Software Update History

Trio Motion Technology Ltd.
Shannon Way,
Tewkesbury, Glos.
GL20 8ND. UK

Tel: +44 (0)1684 292333
Fax: +44 (0)1684 297929
Email: support@trio.zohodesk.eu
Web: http://www.triomotion.com

Product: **MC664(X), MC403(Z), MC404-Z, MC405, MC508, Euro404, Euro408, MC4N-RTEX, MC4N-ECAT, MC6N-ECAT, Flex-6 Nano.**
Applies to:
Started: **Version 2.0307**   **9 April 2021**
Notes: See "MC4xx Software Updates Archive" for versions 2.0306 & lower.

Version Number:	Bug Fixes:	New Features:	Notes:
2.0318 + Boot version 2.05 for F6NANO & MC6NE	**iMX7 Boot fix implemented to address problems of recent Flex6/MC6N controllers resetting or raising E06/E09 errors randomly.** Corrected an issue with the remote program not terminating as expected when a timeout period of 0 seconds has been used. Corrected Flex-X issues when formatting SDcard via FILE "FORMAT". D_INT now returns back to new maximum if user changes the max output value. Improved efficiency of FLASH_STATUS, it was causing delays when requesting MP to perform other tasks such as changing digital IO. Supporting 4 instances of ActiveX (Remote) connections had been broken since 2.0316. Flex-X corrected to offer the same FLASHTABLE storage sectors as Flex6. ECAT : Fix implemented to prevent a processor exception being raised when slave device has a zero vendor ID and product code values and an	New alarm file type (22) added.	18th August 2022

Version	Firmware changes	Additional changes	Date
	EC_EXTEND profile. The firmware would incorrectly match the slave to this profile.		
2.0317 + Boot version 2.04 for FXNANO	Flex-X SDcard detection improvements, this includes an update to the boot to v2.04. Flex-X fixed intermittent problems when writing parameters (eg IP_ADDRESS) or FEC codes flash. MC404-Z fixed CAN problems caused by incorrect process scheduling. Flex-X : LED refresh problems resolved.		26th July 2022
2.0316 + iMX6 boot version 2.03 for MC664	Update to add support for DX4 multi-turn absolute encoder from power-on/restart. Corrected misbehaving FE error being reported. Fixed some issues when a STOP/HALT request is executed whilst a program is currently executing inside a BASIC library function. Change to prevent possible processor exception (E09) when executing the view stack information command [ETHERNET(0,-1,21)]. Changes made so that flash recalling of VR/TABLE data is as expected when changing FLASH_DATA from 0 to 1 and vice versa, eg. when FLASH_DATA=0 then the TABLE points that are expected to be 0.0 will be 0.0 regardless of whether or not they were previously backed up when FLASH_DATA=1.	Flex-X Nano initial release. MC664 : PSU updates to support new TI TPS65216 device, this includes an update to the boot code to v2.03. New recipe file type (21) added. High Density MC508 ATYPE values 104 (Quad input), 105 (SSI Input) and 106 (Tamagawa Input) added as options for axes 0..7 ECAT : P374 CSP mode profile - enable transceiver as outputs to support AOUT in PDO objects.	15th July 2022
2.0315	Changes applied to support Omron R88D-1SN drives with MC6N-ECAT reliably. Fixed CAMLINK problems when used with multiple processes. Using {} now tokenizes to (), ` to space, and \ to / Fixed problems with robot jumping whilst jogging using slow accel. Applied fix for problems with decreasing base axis numbers set by COORDINATOR_DATA(16,1).	ECAT: Added paged mailbox support for slaves with very large minimum mailbox size. Added Modbus RTU debugging to DEBUG_LOG (enabled via DEBUG_LOG_MODE bit 1). Added additional P374 profiles (profile 0 (basic) & 1 (includes touch probe) for modes 0 (CSV) and 1 (CSP)). Added AUTOLOCK_SECONDS (MC_CONFIG only parameter) and DEFAULT_LOCK keyword to support new feature of re-locking the controller automatically after disconnecting from	4th April 2022

Resolved compiling problems when using more than 256 functions.

Type of structfield wasn't being processed for TARGET/J/E when assigning TARGETARRAY. Now fixed.

Fix implemented for 'walking' MPOS after backlash has been applied and WDOG is toggled.

Fixed false singularity errors (frame 41).

Previous changes made to ADDAX (2.0313) to remove cycle lag prevented ADDAX/SYNC working with an external encoder. Now fixed.

IEC: 'Buffered' status of Function Blocks was not showing the expected status.

Fix applied for when an SDcard subdirectory is not found, if another attempt was immediately made to access a subdirectory that was also not found then the command line would lock up permanently.

