mode the controller can be almost any Trio series 2, 3 or 4 *Motion Coordinator*.

TOOL MODE / SYNC MODE

To connect in Tool Mode or Sync Mode the controller must be a Trio series 4 *Motion Coordinator* running system firmware version 2.0177 or later.

Operating Modes

Motion Perfect 3 has four operating modes:

- Disconnected
- Direct
- Tool Mode
- Sync Mode

The current connection mode is displayed on the right of the status bar at the bottom of *Motion Perfect's* main window.

**DISCONNECTED**

Not connected to a controller. All tools are closed and no communications ports are open.

**DIRECT MODE**

A direct connection is made to a controller allowing a Terminal tool to be used for direct interaction with the command line on the controller.

**TOOL MODE**

A multichannel connection is made to a controller allowing the monitoring tools within *Motion Perfect* to be used. This mode allows the user to see a list of the programs on the controller (so that they can be started and stopped) but does not allow editing of any of the programs.

**SYNC MODE**

A multichannel connection is made to a controller and a local project on the PC is opened. The contents of the controller and the project are synchronized so that the local copy of all programs matches those on the controller. All of *Motion Perfect's* tools are available and programs can be edited. The synchronization process can involve deleting programs or copying them from the controller to the PC or vice versa.



A connection (direct or multichannel) to a controller consists of a single TCP/IP socket connection over Ethernet.

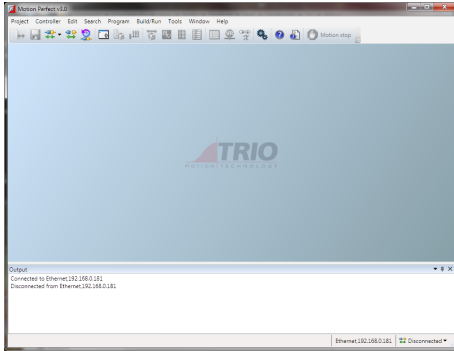
Main Window

The “Main Window” is the main user interface of *Motion Perfect 3*. It acts as a desktop for displaying all controls needed to interact with a single controller.

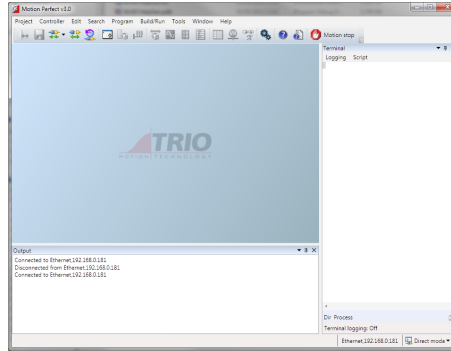
Because the tools available to the user are different for each operating mode the Main Window tends to take on a different appearance for each mode.

In all operation modes the user has access to the Main Menu and Main Toolbar for commands, although the commands available will depend on the operation mode.

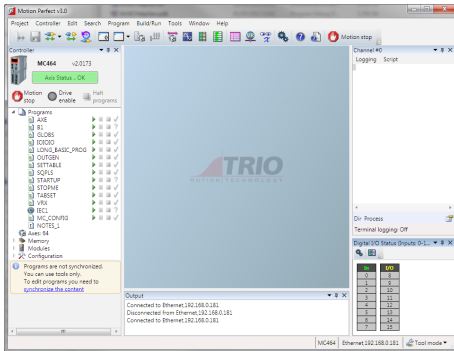
Disconnected Mode



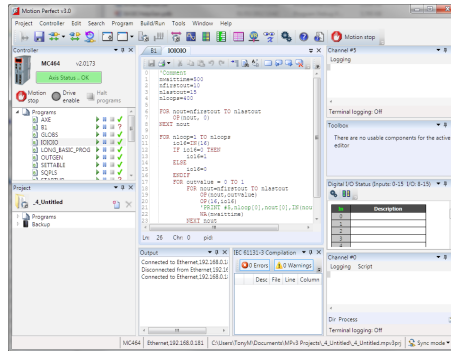
Direct Mode



Tool Mode



Sync Mode



Main Menu

The Main Menu has a set of sub-menus which splits the menu commands into functional groups as follows

PROJECT

New	Create a new project and erase any controller content
Load	Load an existing project onto the controller
Change	Change to a different project and reconcile with the existing controller contents
Create from Controller	Create a new project from the existing controller contents
Save	Save the current project (flushes all changes to disk)
Save As	Save the current project under a different name
Export	Export the project in a different format
Project Check	Check the current project against the controller contents
Create Backup	Create a backup copy of the current project
Backup	Open the “Backup Manager” tool to create or manage project backups
Close	Close the current project (this results in the connection changing to Tool Mode)
Modify STARTUP program	Modifies the STARTUP program
Recent Projects	Allows easy working with recently used projects
Solution Manager	Opens the solution manager to allow working with more than one controller
Print	Prints the current active editing session
Exit	Exits from the application

CONTROLLER

Connect in Sync Mode	Connect to the controller in Sync Mode
Connect in Tool Mode	Connect to the controller in Tool Mode
Connect In Direct Mode	Connect to the controller in Direct Mode
Disconnect	Disconnect from the controller
Connection Settings	Change the connections settings used for the communicating with the controller
Reset Controller	Reset the controller by performing a warm restart
CANIO status	View the CANIO status (not implemented)
Interfaces	Open the sub-menu which allows the configuration of all communications interfaces on the controller.
Enable Features	Enable and disable soft features

Memory Card	Open the “Memory Card Manager” to manipulate the contents of the memory card in the controller.
Load Firmware	Load new system firmware
Directory	Shows an extended directory listing of the programs on the controller
Processes	Shows a list of all user processes currently running on the controller
Lock Controller	Lock the controller using a locking code
Unlock Controller	Unlock a locked controller
Date and Time	Sets the real-time clock on the controller using the “Date and Time” tool

EDIT

Undo	Undo the last editing operation
Redo	Redo the last undone editing operation
Cut	Cut the currently selected text into the clipboard
Copy	Copy the currently selected text into the clipboard
Paste	Paste text from the clipboard
Select All	Select all text in the document
Select None	Deselect the current selection
Delete	Delete the currently selected text
TrioBASIC	Open the TrioBASIC sub-menu which gives access to reformatting and auto-commenting operations.

SEARCH

All search commands apply to the current active editing session

Find	Search for a text string
Find Next	Find the next occurrence of the last search string
Find Prev	Find the previous occurrence of the last search string
Find Next Occurrence Current Selection	Find the next occurrence of the currently selected text string
Find Prev Occurrence Current Selection	Find the previous occurrence of the currently selected text string
Replace	Replace one text string with another
Toggle Bookmark	Toggle a bookmark on the current line
Goto Next Bookmark	Go to the next bookmark
Goto Prev Bookmark	Go to the previous bookmark
Goto Line/Label	Go to a line or label

Match Scope	Go to the end / beginning of the scope started / ended on the current line
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PROGRAM

New	Create a new empty program (see “Creating a New Program”)
Load	Load an existing program and add to the current project
Edit	Edit a program in the current project
Debug	Debug a program in the current project
Save	Save current program to disk (only available if there are unsaved changes).
Copy	Copy a program in the current project
Rename	Rename a program in the current project
Delete	Delete a program in the current project
Delete All	Delete all programs in the current project
Compile All	Compile all programs in the current project
Set Autorun	Set the Autorun process of a program in the current project
Run Autorun programs	Run all programs set to autorun
Stop All (Halt)	Stop all running programs
IEC 61131-3	

BUILD/RUN

The commands in this sub-menu operate on the program open in the current active editing session.

Compile	Compile the program (any changes are saved first)
Run	Run the program
Step	Step the program
Step In	Step program into a function or subroutine
Step Out	Step program out of a function or subroutine
Pause	Pause program execution
Stop	Stop program execution
Toggle Breakpoint	Toggle breakpoint on the current line
Enable/Disable Breakpoint	Toggles the enabled state of the breakpoint on the current line
Breakpoints	Opens a dialog to display all current breakpoints
Watch Variable	Add a watch for the currently selected variable
Set Autorun	Set the Autorun process number



The availability of the commands in the Build/Run sub-menu depends on the type or program being edited and the run state of the program.

TOOLS

Axis Parameters	View and modify axis parameters using the “Axis Parameters” tool
Intelligent Drives	Configure intelligent drives attached to the controller. This is to be implemented using add-ons (at present none are available).
Oscilloscope	A software Oscilloscope tool which can be used to show traces of how parameters vary with time
Digital I/O	View the states of digital inputs and outputs and change the state of digital outputs using the “Digital I/O Viewer” tool
Jog Axes	Manually jog axis positions using the “Jog Axes” tool
Table Viewer	View and change table data values using the “Table Viewer” tool
VR viewer	View and change VR variable data values using the “VR Viewer” tool
Watch Variables	View and change the values of local and global variables whilst debugging using the “Variable Watch” tool
Analogue Inputs	View the status of analogue inputs using the “Analogue I/O Viewer” tool
Terminal	Open a Terminal Tool to interact with the controller
Diagnostics	Configure Diagnostics for fault finding
Options	Change the Options for <i>Motion Perfect</i> and its tools

WINDOW

Toolbar	Show / hide the main toolbar
Status Bar	Show hide the application status bar
Output Window	Show / hide the Output Window
Controller Tree Window	Show / hide the Controller Tree Window
Project Tree Window	Show / hide the Project Tree Window
Toolbox	Show / hide the Toolbox
Show Recent Work	Show the Recent Work dialog
Clear Output Window	Clear the Output Window
Close Window	Close the current window
Reset Window Layout	Reset the window layout to the default layout

HELP

<i>Motion Perfect v3</i> Help	Displays <i>Motion Perfect</i> help
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TrioBASIC Help	Displays TrioBASIC language help
About <i>Motion Perfect v3</i>	Displays the <i>Motion Perfect</i> About Box which shows software versions.

Main Toolbar



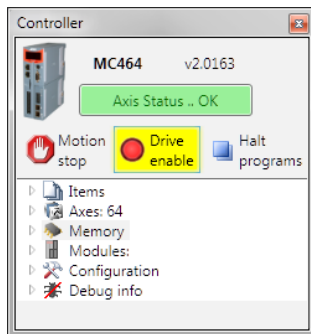
The Main Toolbar gives the user quick access to Motion Perfect’s main tools and functions.

Icon	Command	Operation
	Open Project	Opens a project and synchronizes with the controller contents
	Save Project	Saves the current project to disk (Sync Mode only)
	Connect	Opens up a sub-menu with options to connect in Sync Mode, Tool Mode or Direct Mode
	Disconnect	Disconnects
	Recent Work	Opens the “Recent Work dialog” Which allows reconnection to recently used connections or opening of recently used projects.
	Terminal (channel 0)	Opens a Terminal tool on Channel 0 if in Tool or Sync Mode or directly connected to the command line if connected in Direct Mode
	Terminal	Opens a Terminal on a user selectable channel when connected in Tool or Sync Mode
	Axis Parameters	Opens the Axis Parameters Tool (Tool and Sync Modes only)
	Intelligent Drives	Allows the user to configure Intelligent Drives (Sync Mode only, depends on installed add-ons)
	Jog Axes	Opens the Jog Axis Tool (Tool and Sync Modes only)
	Oscilloscope	Opens the Oscilloscope Tool (Tool and Sync Modes only)
	Digital I/O	Opens the Digital I/O Viewer Tool (Tool and Sync Modes only)

Icon	Command	Operation
	Analogue I/O	Opens the Analogue Input Viewer Tool (Tool and Sync Modes only)
	TABLE Viewer	Opens the TABLE Viewer Tool (Tool and Sync Modes only)
	VR Viewer	Opens the VR Viewer Tool (Tool and Sync Modes only)
	Variable Watch	Opens the Variable Watch Tool (Tool and Sync Modes only)
	Options	Opens the main Options dialog
	Motion Perfect Help	Displays help for Motion Perfect
	TrioBASIC Help	Displays help for the TrioBASIC language
	IEC 61131-3 Help	Displays help for IEC 61131-3 programming

Controller Tree

The controller tree can be displayed when *Motion Perfect* is operating in “Tool Mode” or in “Sync Mode”. It contains information about the controller connected to *Motion Perfect* and its contents.



The tree consists of a header section and the tree body.

TREE HEADER

The tree header contains basic information about the controller plus some important controls. The top of the header contains a pictorial representation of the controller, the controller model (MC464 in the case above), the system software version number and an “Axis Status” control. The bottom of the header

contains three button controls: “Motion Stop”, “Drive Enable” and “Halt Programs”

CONTROLLER INFORMATION

The controller is shown as an icon to the left of the header. The controller model and system software version are displayed towards the top of the header. If the mouse cursor is moved over the icon a tooltip is displayed giving some basic information about the controller.

Controller info:	
Connection	Ethernet,192.168.0.183
Type	MC464
Serial#	107
Version	2.0169
FPGA Version	29
Free memory	7077861

“AXIS STATUS” CONTROL

This control shows the error status of the controller. It is a passive control when there is no error and is coloured green. When an error occurs the control becomes coloured red and then acts as a button which, when clicked, will clear the error on the controller.



Some errors, notably hardware errors, cannot be cleared by clicking the “Axis Status” button.

“MOTION STOP” BUTTON

Clicking on the “Motion Stop” button stops all currently running programs and empties all the move buffers on the controller causing all motion to stop. Its action is similar to an “Emergency Stop” button but, as it is implemented in software, it is less reliable than a properly implemented hardware emergency stop.



IT IS IMPORTANT THAT A PROPER HARDWARE EMERGENCY STOP IS IMPLEMENTED ON ANY SYSTEM. THIS BUTTON MUST NOT BE USED AS A SUBSTITUTE.

“DRIVE ENABLE” BUTTON

Clicking on this button toggles the state of the drive enable (watchdog output) on the controller. When drives are enabled the background of the button is coloured yellow.

“HALT PROGRAMS” BUTTON

Clicking on this button halts all currently running programs but does not stop and current or buffered moves. Use the “Motion Stop” button if you want to stop the motion as well as the programs.

TREE BODY

The body of the tree contains information in several expandable sections:

Section Name	Contents
Programs	Programs and files stored on the controller.
Axes: (Max Axes)	A list if the Axes defined as visible.
Memory	Memory related information.
Modules	Interface modules connected to the controller.
Configuration	Controller configuration information.

PROGRAMS

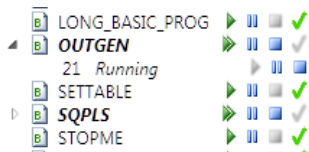
These are the programs and files stored on the controller. The following types of item can be stored on the controller:

- TrioBASIC program
- Text file
- MC _ CONFIG program (one only)
- HMI project (not available on all controllers) containing one or more HMI page definitions.
- IEC 61131-3 project (not available on all controllers) containing one or more programs in one or more of the IEC 61131-3 defined program types.

The “Programs” item in the tree has a context menu to allow creation of programs and some operations on all programs as follows:

Menu Entry	Operation
New	Create a new empty program (see “Creating a New Program”)
Import...	Import a program
Compile all	Compile all compilable programs
Stop all (Halt)	Stop all running programs
Delete all programs	Delete all programs

The program entries in the tree allow the user to run, pause, stop and compile the program by means of a set of icons after each program entry.



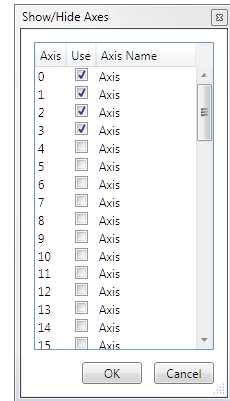
When a program is running it has an extra entry in the tree representing the running instance, showing the process number.

Icon	Operation	Notes
	Run	Run the program. Also run a paused instance from its current (paused) position.
	Run another instance	Run another instance of a program on a different process from currently running instance(s)
	Pause	Pause running program or step non-running program to first line
	Step	Step program onto next line
	Stop	Only available when program is running
	Compile	Icon shows that the program is not compiled.
	Compile	Icon shows that the program is already compiled. Not available when program is running

AXES: (MAX AXES)

The value of Max Axes is the total number of axes available on the controller, both real and virtual.

When expanded the list of axes shown is that specified by the user. To specify which axes are to be shown, right click on axes and select “Show/Hide Axes...” to display the “Show/Hide Axes” dialog and select which axes to display.



MEMORY

This shows various memory related items as follows:

VR

The maximum number of VR variables allowed. Double clicking on this launches the VR Viewer tool.

TABLE

The size (in values) of the **TABLE** memory area. Double clicking on this launches the Table Viewer Tool.

LOCAL VARIABLES

Double clicking on this launcher the variable viewer tool.

GLOBALS

Currently not used.

FREE PROGRAM SPACE

The number of bytes of unused memory available for storing programs in.

MODULES

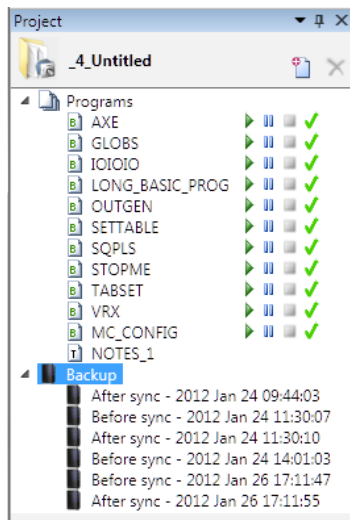
This gives a list of the modules connected to a controller. Currently this only supports the local modules of a modular controller such as the MC464.

CONFIGURATION

Shows the current controller configuration and allows the user to change some user configurable features.

Project Tree

The project tree can be displayed when *Motion Perfect* is operating in “Sync Mode”. It contains information about the current project *Motion Perfect*.



The tree consists of a header section and the tree body.

TREE HEADER

The tree header contains basic information about the project plus some important controls. The header contains a project icon, the project name, a “New Program” button and a “Delete Item” button.

“MOTION STOP” BUTTON

Clicking on the “Motion Stop” button stops all currently running programs and empties all the move buffers on the controller causing all motion to stop. Its action is similar to an “Emergency Stop” button but, as it is implemented in software, it is less reliable than a properly implemented hardware emergency stop.



IT IS IMPORTANT THAT A PROPER HARDWARE EMERGENCY STOP IS IMPLEMENTED ON ANY SYSTEM. THIS BUTTON MUST NOT BE USED AS A SUBSTITUTE.

“NEW PROGRAM” BUTTON

Clicking on this button creates a new program in the project. (See “Creating a New Program”)

“DELETE ITEM” BUTTON

Clicking on this button deletes the currently selected program.

TREE BODY

The body of the tree contains information in several expandable sections:

Section Name	Contents
Programs	Programs and files stored in the project.
Backup	Automatically and manually created backups of the project.
Settings	User changeable settings of the project.

PROGRAMS

This section duplicates the functionality of the “Programs” section in the “Controller Tree”

BACKUPS

Every time *Motion Perfect* synchronizes with a project a backup of the project is made before and after the synchronization operation (the backup after is only made if synchronization has been successful). The tree contains a list of the backups currently stored on the PC.

The “Backups” item in the tree has a context menu as follows:

Entry	Description
Create Backup	Create a backup of the current state of the project
Delete All Backups	Delete all the stored backups
Manage	Start the “Backup Manager” tool

Each backup entry also has a context menu as follows:

Entry	Description
Revert to Selected Backup	Reverts the project to the state saved in the selected backup
Set Name	Allows the user to give the backup a meaningful name
Delete Backup	Deletes the backup entry

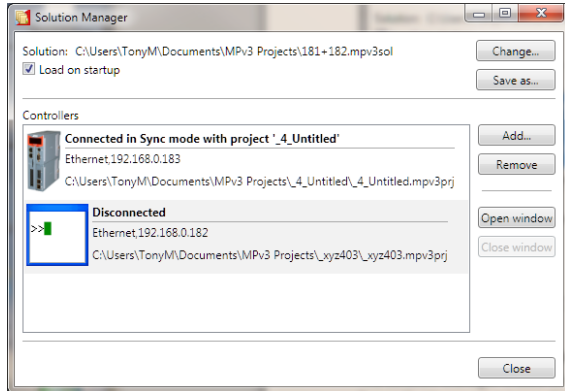
Output Window

The “Output Window” displays the status messages received from the controller.

Solutions

In order to handle systems which contain more than one controller *Motion Perfect* uses a “Solution” to manage the connections to more than one controller and their associated projects. The solution defines a list of controllers included in the solution. For each controller it also defines a connection used to communicate with the controller and a project associated with it. No two controllers can be associated with the same project. The user can create and edit a solution using the Solution Manager.

SOLUTION MANAGER



The Solution Manager is used to manage a collection of projects (solution) which are used for applications containing multiple controllers. In single applications which contain only one project, *Motion Perfect* uses a default solution so that the user does not need to use the solution manager.



The default solution cannot contain more than one project.

CONTROLS

LOAD ON STARTUP CHECKBOX

If checked, the solution manager and the current solution will be loaded when *Motion Perfect* is started.

CHANGE SOLUTION BUTTON

Change to a different solution.

SAVE SOLUTION AS BUTTON

Save the current solution under a new name

ADD CONTROLLER BUTTON

Add a controller (connection) to the solution.

REMOVE CONTROLLER BUTTON

Remove the currently selected controller (connection) from the solution

OPEN WINDOW BUTTON

Open a window for the currently selected controller

CLOSE WINDOW BUTTON

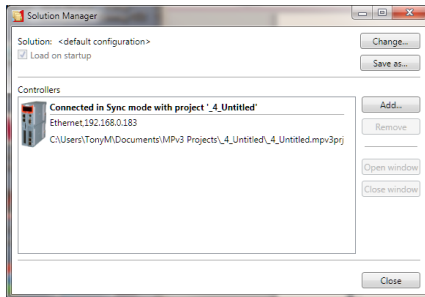
Close the open window for the currently selected controller

CLOSE BUTTON

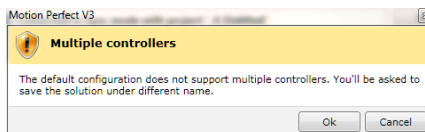
Close the “Solution Manager” window

CREATING A SOLUTION

- Create a project for one controller as normal.
- Open the “Solution Manager” from the Project section of the main menu. This will display the existing project as part of the “Default Solution”.



- Click on the “Add” button. A warning about multiple controllers will be displayed.



- Clicking on the “OK” button will cause the “Connection Dialog” to be displayed. Configure an appropriate connection for another controller. On closing the “Connection Dialog” you will be prompted to save the solution. A desktop window will appear for the connection to the new controller.
- To associate a project with the new controller, attempt to connect to it in Sync Mode (this may happen automatically depending on the stored state of the connection). The “Controller Project Dialog” will be displayed to allow this.

Project

A *Motion Perfect* project contains a set of programs and settings which represents the contents of the controller for a given application. All files relating to a project are stored in a single directory on the PC this is known as the **project directory**.

PROJECT DIRECTORY

The files contained in the **project directory** will depend on the programs used in the project. There are three main files in the **project directory** which all have the same name as the project directory but have different file extensions.

PROJECT FILE (EXTENSION "MPV3PRJ")

This contains a definition of the contents of the project (programs) and any customization such as axis names.

DESKTOP FILE (EXTENSION "MPV3DSK")

This contains the desktop layout used when *Motion Perfect* is connected in sync mode to the controller.

TOOL INTERNAL CONDITIONS (EXTENSION "MPV3IC")

This contains the internal state of each open tool window when *Motion Perfect* is connected in sync mode to the controller.

PROGRAM FILES

Program files are also stored in the project directory. The type of each file can be determined by its file extension the most important being .BAS which is used for TioBASIC programs. Each TrioBASIC program may also have a .PRG file of the same name which specifies editor/debugger settings for the program. Some complex types of program (usually handled by an add-in) can have sub-directories which contain their data as well as one or more files in the project directory.

There is also a "Backup" sub-directory in which backups of the project are stored.

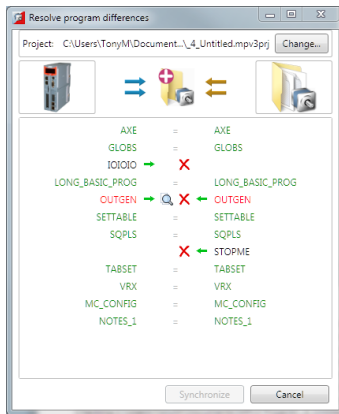
WARNING



ALTHOUGH MANY OF THE FILES WHICH FORM PART OF THE PROJECT ARE TEXT FILES THE USER SHOULD NOT EDIT THEM DIRECTLY USING A TEXT EDITOR AS THIS MAY CAUSE COMPATIBILITY PROBLEMS BETWEEN THE PROJECT AND THE CONTROLLER. ALL CHANGES SHOULD BE MADE USING *MOTION PERFECT*.








Project Check

A project check is performed every time *Motion Perfect* connects in "Sync Mode" and if the user initiates a project check from the main menu. The programs in the project are checked against those on the controller and if there are any differences the "Resolve Program Differences" dialog is displayed so the user can resolve the differences.



RESOLVING DIFFERENCES

The “Resolve Program Differences” dialog can perform several different operations to resolve differences.

Icon	Operation
	Change the project
	Create a new empty project
	Make the contents of the project the same as that in the controller
	Make the contents of the controller the same as that in the project
	Copy a program from the controller to the project
	Copy a program from the project to the controller
	Delete a program (from the project or controller or both)
	Use a “Resolve Differences” tool to examine the differences between the copy of a program on the controller and the one in the project and optionally to make changes to the file in the project (which will then be loaded onto the controller).

The synchronization operation is carried out when the user clicks on the “Synchronize” button which is only enabled

Once a set of operations has been selected which will resolve all differences.



The synchronization operations available depend on the types of program in the project and on the controller.



IT IS POSSIBLE THAT A PROGRAM COPIED FROM THE PROJECT ONTO THE CONTROLLER WILL STILL CAUSE A PROJECT CHECK FAILURE IF THE CONTROLLER SUPPORTS DIFFERENT KEYWORDS TO THOSE SUPPORTED BY THE CONTROLLER ON WHICH THE PROGRAM WAS WRITTEN. THIS PROBLEM CAN BE RESOLVED BY SAVING THE COPY ON THE CONTROLLER INTO THE PROJECT OR MANUALLY RESOLVING THE DIFFERENCES.

PROBLEMS LOADING PROGRAMS

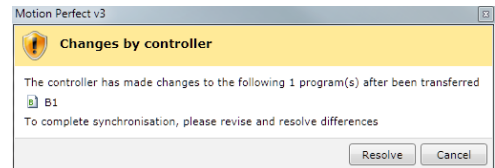
Even though it appears that differences can be resolved by loading the project or some of its programs onto the controller it is still possible to get a mismatch between the controller and the project. This is usually due to different TrioBASIC keywords being supported on the controller to those supported on the controller on which the program was written. This can cause variables to become keywords, keywords to become variables or keywords to change.



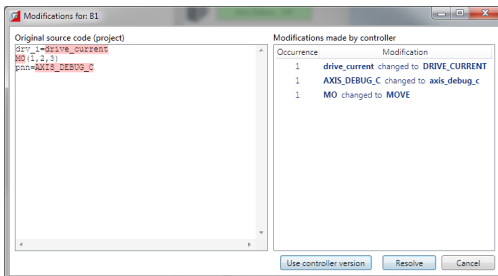
All the letters in a keyword are always upper case whereas all the letters in a variable name are always lower case.

When this occurs a warning dialog will be displayed to show that the controller has made changes to the program.

The user now has the choice of resolving the differences using the program modifications dialog or cancelling. If you cancel it is then possible to resolve differences by doing another project check and manually resolving the differences using the “Resolve Differences” tool.

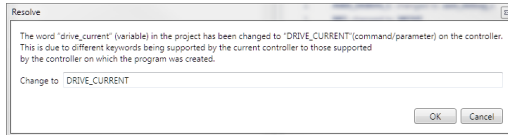


MODIFICATIONS DIALOG



This shows the original program source (on the PC) on the left and the changes made to it on the right. The user can resolve the differences by either using the controller version of the program or by clicking on the “Resolve” button which steps through the differences to allow the user to make a decision for each one using the “Resolve” dialog.

RESOLVE DIALOG



The new value for the word to resolve is automatically filled in using the value obtained from the controller. The user can type any valid keyword, variable name, or number to replace the word in the source file. Clicking on “OK” makes the change and clicking on “Cancel” cancels the whole resolution process.