Changes made to prevent program corruption when multiple programs open file channels to output data to different files - the underlying file offsets are now relative to the start of the program itself rather than the start of all source code, this means that the code now calculates the source code offset each time it accesses the data. The problem was caused by the program file being deleted and re-created and this caused the programs to be moved around in source code memory but the offsets were no longer valid.

Fixed an E09 caused by calling ZIP_READ(0). Made internal fixes for decompressing.

Multi-core controllers could exhibit odd execution when using TICKS to schedule itself, a fix has been applied to prevent this.

MotionPerfect - default for AUTOLOCK_SECONDS -1 which means the feature is disabled.

Added support to ENCODER_RATIO and STEP_RATIO to allow a numerator value of 0 to effectively switch off the input (encoder) or output (stepper). To stop the ratio from being applied then (1,1) must now be used, previously (0,...) would be used to disable it.

Added a new mode to FRAME 3 for continuous slider-crank.

Added new IEC functions TC_DVIN and TC_DVOUT to support thermocouple and RTD Flexslice modules.

Added new function to PRMBLK for setting floating-point precision.

ETHERNET read function 24 added to return status of ethernet cable connection (-1 = connected, 0 = Not connected).

Changes made to support addax'ing to a linked axis (eg. an axis that CONNECTs to another axis)

RPS: Implemented GTAE and ROBOT_TARGET_MODE functionality.

Implemented new frame 120 (Couch Robot).

| 2.0314 + iMXRT boot version 2.02 for MC404-Z | MC404-Z boot fix required to increase the RFRC period (Refresh Recovery time) of the SDRAM due to cold temperature problems. | MC404-Z : CPU_TEMP keyword implemented. | 13th January 2022 |

| 2.0313 | Revisited CASE value parsing to allow for spaces between minus '-' sign and the integer - DEFCONST also updated for this.

Updates to ensure smooth speed and accel profiles are generated when a slow deceleration is used.

Fix to prevent a servo's second encoder input from being included in the FEC axis count.

Improvements made to lag when following DPOS.

Fix for INPUT which did not work with a file channel #.

KINEMATIC_GROUP_IO did not give an error when the RPS kernel is not active..

Changes implemented to prevent demand speed decaying towards 0 when an override accel is used and ACCEL_FACTOR < 1.0.

INT and FRAC could return incorrect value when supplied with a large floating-point value. Now fixed.

The SCARA jumps when switching from joint to linear (or the other way). The jump in position was caused because a check wasn't performed correctly.

Fix for Uniplay/HMI connection which failed after editing page(s).

Fix for DEFCONST when using leading '(' parenthesis.

Added full range checking for the right-hand operand of the bit operator (.).

Added monitor to check when EtherCAT cable is removed between the controller and first slave device, to ensure event raised to record error and network state change out of operational.

Calling a BASIC function from the HMI caused invalid errors to be generated.

Internal FRAME handling code needed to be updated to support the high axis numbering scheme, the INITIALISE command could cause strange things | Multiple PC client ActiveX connections now achieved using independent processes.

PSWITCH parameter 'Enable' bit 1 can now be set to allow Off Pos < ON Pos.

Implemented FLASH_VR_FIRST, FLASH_VR_LAST, FLASH_TABLE_FIRST and FLASH_TABLE_LAST to allow user configuration of the range of VR/TABLE locations that are actually preserved in flash memory.

Added new feature to allow RPS moves to follow the shortest path or longest path to the end point.

Implemented blending of RPS moves MOVEC->MOVEC

Implemented blending of RPS moves MOVEC->MOVEL

STATIC keyword added as an alternative to DIM within local function variables to indicate that the value should be preserved over repeated function calls rather than re-initialised as per using DIM.

Bit 13 of MOVELINK options parameter can now be used to select following of DPOS rather then MPOS.

Added REMAIN_TIME to indicate time remaining for a move to complete.

CORNER_MODE options to limit speed on arcs by angular acceleration either according to radius or the ACCEL parameter value. (MOVECIRCSP).

An INCLUDE can now be used within a BASIC Library file but only if it contains no executable code ie. it only uses DEFCONST statements to define constant values.

Added VP_MODE_PLC to allow a different VP_MODE from 5 to be used with PLCopen Function Blocks (default value = 5).

Added ability to limit HMI to a single connection.