Program Types

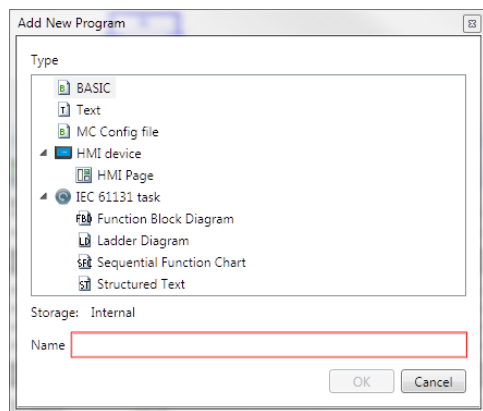
Motion Perfect supports several different program types as follows:

Icon	Type	Note
	TrioBASIC	
	Encrypted TrioBASIC	This type of file can only be written to a controller, it cannot be read. It is produced by encrypting a normal TrioBASIC program.
	Text	This is textural information stored on the controller and does not represent a runnable program.
	IEC Task	Consists of one or more of the IEC program types below.
	IEC Ladder Diagram	
	IEC Structured Text	
	IEC Function Block Diagram	
	IEC Sequential Function Chart	

Creating a New Program

A new program can be created by Selecting “Program / New” from the main menu or by selecting “New” from the “Programs” item in the controller menu.

The “New Program” dialog is launched. This allows the user to select the type of program required and enter a name. Clicking on “OK” will create the new program.



This is only available while connected in Sync Mode.

Program Editor

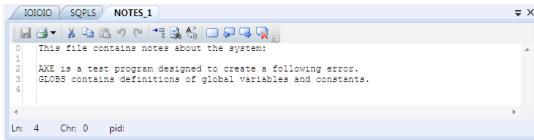
The Program Editor is used to edit TrioBASIC program files and text files which form part of a *Motion Perfect* project and to provide debugging facilities for TrioBASIC programs.

```

19 *****
20 DECEL = baseaccel * 2
21 SPEED = basespeed
22 SERVO = OFF
23 WA(100)
24 SERVO = servostate
25 WAIT(0)
26
27 BASE(baseaxle)
28
29 ticknow=ticks
30 WDOG=ON
31
32 main_loop:
33 WHILE 1
34 IF TICKS < ticknow THEN
35   ticknow=ticks
36 ENDIF
37 IF TICKS > ticknow + tickwait THEN
38   PRINT#, "trigger="
39   TRIGGER
40 ENDIF
41 MOVEABS(0,0)
42
43 lab1:
44 WAIT IDLE
45 WA(200)
46 d = 1
47
48 move_loop:
49 MOVECIRC(500,500,250,250,0)
50 MOVE(0,500)
51
52
53
54
55
56
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```

Editing a TrioBASIC program



Editing a text file















The editor performs in a similar way to most modern text editors. Editing functions are available for all supported program/file types, debugging functions and special formatting functions are only available when editing a TrioBASIC program.

EDITING FUNCTIONS

Editing functions are available from the Edit Toolbar:



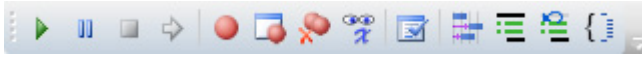
The available editing functions are as follows and apply to the current program/file being edited:

-  Save to disk
-  Print
-  Cut selected text to clipboard
-  Copy selected text to clipboard
-  Paste text from clipboard
-  Undo last operation
-  Redo last undone operation
-  Go to line or label
-  Find text
-  Replace text
-  Toggle bookmark on current line
-  Go to previous bookmark
-  Go to next bookmark
-  Clear all bookmarks














 Some editing functions are available on the Editor Context Menu.

DEBUGGING FUNCTIONS

Debugging functions are available from the Debug Toolbar.



The available debugging functions are as follows and apply to the current program being edited:

-  Run
-  Pause/Step
-  Stop
-  Go to current execution line (when stepping program)
-  Toggle breakpoint on current line
-  Show all breakpoints
-  Remove all breakpoints
-  Watch variable
-  Compile program
-  Auto-format text
-  Comment out selected lines
-  Un-comment selected lines
-  Go to end/start of scope (program structure) which starts/ends on the current line



Some debugging functions are available on the Editor Context Menu.


OPERATION

Although the editor appears to work like any other text editor it has one main difference. Each line of text is sent to the connected controller as it is entered or edited. This means that the controller is always kept up to date with changes. The controller is used to perform syntax checking when editing a TrioBASIC program, removing any possibility that the syntax is checked against out of date rules. All compiling and debugging operations are also carried out on the actual controller.

The general appearance of the editor can be customized using the Program Editor pages in the main Options Dialog.

WATCHING VARIABLES

The values of variables can be watched while a program is running or being stepped. This is done using the “Watch Variables” tool, which can be used to monitor both local and VR variables.

To add a variable to the watch list, select the variable name (including index if a VR) in the editor, then select “Watch Variable” from the context menu or click on the  icon in the editor toolbar. Alternatively, if the “Watch Variables” tool is open, select the variable name then drag and drop it into the “Watch Variables” tool.

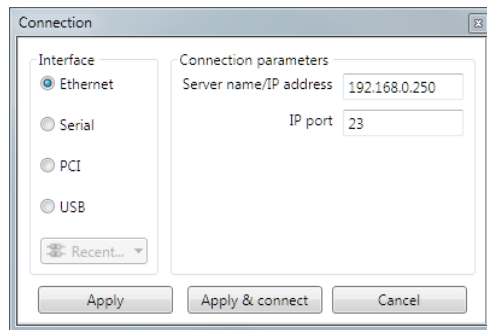
Connection Dialogue

The connection dialog allows the user to configure a communications interface in order to connect to a controller. Ethernet, Serial, PCI and USB interfaces are supported by *Motion Perfect*. It is possible to select a communications interface and configure it manually or choose from recently used connections.

RECENT CONNECTIONS

To choose a recent connection, click on the “Recent” button and choose a connection from the drop-down list.

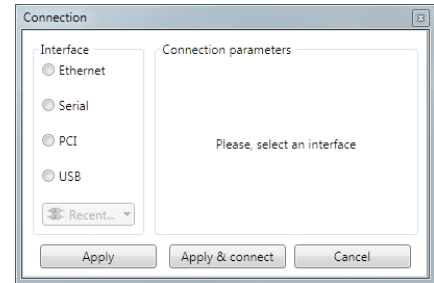
ETHERNET



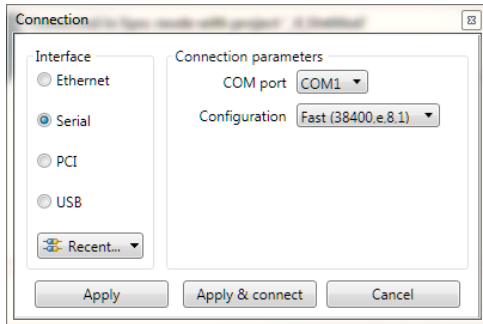
It is possible to change the server IP address (IP address of the controller) and the IP port on which it communicates.



By default a controller will expect a connection from *Motion Perfect* to be made on port 23.

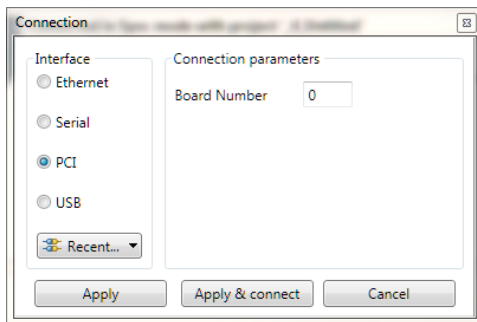


SERIAL



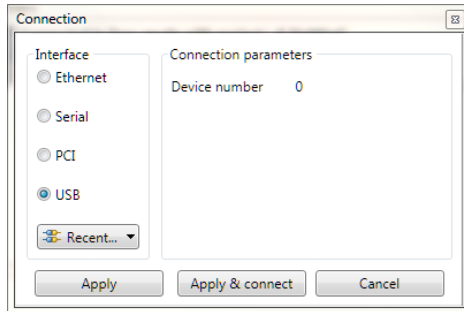
It is possible to select the COM interface and the configuration (serial link parameters) from a choice of Slow (9600,e,7,2) and Fast (38400,e,8,1), these being the default settings for series 2 & 3 Trio *Motion Coordinators*.

PCI



It is possible to select the board number. Board numbers are allocated when the PC is started up and is enumerated between 0 and the one less than the number of Trio PCI cards connected.

USB



It is possible to select the device number. Device numbers are allocated when the PC is started up and when devices are added or removed. It is normally enumerated between 0 and the one less than the number of Trio USB devices connected. Because of the nature of the internal scanning process which enumerates USB devices and the possibility that devices are added or removed after the initial scan has completed, a given device may not always have the same device number.

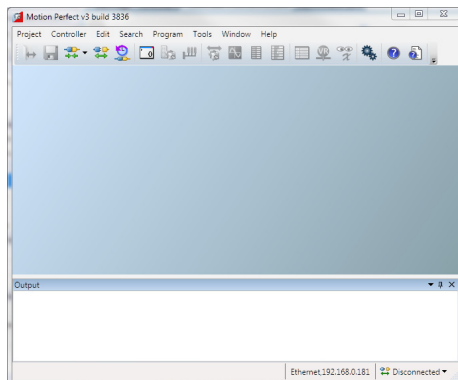


It is recommended that only one Trio USB device be connected to a PC at any one time.

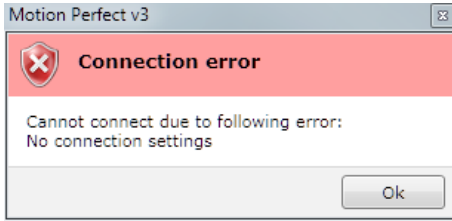
Initial Connection

To make the initial connection to a controller:

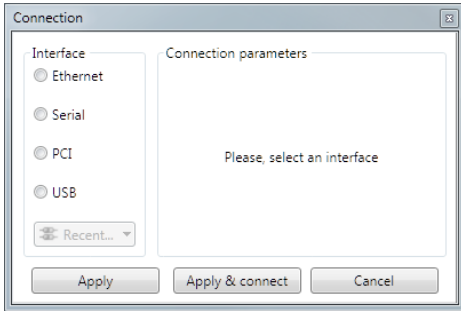
1. Make sure that your controller is powered up and connected to the computer
2. Start *Motion Perfect 3*. Once it has started up the initial screen should be displayed.



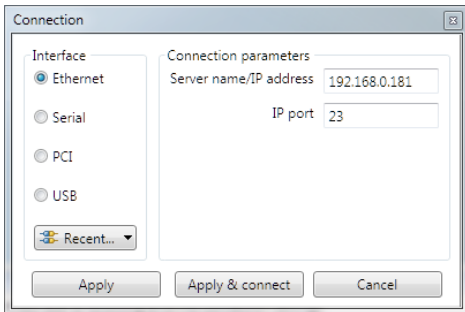
3. Select “Connect in Direct mode” from the “Controller” menu. As *Motion Perfect* has not been connected before the “Connection Error” dialog will be displayed.



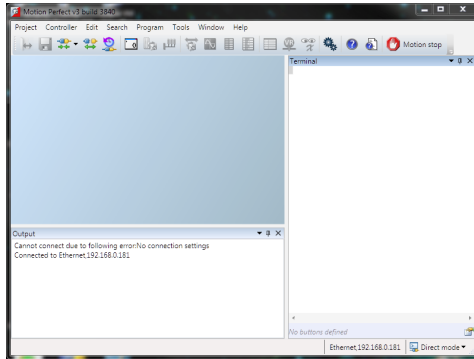
4. Click on the “OK” button. The “Connection” dialog will then be displayed.



5. Select the communications interface used by your controller (this will usually be Ethernet), then enter its parameters. For an Ethernet connection this will be the IP address (default 192.168.0.250) and the TCP port (default 23).



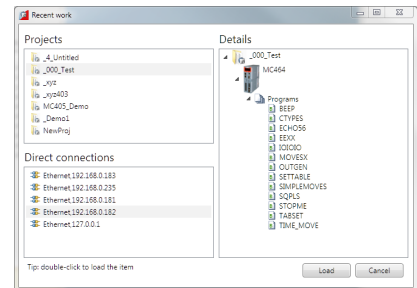
6. Click on the “Apply & Connect” button. The “Connect” will close and *Motion Perfect* will go into Direct Mode with an active Terminal tool.



Motion Perfect will remember the last used connection parameters and will automatically try and use them when reconnecting in Direct Mode in the future.

Recent Work Dialogue

The “Recent Work Dialog” lists recently used projects and connections to allow the user to quickly switch to a different, recently used, project or connection. When a project is selected the “Details” pane on the right of the dialog shows the contents of the project, otherwise, if a connection is selected it shows connection details. Clicking on the load button will load the selected project or connect using the selected connection.



Tools

Motion Perfect 3 has several tools which are used to monitor the controller and interact with it. Some tools are built into *Motion Perfect*, others are implemented as add-ons. The add-on mechanism allows the easy addition of extra tools in the future. Most tools are available in both “Tool Mode” and “Sync Mode”.







BUILT-IN TOOLS





Terminal - direct interaction with the controller’s command line and character I/O



Axis Parameters - view and change the control parameters for each axis

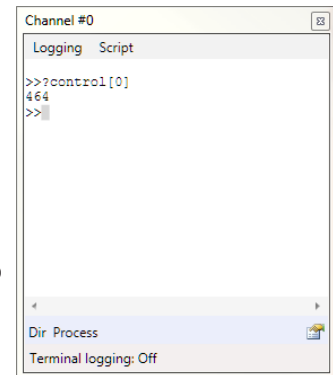
-  Digital I/O Viewer - view and change digital I/O values
-  Analogue I/O Viewer - view and change analogue I/O values
-  Table Viewer - view and change values in **TABLE** memory
-  VR Viewer - view and change global VR variables
-  Variable Watch - view and change program internal variables
- Options - change the configuration options for *Motion Perfect*
- Diagnostics - enable and disable diagnostic functions
-  Jog Axes - manually jog the control axes

ADD-ON TOOLS

-  Oscilloscope - capture and view parameters graphically
-  Intelligent Drives – configure intelligent drives

Terminal

The “Terminal” tool allows the user to interact directly with the controller, either with the command line (channel 0) or with user programs (channel 5, 6 or 7). Characters typed on the keyboard are sent to the controller and characters output by the controller are displayed in the terminal window.



TERMINAL MENU

The menu controls terminal logging and scripting.

TERMINAL LOGGING

When logging is active all the data displayed on the terminal is also written to a file. The name of the log file is displayed in the status bar at the bottom of the terminal window.

TERMINAL SCRIPTING (ONLY AVAILABLE ON CHANNEL 0)

INTRODUCTION

Motion Perfect has built in support for simple terminal scripting. This allows the user to write files of commands and then send the file contents to the controller in a single operation. In addition to the commands to be sent to the controller there are some extra commands which are used by Motion Perfect to control the running of the script.

INTERACTION WITH THE CONTROLLER

Command lines are sent to the controller one at a time in sequence. Motion Perfect sends a command then waits to receive a prompt (>>) before sending the next one.

To not wait for a prompt put the two character sequence \& on the end of the line. These extra characters

are not sent to the controller.

SCRIPT COMMANDS

Script commands control the running of the script. All script commands start with two colons. The following commands are valid:

Command	Parameter	Description
::Timeout	timeout in seconds	Changes the time <i>Motion Perfect</i> waits for a prompt to be returned. The default value is 10 seconds.
::Wait	wait time in seconds	Wait and do nothing for the given time

e.g.:

```
::Timeout 55
```

sets the timeout to 55 seconds

TESTS

Special support has been added in order to enable the use of scripts for testing purposes. The response from a command can be tested by Motion Perfect and the results written to a log file. A test is written on the line after the one whose response is to be tested and consists of a single ^ character followed by a list of alternative responses separated by single | characters. The comparison is done as a string comparison after all leading and trailing spaces have been removed.

e.g.:

```
^12.0000|13.0000
```

gives a **PASS** if the returned string is “12.0000” or “13.0000”, otherwise a **FAIL**.

The **PASS** or **FAIL** state of each test is logged in the log file and a summary of passes and failures is given at the end.

EDITING SCRIPTS

To edit or write a new script, select “Script / Edit” from the terminal window menu.

RUNNING SCRIPTS

To run a script normally, select “Script / Run” from the terminal window menu. This does not produce a log of what has happened.


To run a script with full logging, select “Script/Run logged” from the terminal window menu. The log will contain a full log of what has happened including test results.

To run a script in test mode, select “Script/Run Test” from the terminal window menu. This will produce a log containing only test failures and a **PASS/FAIL** summary.

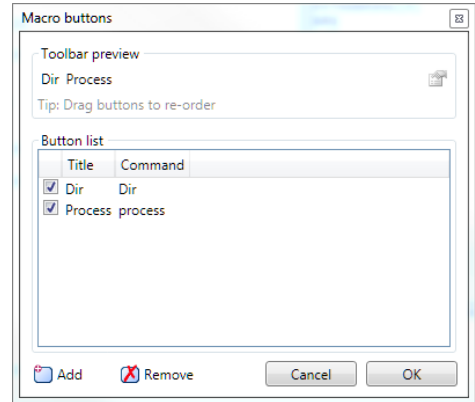
CONTEXT MENU

Entries allow the user to clear the terminal display, and copy and paste text in the terminal window.

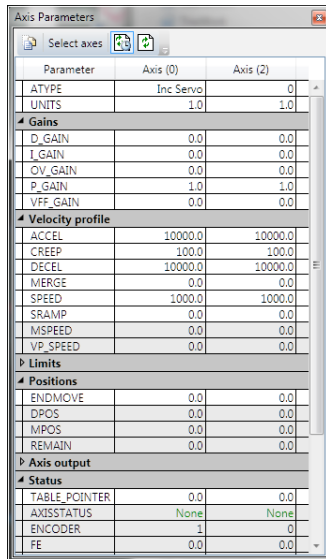
MACRO BUTTONS

There are a row of user configurable macro buttons above the status bar at the bottom of the terminal window. The user can configure these to send often used strings (commands) to the controller. To configure these buttons click on the  icon at the right of the macro button bar. This will cause the “Terminal Macro Buttons” dialog to be displayed.

The “Add” button will add an entry in the button list and the “Remove” button will remove the selected entry. The title of is the text which is displayed in the button in the terminal window. The command is the string of characters sent to the controller. A carriage return character will be appended to the string when it is sent.



Axis Parameters

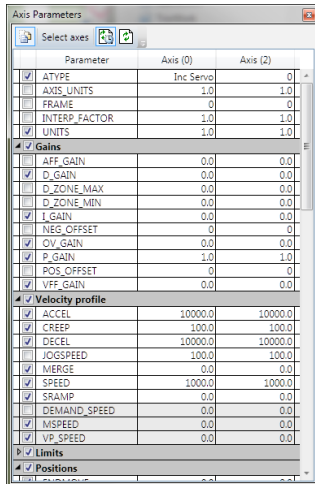


The Axis Parameters window enables the user to monitor and change the motion parameters for any axis on the controller. The display is made up of collapsible groups of parameters. This is done to make locating a parameter in the display easier and also allows the hiding of whole groups of parameters so that only parameters of interest are shown. It is also possible to individually show or hide individual parameters.

Parameters which can be edited have the normal edit box background and those which are read-only have a greyed-out background.

VIEWS

There are two main views; filtered view which shows selected parameters (see above) and all parameter view which allows the selection of individual parameters for the filtered view. Normally the filtered view is used. The view is selected by using the “all parameters” toggle button on the left of the window’s toolbar.



The “all parameters” view has a check box next to each parameter and group. If the box is checked then the corresponding parameter or group is displayed in the filtered view, otherwise it is hidden.

EDITING A PARAMETER

To enter a new value for a parameter:

1. select its cell in the grid
2. type a new value

To edit a parameter:

1. double click on its cell in the grid


Digital I/O Viewer

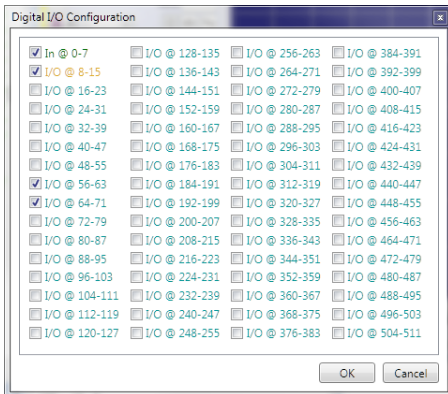
The digital I/O viewer is used to show the states of the digital inputs and outputs of the controller (both local and remote).

In	I/O	I/O	I/O
0	8	56	64
1	9	57	65
2	10	58	66
3	11	59	67
4	12	60	68
5	13	61	69
6	14	62	70
7	15	63	71



The display divides the I/O address space up into blocks of 8 lines. Usually all the lines in a block are the same type. The types available and their associated colours are shown in the table below:

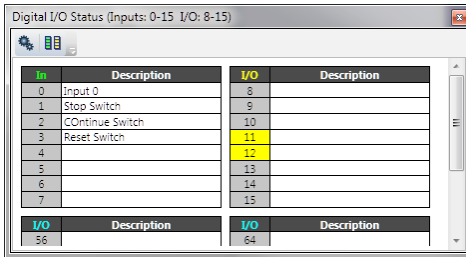
Type	Colour
Input	Green
Output	Orange
Input/Output	Yellow
Virtual Input/Output	Cyan

It is possible to change which banks are displayed by clicking on the “Configuration” button  which then displays the configuration dialog.



Using this dialog the user can select which banks of I/O lines to display.

Each i/o line can be given a description. The description can be shown or hidden by clicking on the “Show/Hide Descriptions” button  or .




IN	Description	I/O	Description
0	Input 0	8	
1	Stop Switch	9	
2	Continue Switch	10	
3	Reset Switch	11	
4		12	
5		13	
6		14	
7		15	
I/O	Description	I/O	Description
56		64	

Analogue I/O Viewer

The analogue input viewer is used to show the values measured on the analogue inputs of the controller (both local and remote).

The tool normally displays inputs selected by the user. This defaults to showing all inputs until the user has selected which inputs to show. The value shown for each input is the raw value decoded by the hardware.

Clicking on the “Show All Inputs” button  in the toolbar toggles the display between the normal (filtered) display and the “All Inputs” display.

In “All Inputs” display mode there is a check box for each input to determine which inputs are displayed in normal mode. When in normal mode only the inputs which are checked will be displayed.

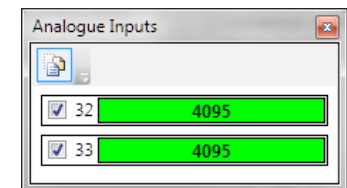
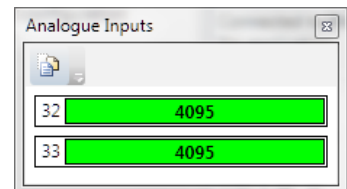


Table Viewer

Address	Value
Range: [0-3]	
0	1000
1	1000
2	1000
3	1000
Range: [40-46]	
40	-56.472
41	-2.405
42	0
43	12.77
44	54.703
45	133.952
46	253.21

The Table Viewer tool allows the user to view and edit ranges of **TABLE** memory.

VIEWING A RANGE




To add a range of **TABLE** values to the display click on the “New Range” button in the toolbar. This will bring up the “Select Range” dialog to allow the user to specify the range required.

After a range has been added to the viewer it can be edited by clicking on the corresponding range display in the tree (blue numbers), collapsed or expanded by clicking on the corresponding arrow in the tree, or deleted by on the corresponding red cross in the tree.

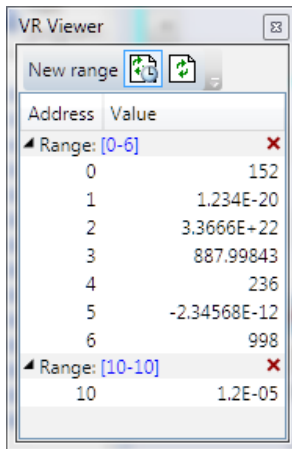
EDITING A VALUE

A value can be overwritten by clicking on it and entering a new value. A value can be edited by double clicking on it. In both of these cases the value is written to the controller when the “Enter” key is pressed. Pressing the “Esc” key will abort the edit. Changes can be made whilst programs are running.

REFRESHING THE VALUES DISPLAYED

The displayed valued can be updated automatically using periodic polling of the controller or manually when the user clicks on the refresh button . Automatic refresh is controlled by the “Periodic update” button. Clicking on the periodic update button changes its state from “Polling”  to “Not Polling” . The update rate can be changes on the “General” tab of the main application options dialog.

VR Viewer

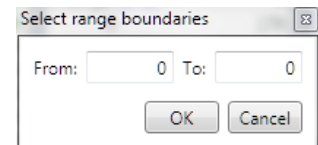


The VR Viewer tool allows the user to view and edit ranges of VR values.

VIEWING A RANGE

To add a range of VRs to the display click on the “New Range” button in the toolbar. This will bring up the “Select Range” dialog to allow the user to specify the range required.




After a range has been added to the viewer it can be edited by clicking on the corresponding range display in the tree (blue numbers), collapsed or expanded by clicking on the corresponding arrow in the tree, or deleted by on the corresponding red cross in the tree.



EDITING A VALUE

A value can be overwritten by clicking on it and entering a new value. A value can be edited by double clicking on it. In both of these cases the value is written to the controller when the “Enter” key is pressed. Pressing the “Esc” key will abort the edit. Changes can be made whilst programs are running.

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Watch Variables

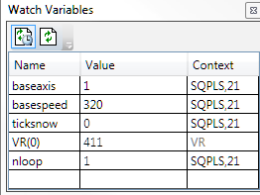
The “Watch Variables” tool allows the user to look at the values of program internal variables and global variables while a program is running or stepping.

ADDING VARIABLES

The methods of adding variables to be watched is covered in the “Program Editor” section under “Watching Variables”.

VARIABLE INFORMATION


The entry for each variable contains the name of the variable, its present value (blank if not yet read) and its context. The context is either “VR” denoting a global VR variable or the program name and the process on which it is running.



Name	Value	Context
baseaxis	1	SQPLS,21
basespeed	320	SQPLS,21
ticksnow	0	SQPLS,21
VR(0)	411	VR
nloop	1	SQPLS,21

UPDATING

The displayed values can be automatically updated periodically. Periodic updating enabled or disabled by clicking on the “Toggle Periodic Updating” button ( when enabled,  when disabled).

Clicking on the refresh button  will cause the values to be updated regardless of the state of periodic updating.

CHANGING VALUES

Values can be edited by double clicking on the value in the grid and pressing the “Return” key. The act of pressing the “Return” key sends the value to the controller.

Options Dialogue

The options dialog has several pages of options for various tools in Motion Perfect. The page displayed is controlled by a tree control on the left of the dialog.

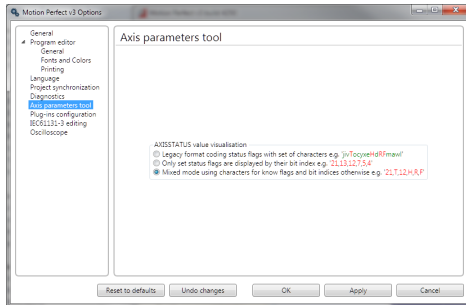
The following can be selected from the tree:

- General
- Program editor
- Language
- Project synchronization
- Diagnostics
- Axis Parameters Tool
- Plug-ins

Plugin options pages. These depend on which plugins are installed but may include:

- Oscilloscope
- IEC61131-3 Editing
- **HMI** Editing

Options - Axis Parameters Tool



AXISSTATUS VISUALIZATION

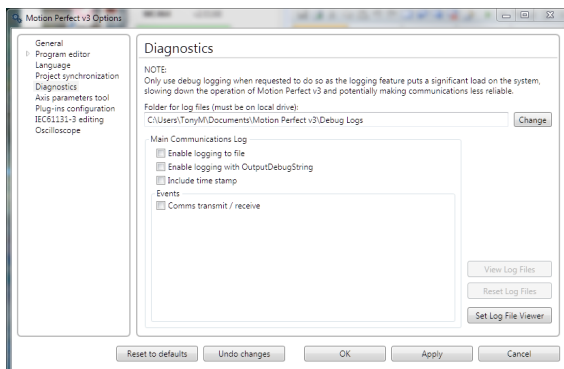
This controls how the **AXISSTATUS** parameter is displayed in the parameter grid. The parameter can be displayed in one of three ways:

- **Legacy Format** – This is the same as *Motion Perfect 2* and shows each known status bit as an alphabetic character, lower case green for clear, upper case red for set.
- **Numeric Set Flag Format** – This shows all known set status bits as their bit number. No clear bits are shown.
- **Mixed Set Flag Format** – This shows all known set bits as an alphabetic character and all unknown set bits as their bit number. No clear bits are shown.



Unknown flag bits can occur when new features are added to a controller.

Options - Diagnostics



This page give options for diagnostics functions used to aid Trio Motion Technology in finding and rectifying faults in *Motion Perfect*.



DIAGNOSTIC FUNCTIONS SHOULD ONLY BE ENABLED ON INSTRUCTION FROM TRIO MOTION TECHNOLOGY AS THEY REDUCE THE APPLICATION'S PERFORMANCE AND CAN LEAD TO THE APPLICATION BEING LESS RELIABLE.

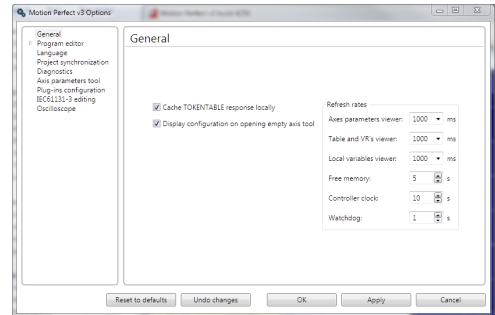
Options - General

Options are available for the following:

TOKEN TABLE CACHING

When “Cache **TOKENTABLE** response locally” is checked, token table data for each controller type and system version used is stored on the PC. The token data is used by *Motion Perfect* to check that certain TrioBASIC commands are supported on the controller. If the token table data is not cached locally then it has to be read from the controller every time *Motion Perfect* connects in Tool Mode or Sync Mode.

Token table caching should be left enabled in order to speed up the connection process. The only time when it may need to be disabled is if special versions of controller system software (provided by Trio Motion Technology) are used on a controller.



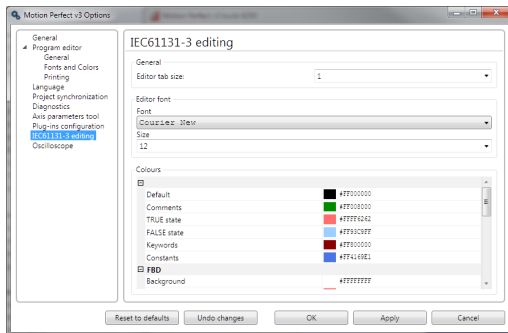
DISPLAY CONFIGURATION ON OPENING EMPTY AXIS TOOL

When checked, opening a tool which displays axis date will open an axis selection dialog if no axes have been previously selected.

REFRESH RATES

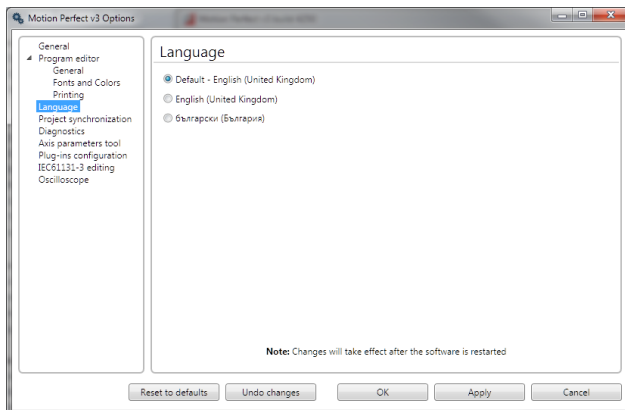
This allows the user to select the update rates used by various tools and monitoring processes. If a tool is set to update too frequently it may interfere with the operation of other tools due to the limited bandwidth of the communications link,

Options - IEC 61131 Editing



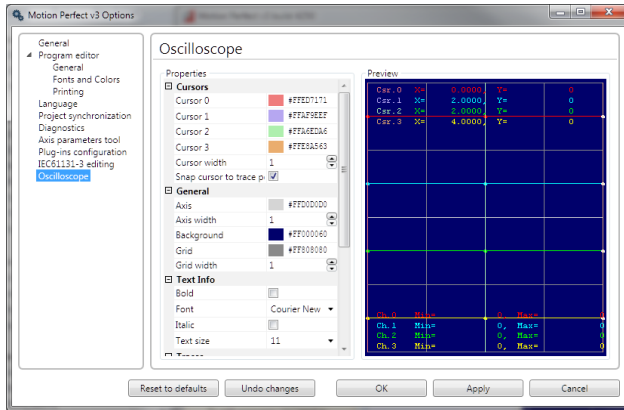
This allows the user to select options for the IEC61131-3 program editors. Some sections are common to all IEC61131-3 editors, others specific to the IEC61131-3 program type.