DEBUG_LOG : Added new DEBUG_LOG_MODE parameter (32-bits) to support enabling of individual debug log sources, bit 0 = Enable ActiveX logging, bit 1 = Enable Modbus logging. | 17th December 2021 |

	to happen if FRAME was used afterwards. Also, the active axes restored after INITIALISE had an issue, only non-virtual axes would be reactivated which is not correct. Fixes required for synchronised frame group management from multiple processes. MC404-Z Serial errors (eg receiver overrun) will cause the port to freeze, added a fix to resolve this. Prohibit loading moves if the target is outside robot's workspace. (only for SCARA frame 41). Fix for SPHERE_CENTRE returning the wrong angle. Fixes applied for MOVEABSSEQ issues when very small MOVEABS requests are generated. Changes applied to remove "[ROBOT]" channel #9 Motion Perfect messages unless connected to Motion Perfect in Tool/Sync mode. KEY function with no parameters throws an exception in the Simulator. SCARA can now rotate the last axis without it jumping after 1 revolution.	FLASH_LOG : added entries for directory being locked/unlocked ECAT : Additional EtherCAT diagnostic support for checking working counter errors.. PROGRAM_LINE no longer a primary token, it is now an alternative for PROC_LINE. SCHEDULE_TYPE : Bits 20 & 21 can now be used to move 'fast' processes 20 and 21 to core 1. Mach4 : Backlash changes for consistent REG_POS reading (via Bit 10 of REGIST mode parameter) and BACKLASH_DIST also corrected.	
2.0312 + iMX7 boot version 2.01 for Flex6	Fixes implemented to allow successful MC404-Z RS485 2-wire operation @ 57600 baud.	Flex6Nano : Support added for PCB Rev D PSU device changes, this includes an update to the boot code to v2.01. Boot 2.01 is required from serial number P600-08820 onwards.	8th October 2021

2.0311 + MC405 FPGA image version $0412 + iMX35 boot version 2.0	MC_CAMIN did not function if the first master position was 0.0. Now fixed.
	
	MC_CAMIN also fix for behaviour when used on a physical axes if the master encoder feedback jittered outside the defined CAM master window positions.
	
	MC_PositionProfile: fixed an issue with profiling to the first data point when starting from a non-zero axis position.
	
	MC_PositionProfile: when used consecutively for 2 different axes then DPOS of the second axis would be incorrect. Now fixed.
	
	DRIVE_FE_LIMIT now scales properly when the UNITS switch happens.
		Updates to support multiple PC client ActiveX connections.
		
		ECAT: Additional DX5 profiles added.
		
		Optional parameter added to HALT command to specify halt mode :
		    0 = Halt all programs (default)
		    1 = Halt BASIC programs only
		    2 = Halt IEC programs only
		SCHEDULE_TYPE bit 10 can be used to force default HALT command to use mode 1 rather than 0
		
		BiSS FPGA image included for MC405 release firmware.
		
		Added DV_OUT support for P368 RTD Flexslice
			28th September 2021

UNITS switch when the user switches between linear and joint mode. (RPS)

IEC Function/Function Blocks can now access the higher axis number counts available.

IEC Function TCW_OFFPOS corrected to use LREAL for the parameter data type.

Changes made for correct reporting of file sizes as required by MP.

Fix for DEFCONST symbols which could cause issues when MP uploads a list of variables, e.g. the program variable bindings for HMI elements.

OFFPOS and AXIS_MODE.16 now re-applied correctly when EtherCAT is reinitialised.

Flex-6Nano enabled with 64 remote axes now reports to *Motion*Perfect a 'P' number of P605 rather than P604.

Fix applied for MC404-Z where continuous changes to AOUT(0) caused stepper pulse issues on axis 3.

DEFCONST: fix for issue using floating point numbers which was broken in 2.0310.

RPS: Object Frame activation failed when mentioned in MOVE commands.

RPS: Edge case fix for w-axis over rotation while using MOVEJ.

RPS: Fix for MOVEL, if the user target point orientation was >180 or <-180 the robot would go to the correct position but WORLD_DPOS for the last orientation axis displays the invalid user value instead of the correct orientation.

Fix implemented for problem caused by ADDAX axis changing mid-servo on multi-core which resulted in Jumping FE value.

SDcard detection improved to prevent LED control from locking up and preventing the LEDs flashing during firmware update.

Fix to prevent potential E09 if a variable is read from a Watch Window but isn't actively running on any

Added support for SDO abort error code 0x06010003 "Subindex cannot be written, SI0 must be 0 for write access".

Added TARGET member access via PRMBLK. E.g.
```
      DIM t AS TARGET
      t.x = 5
      t.y = 6
```
```
PRMBLK(0,0,4,"MY_PROG",-1,t.x,t.y)
```

MC405 performance improvements.

Added new FILE "SIZE" "<prog name>" feature to return the size of a file on SDcard.