Options - Language



This allows the user to choose which of the available languages will be used by *Motion Perfect* to display text in the user interface. English (UK) will always be available, the availability of other languages may vary with application version.

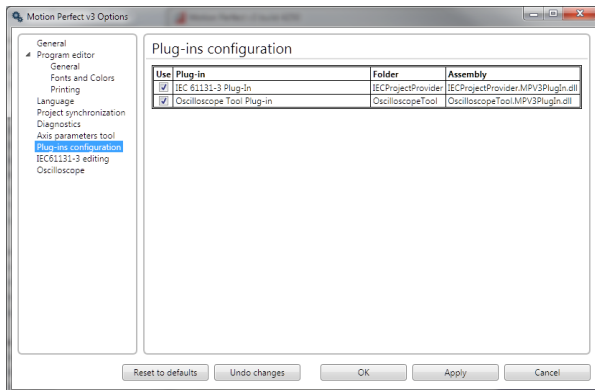
Options - Oscilloscope



This allows the user to change the display parameters used by the oscilloscope including:

- Background colour
- Grid colour and line thickness
- Trace colour, line thickness and data point size
- Cursor colour and line thickness
- Font used to display text
- Scale matching for X/Y plots
- Data set buffering for X/Y plots

Options - Plug-ins

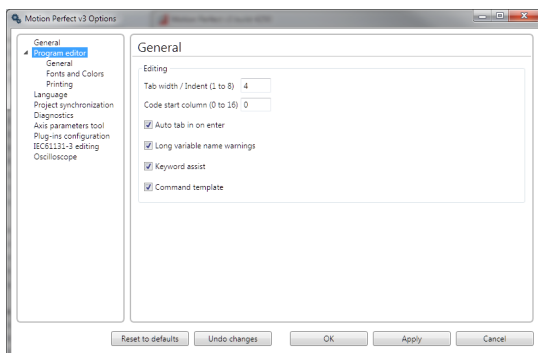


This page lists all the installed plug-ins and allows the user to enable or disable each one by means of a check box.

Options - Program Editor

The program editor options are controlled using three different pages:

PROGRAM EDITOR – GENERAL PAGE



This page specifies the options for automatic assistance whilst editing:

Tab width - the number of spaces to use for tabs

Code start column - the start column for line of TrioBASIC code when auto-formatting (label definition lines always start in column 0).

Auto-tab on enter - When checked enters spaces at the start of the new line to match the start column of the current line.

Long variable names warning - If checked the user is warned if a variable name is longer than the unique name size supported by the controller.

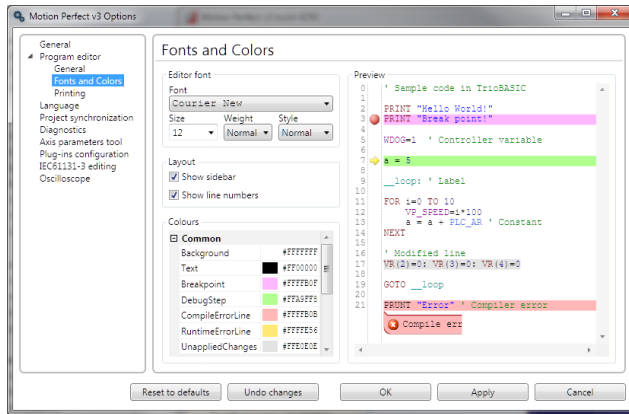


Variable names can be longer than the unique name size but the controller only checks the first “unique name size” characters for uniqueness.

Keyword assist - If checked the user is presented with a list of possible keywords as a keyword (or variable name) is being typed in.

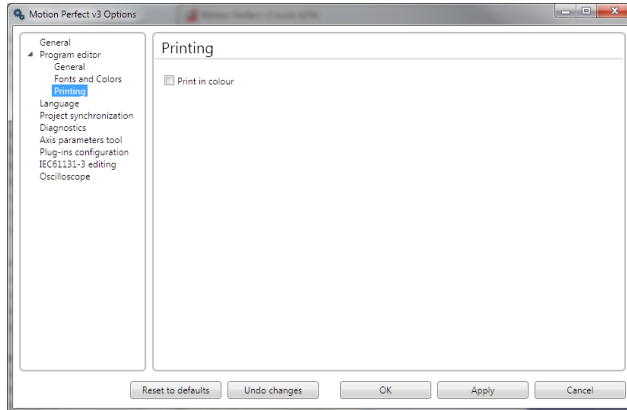
Command template - If checked, when the user types a command which has parameters in brackets, a template is displayed to remind the user of the parameters.

PROGRAM EDITOR – FONTS PAGE



This page allows the user to specify which font is to be used in the editor (including its weight and size). It also specifies the colours used for editing and debugging including syntax highlighting of TrioBASIC programs.

PROGRAM EDITOR – PRINTING PAGE

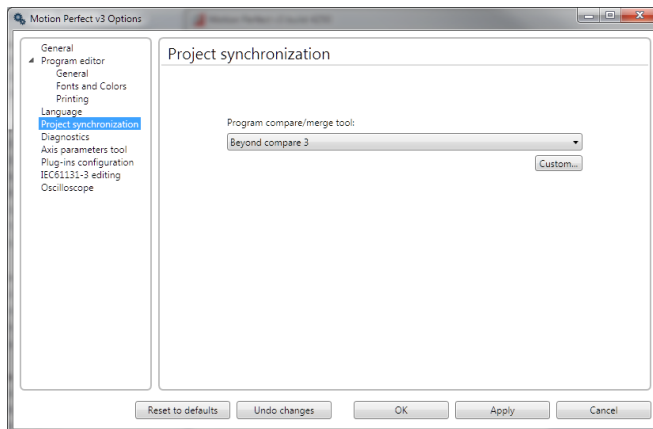


This page controls how program listings are printed.

PRINT IN COLOUR

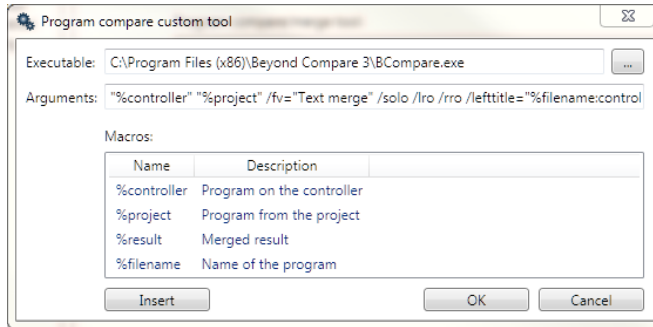
If this is checked then the printout is coloured using the same syntax highlighting colouring scheme as the editor screen display. Otherwise the printout is done in monochrome.

Options - Project Synchronization



This allows the user to select a program to use to compare the difference between the copy a program on the controller and the one in the project. It allows the user to configure any program which can compare text files. A list of common text file comparison programs is given in the drop down list.

Clicking on the “Custom” button will display the “Program Compare custom tool” dialog which allows the user to specify any suitable program already installed on the PC and which command line arguments are to be used.



If you do not have a suitable text file compare program installed on your computer, WinMerge can be downloaded free of charge from winmerge.org

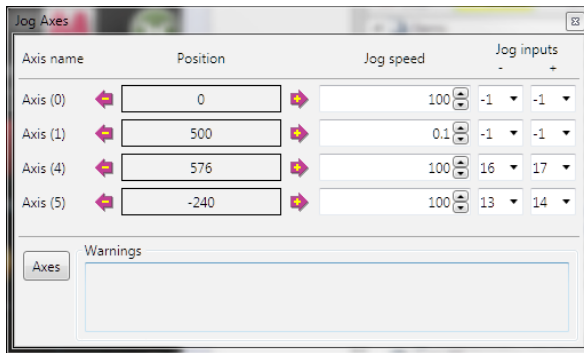
Diagnostics

Motion Perfect has some built-in diagnostics which are designed to provide useful information in diagnosing some communications problems and possibly problems with *Motion Perfect* functionality. Diagnostic functions should not be used unless requested to do so by Trio Motion Technology, as enabling diagnostics increases the load on the application and can, in some cases, lead to unreliability.

See “Options - Diagnostics”

Jog Axes

The Jog Axes tool allows the user to move the axes on the *Motion Coordinator*.



This tool takes advantage of the bi-directional I/O channels on the *Motion Coordinator* to set the jog inputs. The forward, reverse and fast jog inputs are identified by writing to the corresponding axis parameters and are expected to be connected to NC switches. This means that when the input is on (+24V applied) then the corresponding jog function is **DISABLED** and when the input is off (0V) then the jog function is **ENABLED**.

The jog functions implemented here disable the fast jog function, which means that the speed at which the jog will be performed is set by the **JOGSPEED** axis parameter. What is more this window limits the jog speed to the range 0..demand_speed, where the demand_speed is given by the **SPEED** axis parameter.

Before allowing a jog to be initiated, the jog window checks that all the data set in the jog window and on the *Motion Coordinator* is valid for a jog to be performed.

JOG REVERSE

This button will initiate a reverse jog. In order to do this, the following check sequence is performed:

- If this is a **SERVO** or **RESOLVER** axis and the servo is off then set the warning message
- If this axis has a daughter board and the WatchDog is off then set the warning message
- If the jog speed is 0 the set the warning message
- If the acceleration rate on this axis is 0 then set the warning message
- If the deceleration rate on this axis is 0 then set the warning message
- If the reverse jog input is out of range then set the warning message
- If there is already a move being performed on this axis that is not a jog move then set the warning message

If there were no warnings set, then the message “Reverse jog set on axis?” is set in the warnings window, the **FAST _ JOG** input is invalidated for this axis, the **CREEP** is set to the value given in the jog speed control and finally the **JOG _ REV** output is turned off, thus enabling the reverse jog function.

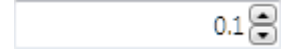
JOG FORWARD

This button will initiate a forward jog. In order to do this, a check sequence identical to that used for **Jog**

Reverse is performed.

JOG SPEED

This is the speed at which the jog will be performed. This window limits this value to the range from zero to the demand speed for this axis, where the demand speed is given by the **SPEED** axis parameter. This value can be changed by writing directly to this control or using the jog speed control. The scroll bar changes the jog speed up or down in increments of 1 unit per second



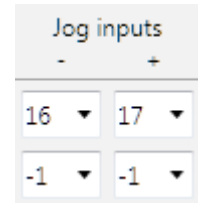
JOG INPUTS

These are the inputs which will be associated with the forward / reverse jog functions.

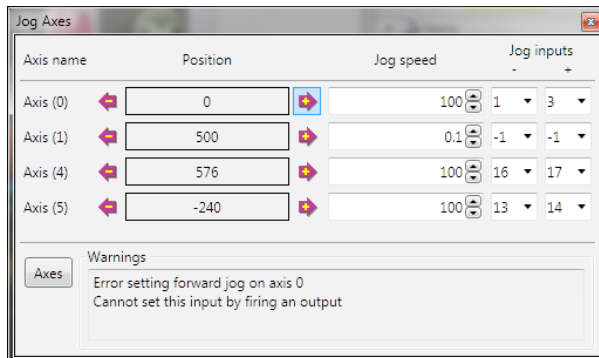
They must be in the range 8 to the total number of inputs in the system as the input channels 0 to 7 are not bi-directional and so the state of the input cannot be set by the corresponding output. Both real and virtual I/O lines can be used for jogging. The value -1 is shown when no input has been allocated for jogging.

The jog function depends on the state of the jog inputs as follows:

Jog -	Jog +	Function
OFF	OFF	Not defined
OFF	ON	Reverse Jog
ON	OFF	Forward Jog
ON	ON	No jog

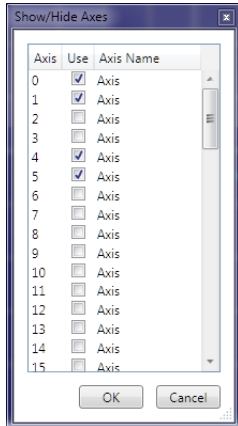


WARNINGS



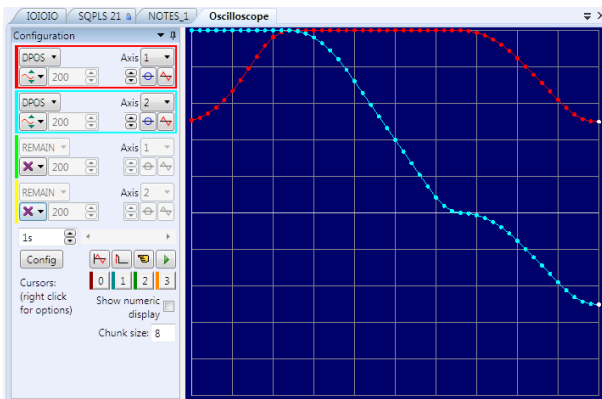
This shows the status of the last jog request. For example, the screen below shows axis 0 with IO channel 7 selected. This is an Input-only channel and therefore cannot be used in the jog screen.

AXES



This displays an axis selector box which enables the user to select the axis to include in the jog axes display. By default, the physical axes fitted to the controller will be displayed.

Oscilloscope



The software oscilloscope can be used to trace axis and motion parameters, aiding program development and machine commissioning.

There are four channels, each capable of recording at up to 1000 samples/sec, with manual cycling or program linked triggering.

The controller records the data at the selected frequency, and then uploads the information to the

oscilloscope to be displayed. If a larger time base value is used, the data is retrieved in sections, and the trace is seen to be plotted in sections across the display. Exactly when the controller starts to record the required data depends upon whether it is in manual or program trigger mode. In program mode, it starts to record data when it encounters a **TRIGGER** instruction in a program running on the controller. However, in manual mode it starts recording data immediately.

CONTROLS

There are four groups of controls, one for each of the oscilloscope's four channels, a group of horizontal function controls and a group to control up to four cursors.

OSCILLOSCOPE CHANNEL CONTROLS

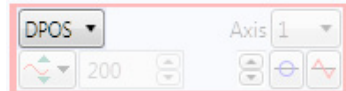
The controls for each of the four channels are grouped together and are surrounded by a coloured rectangle if the channel is ON, or a coloured bar to the left of the group if the channel is OFF. The colour is the same as the trace for that channel.



The group contains controls for channel operating mode, parameter selection and scaling.

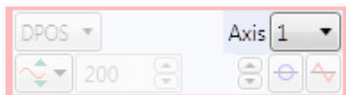
PARAMETER

The parameters which the oscilloscope can record and display are selected using the pull-down list box in the upper left hand corner of each channel control block. Depending upon the parameter chosen, the next label switches between 'axis' or 'ch' (channel). This leads to the second pull-down list box which enables the user to select the required axis for a motion parameter, or channel for a digital input/output or analogue input parameter. It is also possible to plot the points held in the controller table directly, by selecting the 'TABLE' parameter, followed by the number of a channel whose first/last points have been configured using the advanced options dialog. If the channel is not required then 'NONE' should be selected in the parameter list box.



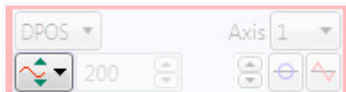
AXIS / CHANNEL NUMBER


A pull-down list box which enables the user to select the required axis for a motion parameter, or channel for a digital input/output or analogue input parameter. The list box label switches between being blank if the oscilloscope channel is not in use, 'axis' if an axis parameter has been selected, or 'ch' if a channel parameter has been selected.





OPERATING MODE

The channel operating mode controls how the trace is displayed and scaled



 Trace off - no data gathered, trace not displayed

 Automatic Scaling - data gathered - trace automatically scaled to fit display


 Manual Scaling - data gathered - trace manually scaled

 Frozen - no data gathered - trace displayed as it was when frozen

VERTICAL SCALING

In automatic mode the oscilloscope calculates the most appropriate scale when it has finished recording, prior to displaying the trace. The value shown is the value calculated by the oscilloscope.

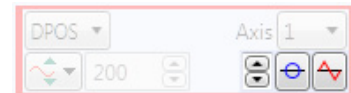
In manual mode the user selects the scale per grid division.


The vertical scale is changed by pressing the up/down scale buttons  on the left side of the current scale text box.



CHANNEL TRACE VERTICAL OFFSET

There are three controls which control the vertical offset of the trace:



 The Vertical Offset buttons are used to move a trace vertically on the display. This control is of particular use when two or more traces are identical, in which case they overlay each other and only the uppermost trace will be seen on the display.

 The Zero Offset button clears the vertical offset.

The auto-zero button, when active (in the down position), applies automatic vertical offset to the channel. The vertical offset and Zero Offset buttons are disabled (greyed out). This is equivalent to AC coupling on a conventional oscilloscope.



When not active the vertical offset manually set using the Vertical Offset buttons is applied. The vertical offset and Zero Offset buttons are enabled.

OSCILLOSCOPE HORIZONTAL CONTROLS

The oscilloscope horizontal controls appear towards the bottom of the oscilloscope control panel. From here you can control such aspect as the timebase, triggering modes and memory used for the captured data.



TIMEBASE

The required time base is selected using the up/down scale buttons on the left side of the current time base scale text box. The value selected is the time per grid division on the display.

If the time base is greater than a predefined value, then the data is retrieved from the controller in sections (as opposed to retrieving a complete trace of data at one time.) These sections of data are plotted on the display as they are received, and the last point plotted is seen as a white spot.

After the oscilloscope has finished running and a trace has been displayed, the time base scale may be changed to view the trace with respect to different horizontal time scales. If the time base scale is reduced, a section of the trace can be viewed in greater detail, with access provided to the complete trace by moving the horizontal scrollbar.




HORIZONTAL SCROLLBAR

Once the oscilloscope has finished running and displayed the trace of the recorded data, if the time base is changed to a faster value, only part of the trace is displayed. The remainder can be viewed by moving the thumb box on the horizontal scrollbar.



Additionally, if the oscilloscope is configured to record both motion parameters and plot table data, then the number of points plotted across the display can be determined by the motion parameter. If there are additional table points not visible, these can be brought into view by scrolling the table trace using the horizontal scrollbar. The motion parameter trace does not move.

HORIZONTAL DISPLAY MODE

Button up  = x/t (timebase) mode.

This is the normal operation mode for an oscilloscope where each set of gathered data is plotted against time.

Button down  = x/y mode.

Channels are grouped in pairs and the values from one channel are plotted against the values of the other one in the pair.



ONE SHOT / REPEAT TRIGGER MODE

Button up  = One Shot Trigger Mode.

In one-shot mode, the oscilloscope runs until it has been triggered and one set of data recorded by the controller, retrieved and displayed.

Button down  = Continuous (Auto-repeat) Trigger Mode.

In continuous mode the oscilloscope continues running and retrieving data from the controller each time it is



re-triggered and new data is recorded. The oscilloscope continues to run until the trigger button is pressed for a second time.

MANUAL/PROGRAM TRIGGER MODE

The manual/program trigger mode button toggles between these two modes. When pressed, the oscilloscope is set to trigger in the program mode, and two program listings can be seen on the button. When raised, the oscilloscope is set to the manual trigger mode, and a pointing hand can be seen on the button.



Button up  = Manual Trigger Mode:


In manual mode, the controller is triggered, and starts to record data immediately the oscilloscope trigger button is pressed.

Button down  = Program Trigger Mode:




In program mode the oscilloscope starts running when the trigger button is pressed, but the controller does not start to record data until a **TRIGGER** instruction is executed by a program running on the controller. After the trigger instruction is executed by the program, and the controller has recorded the required data. The required data is retrieved by the oscilloscope and displayed.

The oscilloscope stops running if in one-shot mode, or it waits for the next trigger on the controller if in continuous mode

TRIGGER BUTTON

When the trigger button  is pressed the oscilloscope is enabled. If it is manual mode the controller immediately commences recording data. If it is in program mode then it waits until it encounters a trigger command in a running program.



After the trigger button has been pressed, it changes to  (stop) whilst the oscilloscope is running. If the oscilloscope is in the one-shot mode, then after the data has been recorded and plotted on the display, the trigger button returns to  indicating that the operation has been completed. The oscilloscope can be halted at any time when it is running by pressing the  button.

CONFIG. BUTTON

Clicking in the **Config.** button causes *Motion Perfect* to display the Capture Configuration Dialog.



OSCILLOSCOPE CURSORS

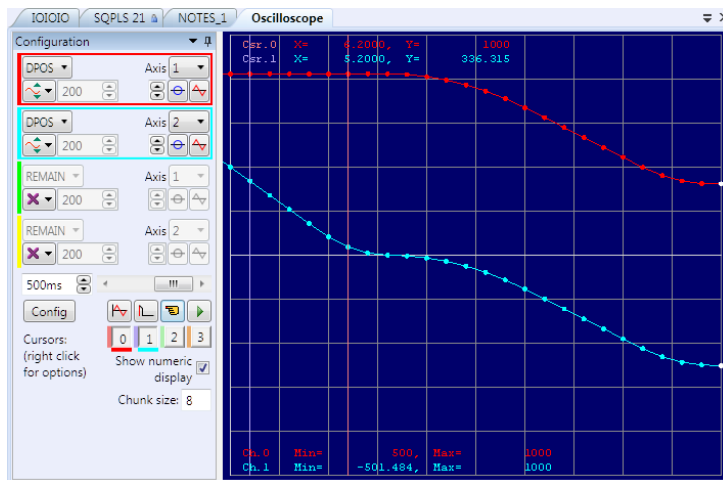
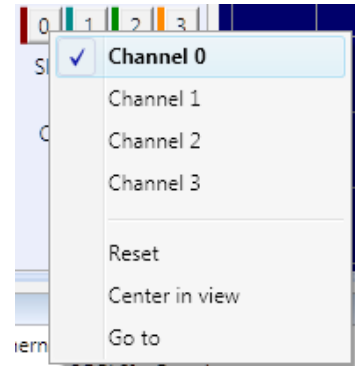
The cursor bars are enabled/disabled by clicking on one of the cursor buttons which shows/hides the corresponding cursor. A cursor can be moved by positioning the mouse cursor over the required bar, holding down



the left mouse button, and dragging the bar to the required position. Cursors are automatically allocated to the first channel currently enabled. To allocate a cursor to a different channel, right click on its button and choose the desired channel from the pop-up menu. When a cursor is active a coloured bar representing the channel to which the cursor has been allocated is displayed under the cursor's button.

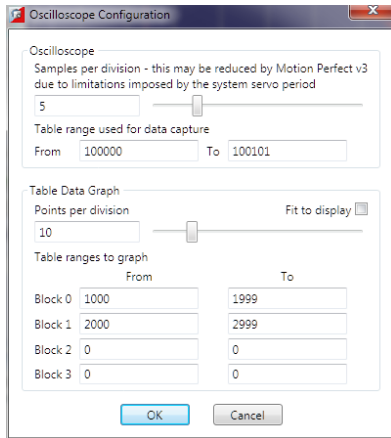
The cursor (right click) menu allows the user to assign the cursor to a channel and also contains **Reset** which resets the cursor position to a position close to the start of the display and **Go To** which scrolls the display so that the cursor is visible (only if zoomed in).

If the **Show numeric display** box is checked then the numeric display is enabled, this shows maximum and minimum values for all enabled traces at the bottom of the oscilloscope display and the positions of the active cursors at the top.



CAPTURE CONFIGURATION

When the **Config** button is pressed the oscilloscope capture configuration dialog is displayed, as shown below. Click the mouse button over the various controls to reveal further information.



SAMPLES PER DIVISION

The oscilloscope defaults to recording five points per horizontal (time base) grid division. This value can be adjusted using the adjacent scrollbar.

To achieve the fastest possible sample rate it is necessary to reduce the number of samples per grid division to 1, and increase the time base scale to its fastest value (1 servo period per grid division).

It should be noted that the trace might not be plotted completely to the right hand side of the display, depending upon the time base scale and number of samples per grid division.

OSCILLOSCOPE TABLE VALUES

The controller records the required parameter data values in the controller as table data prior to uploading these values to the scope. By default, the lowest oscilloscope table value used is zero. However, if this conflicts with programs running on the controller which might also require this section of the table, then the lower table value can be reset.

The lower table value is adjusted by setting focus to this text box and typing in the new value. The upper oscilloscope table value is subsequently automatically updated (this value cannot be changed by the user), based on the number of channels in use and the number of samples per grid division. If an attempt is made to enter a lower table value which causes the upper table value to exceed the maximum permitted value on the controller, then the original value is used by the oscilloscope.

TABLE DATA GRAPH

It is possible to plot controller table values directly, in which case the table limit text boxes enable the user to enter up to four sets of first/last table indices.

PARAMETER CHECKS

If analogue inputs are being recorded, then the fastest oscilloscope resolution (sample rate) is the number of analogue channels in milliseconds (i.e. 2 analogue inputs infers the fastest sample rate is 2msec). The

resolution is calculated by dividing the time base scale value by the number of samples per grid division.

It is not possible to enter table channel values in excess of the controllers maximum **TABLE** size, nor to enter a lower oscilloscope table value. Increasing the samples per grid division to a value which causes the upper oscilloscope table value to exceed the controller maximum table value is also not permitted.

If the number of samples per grid division is increased, and subsequently the time base scale is set to a faster value which causes an unobtainable resolution, the oscilloscope automatically resets the number of samples per grid division.

Before the oscilloscope is triggered a sample quantization check is done to make sure that it is possible to gather the data at the sample interval requested. This may cause the number of samples per division to be adjusted so that the controller is able to gather the data at a sample period which is a whole number of servo cycles.

OPTIONS

The oscilloscope options are used to control the visual look of the oscilloscope display. Most colours and line thicknesses can be set, allowing the user to set up the oscilloscope to their own preference.

The **X/Y mode only** settings control the matching of the two channels used to capture X/Y data and the number of data sets buffered (and displayed) when in X/Y mode.

General Oscilloscope Information

DISPLAYING CONTROLLER TABLE POINTS

If the oscilloscope is configured for both table and motion parameters, then the number of points plotted across the display is determined by the time base (and samples per division). If the number of points to be plotted for the table parameter is greater than the number of points for the motion parameter, the additional table points are not displayed, but can be viewed by scrolling the table trace using the horizontal scrollbar.

DATA UPLOAD FROM THE CONTROLLER TO THE OSCILLOSCOPE

If the overall time base is greater than a predefined value, then the data is retrieved from the controller in blocks, hence the display can be seen to be updated in sections. The last point plotted in the current section is seen as a white spot.

If the oscilloscope is configured to record both motion parameters, and also to plot table data, then the table data is read back in one complete block, and then the motion parameters are read either continuously or in blocks (depending upon the time base).

Even if the oscilloscope is in continuous mode, the table data is not re-read, only the motion parameters are continuously read back from the controller.

ENABLING/DISABLING OF OSCILLOSCOPE CONTROLS

Whilst the oscilloscope is running all the oscilloscope controls except the trigger button are disabled. Hence, if it is necessary to change the time base or vertical scale, the oscilloscope must be halted and re-started.

DISPLAY ACCURACY

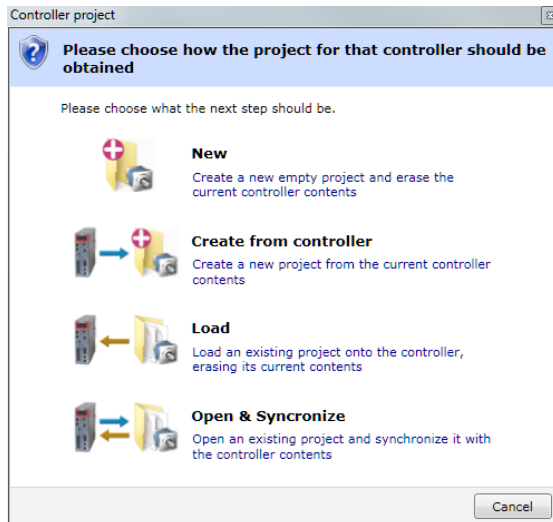
The controller records the parameter values at the required sample rate in the table, and then passes the information to the oscilloscope. Hence the trace displayed is accurate with respect to the selected time base. However, there is a delay between when the data is recorded by the controller and when it is displayed on the oscilloscope due to the time taken to upload the data via the communications link.

Intelligent Drives

Intelligent drive are drives which contain built-in control loops and are controlled via a digital interface, often over a data bus. *Motion Perfect* supports the configuration but means of add-ins. The following add-ins are currently available:

Add-in Drives Supported

Controller Project Dialogue



The “Controller Project Dialog” is displayed when the user first attempts a Sync Mode connection to a controller. The options available are explained on the dialog.

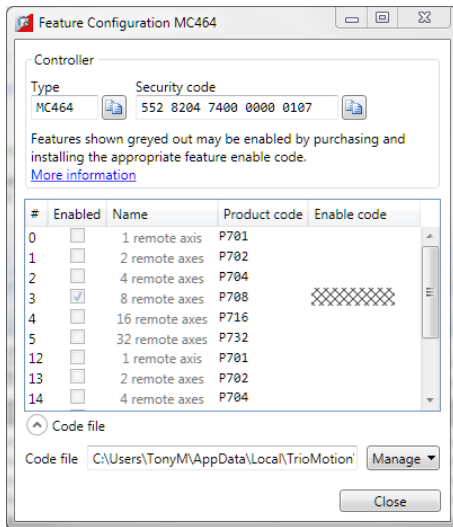
Controller Tools

Motion Perfect 3 has several tools which are used to configure the controller and interact with it. Most of these tools are available from the “Controller” section of the Main Menu.

Tool	Description
Connection Settings	Settings for the communications interface on the PC used by Motion Perfect to communicate with the controller
Reset Controller	Performs a soft reset on the controller
Interfaces	Settings for the communications interfaces on the controller
Enable Features	Enable or disable software configurable features on the controller
Memory Card	Manipulate files stored on the memory card in the controller
Load Firmware	Load system firmware onto the controller
Directory	Show a full directory listing of the programs on the controller
Processes	Show details of the processes currently running on the controller
Lock / Unlock Controller	Lock or unlock the controller
Date And Time	View or change the real-time clock on the controller.

Feature Configuration

Some *Motion Coordinators* have features which can be enabled by the user. The features are enabled using the “Feature Configuration” tool.



FEATURE CODES

The features are made available by purchasing feature enable codes from Trio Motion Technology Ltd, each feature having a unique code, the codes also being different for every controller. Feature codes are stored on the computer in a special file on the computer which holds all feature codes entered. This file (default “FeatureCodes.tfc”) is normally located in the “TrioMotion \ MotionPerfectV3” sub directory of the current user’s local application data directory. The file used can be changed to another in a different location by clicking on “Manage” button and selecting “Change” from the drop-down list. It is also possible to import values from another Feature Code file by selecting “Import” from the same drop-down list.

To manually enter a new code select the appropriate “Enable” Code” cell in the feature grid and enter the code, being careful to get the case of the characters correct. If the code is entered correctly then the “Enabled” check box for the feature should become enabled and allow the user to enable and disable the feature.

When purchasing feature codes you will need to supply the Security code for your controller to ensure that you get the correct codes.



FEATURE CODES ARE BASED ON THREE FACTORS: THE FEATURE NUMBER, AN INTERNAL DEVICE CODE HELD IN THE CONTROLLER, AND THE SERIAL NUMBER OF THE CONTROLLER. EACH CODE IS UNIQUE, SO IT IS VITAL THAT THE CORRECT SECURITY CODE AND FEATURE NUMBER (OR PRODUCT CODE) ARE USED WHEN ORDERING A FEATURE CODE.

Load System Firmware

Motion Coordinators feature a flash EPROM for storage of both user programs and the system firmware. Using

Motion Perfect it is possible to upgrade the system firmware to a newer version using a system file supplied by Trio.

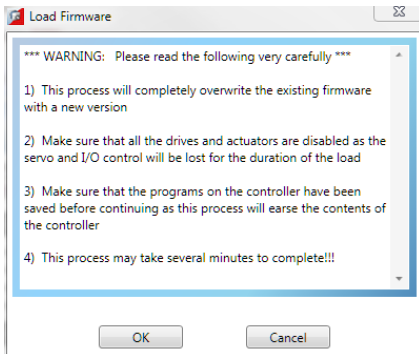


We do not advise that you load a new version of the system firmware unless you are specifically advised to do so by your distributor or by Trio.

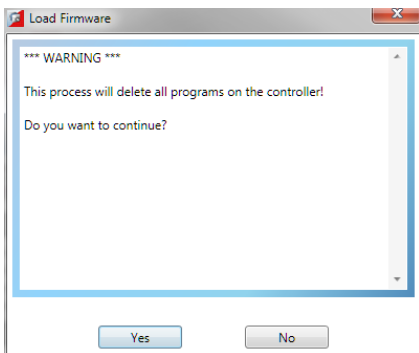


THE PROCESS OF LOADING NEW SYSTEM FIRMWARE WILL ERASE ALL PROGRAMS STORED ON THE CONTROLLER. SO MAKE SURE THAT THEY ARE BACKED UP (IN A PROJECT ON THE PC) BEFORE STARTING.

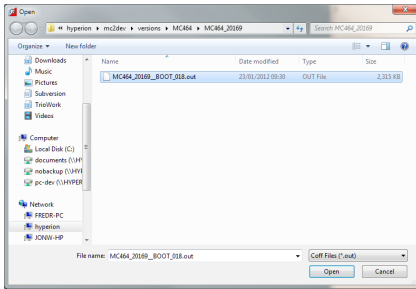
When you select the ‘Load Firmware’ option from the controller menu, you will first be presented with a warning dialog to ensure you have saved your project and are sure you wish to continue.



if you click on **OK** you will then be warned that the operation will delete all programs on the controller. This must be done because the programs are stored on the controller in a tokenized form and loading new system code may change the token list, consequently changing the commands in the programs.



When you click on **Yes** you will be presented with the standard Windows file selector to choose the file you wish to load.

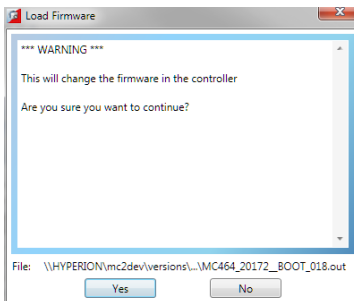


Each *Motion Coordinator* controller has its own system file, identified by the first characters of the file name.

System Code File Name	File Type	Controller Type
MC403*.OUT	COFF	MC403
MC405*.OUT	COFF	MC405
MC464*.OUT	COFF	MC464

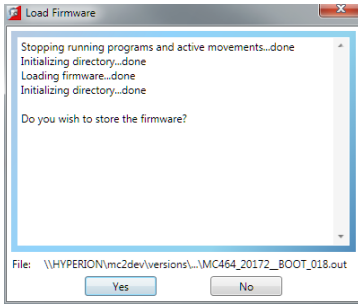
You must ensure that you load only software designed for your specific controller, other versions will not work and will probably make the controller unusable.

When you have chosen the appropriate file you will be prompted once again to check that you wish to continue. Click on **Yes** to start the download process.

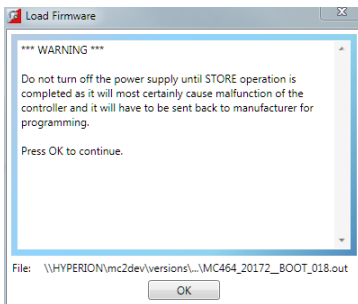


Downloading may take several minutes, depending on the speed of your PC, the controller and the communications link being used. During the download, you should see the names of each section displayed in the Output Window as they are loaded.

When the download is complete, a checksum check is performed to ensure that the download process was successful. If it passes the check you will be presented with a confirmation screen and asked if you wish to store the firmware into EPROM.



When you click on **Yes** a further warning dialog is displayed.



It will take a short time to fix the project into the EPROM and reconnect to the controller. You can then click on **Yes** and continue using *Motion Perfect* in the normal way.



It is advisable to check the controller configuration to confirm the new firmware version.

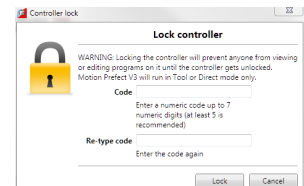
Lock / Unlock Controller

Locking the controller will prevent any unauthorised user from viewing or modifying the programs in memory, and also prevent *Motion Perfect* from connecting in Sync mode.

LOCKING

To Lock the currently connected controller, select “Controller / Lock Controller” from the main menu.

In the “Controller Lock” dialog, enter a numeric code (up to 7 digits) as a lock code. This value will be encoded by the system and used to lock the directory structure. The lock code is held in encrypted form in the flash memory of the

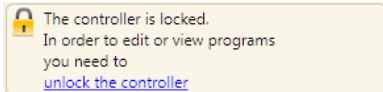


controller.

 **IF YOU FORGET THE LOCK CODE THERE IS NO WAY TO UNLOCK THE CONTROLLER. YOU WILL NEED TO RETURN IT TO TRIO OR A DISTRIBUTOR TO HAVE THE LOCK REMOVED.**

When the controller is locked the controller icon in the “Controller Tree” will have a lock symbol overlaid on it,

a message will be shown at the bottom of the controller tree,

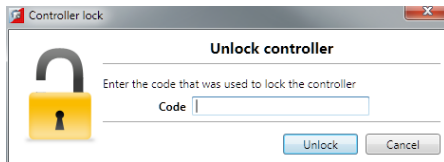


and the controller name in the “Status Bar” will have a lock symbol next to it.



UNLOCKING

To Unlock the currently connected controller, select “Controller / Unlock Controller” from the main menu (only available when the controller is locked).

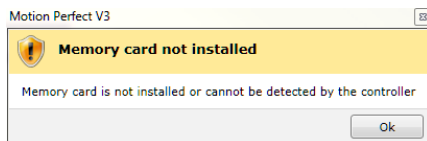


Enter the lock code with which the controller was previously locked. After the lock code has been accepted full access to the contents of the controller will be restored.

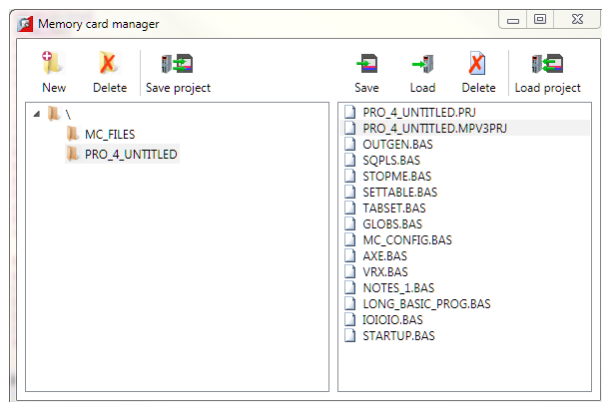
Memory Card Manager

The “Memory Card Manager” allows the user to manage the contents of the memory card in the controller. It is started by selecting “Controller / Memory Card” from the Main Menu.

If there is no memory card present a warning dialog is displayed.










If a memory card is present the Memory Card Manager dialog is displayed.

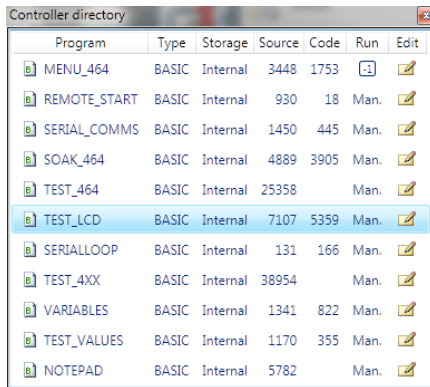


The panel on the left of the dialog shows the directory structure on the memory card and the panel on the right shows the files (not directories) in the currently selected directory.

The following operations are available:

Icon	Operation	Description
	New folder	Creates a new sub-folder in the selected folder
	Delete folder	Deletes the selected folder
	Save Project	Saves the project from the controller into the selected folder
	Save to Card	Saves one or more programs from the controller into the selected folder on the memory card
	Load from Card	Loads the selected program file onto the controller from the memory card
	Delete	Deletes the selected program
	Load Project	Loads the selected project onto the controller. This option is only available when a project file (extension .mpv3prj) is selected

Directory Viewer

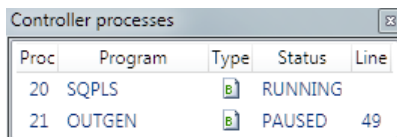


Program	Type	Storage	Source	Code	Run	Edit
MENU_464	BASIC	Internal	3448	1753		
REMOTE_START	BASIC	Internal	930	18	Man.	
SERIAL_COMMS	BASIC	Internal	1450	445	Man.	
SOAK_464	BASIC	Internal	4889	3905	Man.	
TEST_464	BASIC	Internal	25358		Man.	
TEST_LCD	BASIC	Internal	7107	5359	Man.	
SERIALLOOP	BASIC	Internal	131	166	Man.	
TEST_4XX	BASIC	Internal	38954		Man.	
VARIABLES	BASIC	Internal	1341	822	Man.	
TEST_VALUES	BASIC	Internal	1170	355	Man.	
NOTEPAD	BASIC	Internal	5782		Man.	

The Directory Viewer shows a more detailed directory view to that available in the “Controller Tree”. The information in the grid is as follows:

Column	Description
Program	Program name
Type	Program type
Storage	Storage location (Normally internal)
Source	Source code size in bytes
Code	Object code size in bytes
Run	Run method: Manual or Auto-run process number
Edit	Edit the program by clicking on the icon. If the icon is greyed-out then the program is not editable (running programs are not editable and some programs may be locked against editing for other reasons).

Process Viewer

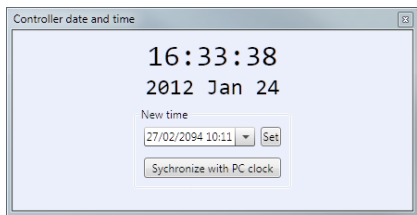


Proc	Program	Type	Status	Line
20	SQPLS		RUNNING	
21	OUTGEN		PAUSED	49

The Process Viewer shows information about all currently running user processes on the controller. The information in the grid is as follows:

Column	Description
Proc.	Process number
Program	Program name
Type	Program type (See “Program Types”)
Status	Run status (usually RUNNING or PAUSED)
Line	Current execution line in the program (if PAUSED)

Date And Time Tool



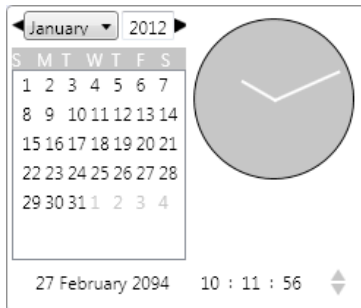
The Date and Time tool is used to monitor and set the real-time clock on the controller.

SETTING THE DATE AND TIME

The date and time can be set in two ways:

MANUAL SETTING

To set the date and time manually, click on the combo box to display a date and time selector dialog.



Select the date and time in the dialog then click outside it. The date and time selector dialog will close. Then click on the Set button in the Date and Time tool to update the controller.

AUTOMATIC SETTING FROM THE LOCAL PC CLOCK

To set the date and time on the controller to same time as the local PC clock, click on the “Synchronize with PC Clock” button.

STARTUP Program

The **STARTUP** program is an automatically generated program designed to be run at system start to initialize the system. The **STARTUP** program is a standard TrioBASIC program which needs to be run as a user specified auto-run program (unlike the **MC _ CONFIG** program which always run at power-up).

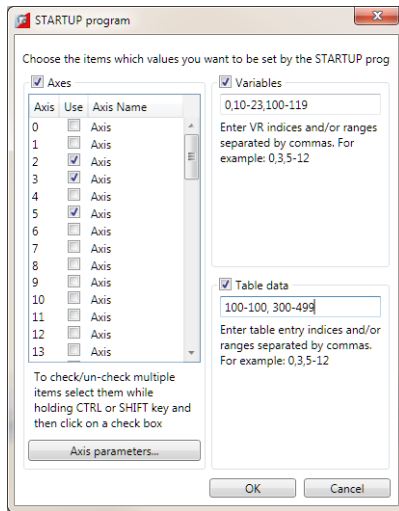


THE **STARTUP PROGRAM SHOULD NOT BE EDITED MANUALLY AS DOING SO MAY RESULT IN THE MANUAL ADDITIONS BEING LOST WHEN THE PROGRAM IS REGENERATED OR WRONG VALUES BEING GENERATED IF CODE USED BY THE AUTOMATIC GENERATION PROCESS IS CHANGED.**

The file is divided up into sections each section being generated by a different tool. Some add-ins will generate a section in the **STARTUP** file for the configuration of external devices (such as intelligent drives).

Modify **STARTUP** Program

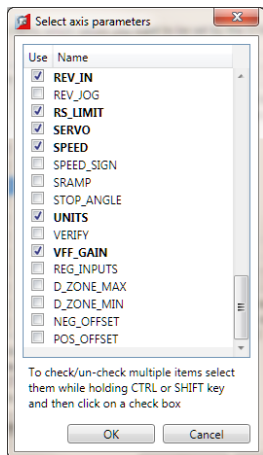
The **STARTUP** program is a user run TrioBASIC program used to initialize the system on power-up. It is commonly used to set up Axis Parameters, **TABLE** areas, VR Variables and Drive Parameters (when intelligent drive support is available).



The “Modify **STARTUP** Program” tool allows the user to save Axis Parameters, VR Variables and **TABLE** data in the **STARTUP** file so that it can be used to initialize the system. The storing of each type of data is enabled using a check box (check to enable).

AXES

The axes whose parameters need to be stored should be selected in the axis table. After doing this click on the “Axis Parameters” button to display the “Axis Parameters Selection Dialog” which allows the user to select which parameters should be stored. The same parameters are stored for all selected axes.



VARIABLES

VR variables can be stored by specifying variable numbers and ranges of variable numbers.

e.g. 1,4,6-9,12-23 will store VR(1), VR(4), VR(6) to VR(9) and VR(12) to VR(23)

TABLE DATA

TABLE values can be stored by specifying table indices and ranges of table indices.

e.g. 1,4,6-9,12-23 will store TABLE(1), TABLE(4), TABLE (6) to TABLE (9) and TABLE (12) to TABLE (23)

MC_CONFIG Program

The MC_CONFIG program is a special program which can contain a small subset of TrioBASIC commands. It is automatically run at power-up and is used to set some basic configuration parameters on the controller.



MC_CONFIG, if present, is always run at power-up and does not need to be specified as an auto-run program. It is always run before user specified auto-run programs.

If a parameter is not set in MC_CONFIG then the value in the controller's flash EPROM memory is used.

The following system parameters can be written in the MC_CONFIG program. No other BASIC commands or parameters are allowed. If an illegal parameter is put in the MC_CONFIG program then it will cause a compiler error.

Parameter Name	Parameter Stored in
AUTO_ETHERCAT	RAM
AXIS_OFFSET	Flash EPROM
CANIO_ADDRESS	Flash EPROM
CANIO_MODE	Flash EPROM
IP_ADDRESS	Flash EPROM
IP_GATEWAY	Flash EPROM
IP_NETMASK	Flash EPROM
MODULE_IO_MODE	Flash EPROM
REMOTE_PROC	Flash EPROM
SCHEDULE_TYPE	Flash EPROM
SERVO_PERIOD	Flash EPROM
IP_MEMORY_CONFIG	RAM
IP_PROTOCOL_CONFIG	RAM



Parameter modifiers; SLOT and AXIS are allowed where appropriate.

PARAMETER DESCRIPTION

AUTO_ETHERCAT

Select the startup mode of EtherCAT. (Default: ON)

```
AUTO_ETHERCAT = OFF ` do not start EtherCAT network on power up
```

AXIS_OFFSET

Set the start address of an MC464 axis module. (Default: 0)

```
AXIS_OFFSET SLOT(1)=16 ` set start axis of module in slot 1
```

CANIO_ADDRESS

Set the operating mode of the built-in CAN port. (Default: 32)

```
CANIO_ADDRESS=40 ` set the CANIO_ADDRESS to use CANopen IO
```

CANIO_MODE

Determines the mode used with **CANIO** modules P317 (output), P318 (input) and P327 (relay).

Set to 0 to use the “up to 512” IO point mode. Set to 1 to use the mode compatible with *MC2xx Motion Coordinators*. (Default: 0)

```
CANIO_MODE=1 ` set the CANIO to compatibility mode
```

IP_ADDRESS

Set the network IP address of the main Ethernet port. (Default: 192.168.0.250)

```
IP_ADDRESS = 192.168.0.110
```

IP_GATEWAY

Set the default gateway of the main Ethernet port. (Default: 192.168.0.255)

```
IP_GATEWAY = 192.168.0.103
```

IP_NETMASK

Set the subnet mask of the main Ethernet port. (Default: 255.255.255.0)

```
IP_NETMASK = 255.255.240.0
```

MODULE_IO_MODE

Define the operation and position of the axis module digital IO. (Default: 1)

```
MODULE_IO_MODE = 2 ` set so that module IO is after CAN IO
```

REMOTE_PROC

For use in systems with the TrioPC ActiveX. When the programmer needs to allocate the ActiveX synchronous connection to use a certain process number, set this value. (Default: -1)

```
REMOTE_PROC = 10 ` set the ActiveX to use process 10
```

SCHEDULE_TYPE

Alters the MC464 multi-tasking scheduler. See MC4xx Technical Reference Manual. (Default: 0)

```
SCHEDULE_TYPE = 0 ` WA() commands release their process for  
` other programs to use.
```



```
SCHEDULE_TYPE = 1 ` WA() commands use up all their process time
```

SERVO_PERIOD

Set the scan period of the servo loops and motion in microseconds. (Default: 1000)

```
SERVO_PERIOD = 500 ` set to half millisecond servo period.
```

IP_MEMORY_CONFIG

Set the Ethernet processor memory allocation. Buffer sizes can be increased to allow better processing of Ethernet Packets on a busy network. There is a trade-off between buffer size and the number of available protocols that can be connected. The default buffers are 2 for Tx and 2 for Rx. This allows all protocols to be used.



INCREASING THE BUFFERS SIZES MUST BE DONE ACCORDING TO INSTRUCTIONS FROM TRIO MOTION TECHNOLOGY, OTHERWISE AN UNSTABLE CONFIGURATION MAY RESULT.

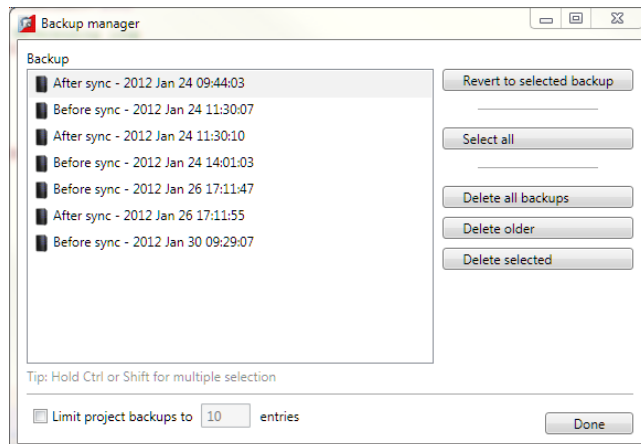
IP_PROTOCOL_CONFIG

Set the available protocols ON or OFF. By default all protocols are available.



THIS SHOULD ONLY BE USED UNDER AFTER TAKING ADVICE FROM TRIO MOTION TECHNOLOGY.

Backup Manager



The “Backup Manager” is used to manage the backups automatically created before and after every synchronization operation.

As *Motion Perfect* is used the number of stored backups can become excessively large. The “Backup Manager” gives the user a way to limit these backups or to easily delete multiple backups if automatic limiting is not in use.

AUTOMATIC LIMITING

To automatically limit the number of backups stored check the “Limit Project Backups” check box and enter the number of entries you would like to keep. The backups kept are always the most recent ones. Although automatic limiting is good for saving disk space it is not good for keeping backup for any length of time.

MANUAL LIMITING

If the “Limit Project Backups” check box is not checked then no backups are deleted automatically. This means that the user should use the backup manager to remove unwanted backups in order to stop the number of stored backups growing excessively. Buttons allow the selection and deletion of individual and ranges of backups as well as the deletion of all backups.



It is possible to set the automatic limit to a high number to give an overall limit but to manage the backups manually.

REVERTING

To revert the project back to a given backup; Select the backup and click on the “Revert to Selected Backup” button.