FRAME 118 added for XYZ gantry with rotation and tilt. Offset tilt centre point.

IEC support added for STRING binding to VR/TABLE data.

Added debug logging via new MODBUS function $13 which toggles the flash debug logs (DEBUG_LOG).

REP_OPTION bit 0 now available to control +/- range when FRAME_REP_DIST is active.

Changes made to allow the Analogue IO base address to be propagated through a multi axis slave from the base to the sub-nodes, to ensure correct AIO mapping on the sub nodes.

ARM Boot recovery scheme updated for all controllers to use the same SDcard mechanism. Serial and LCD display are used to display status info and SDcard content messages.

Added option CONNECT 'mode' parameter to select between following changes in MPOS (0 = default) or DPOS (non-zero) for driving the axis.
```
CONNECT(ratio, link_axis, [mode])
```

Optimized the performance of CONNECT command to update current ratio directly rather than via another process command buffer.

RPS_KERNEL_V2 changes now restricted to MC_CONFIG only.

Performance enhancements when using BASIC Library files.

	processes. MC404Z : Reported FPGA version as integrated in firmware was incorrect and didn't match the real version as reported by the FPGA.	Added PROGRAM_LINE to return the current program line number. This is for use by the firmware test infrastructure. Added DEBUG_LOG command and associated flash log for recording debug specific messages eg. Remote ActiveX comms.	
2.0310	SELECT_CASE corrected to accept negative values at beginning of CASE value list. iMXRT Changes made for MC404-Z SDRAM burst length to comply with chip errata ERR050577 to prevent corrupt data. Fixed issue where E09 would be generated if a LOOKUP request is used to fetch variables from another program and then the program attempts to use other process related parameters, eg TICKS. MC_WriteParameter rejected -1 as a valid value for FWD_IN. Corrected an issue with checks that had been added to prevent duplicate VR indices from being defined. ETHERNET command function 21 (List port status) corrected to prevent an E09 exception. Corrected PLCopen MC_POSITIONPROFILE path generator and added automated UNITS scaling for position data.	New error 247 now generated when a non-constant value is used within a DEFCONST expression. De-bounce filter added for digital inputs, new IN_DEBOUNCE keyword added to define the global de-bounce period in servo cycles. Update to add DV_OUT write access callback function, which enables the device channel to be informed when the DV_OUT data value has been updated (write access). MC404-Z, Flex6-Nano and MC6N-ECAT: Improvements made for Quad/Flex SPI interfacing to Flash EPROM. MC404-Z FlexSPI clock has been increased in frequency from 80MHz to 132MHz, resulting in faster Flash access. ECAT: Initial support for Estun ED3L drive. ECAT : change made to allow the user to select the express startup mode for non DC enabled IO devices to increase speed of startup.	12th July 2021
2.0309 + MC404Z FPGA image version $0010	Panasonic drives use 0x10 offset for multi axis TxPDO/RxPDO mapping. MOVEABSSEQ was using MOVESPHERICALSP instead of MOVESPHERICAL. CAM did not function correctly with MERGE=ON. Added checks to GLOBAL command to raise an error during compilation if a VR index is duplicated. Fix implemented for controllers becoming stuck (with SYS displayed) during test sequence, it was possible for flash to be read whilst a sector is being erased. E09 generated when a log entry is	Added back SanyoDenki CSP + actual torque (0x6077:00) profile ECAT : Initial P368 RTD profile added. Parsing changed to allow sub-dimensions of an array parameter to be passed to another function. Frame 34 improvements. Added multi-trigger functionality to software PSWITCH. New HOMEPOS command implemented Implemented a range of interface improvements with MPv5 including GLOBAL/CONSTANT, LIST_GLOBAL, EDPROG, RPS, TABLE_PROTECT and PRMBLK changes.	1st June 2021

	recorded in robot log. System variable bit writing was not atomic. PRMBLK command, used by MotionPerfect for collecting data from various sources, had problems when reading data for the axis parameters window when used with high axis numbers eg >=64 on Flex6Nano. Potential for incorrect evaluation of the KEY value for a serial channel found on MC664-X, multi-core only. PRMBLK : 'Get' function for IO values wasn't adding a comma between values so the TrioPC parser wasn't extracting the right values. MC404-Z : Improved I2C communications to help prevent potential locking up during startup if a device is not communicating as expected.	Increased number of available device variable (DV_IN/DV_OUT) channels from 32 to 128. Added support to DV_MAP to display channel to slave mapping. Implemented RPS Kernel v2.0 Added RPS_KERNEL_V2 boolean system flag to control the enabling of RPS Kernel v2.0, default = FALSE ie.disabled. Flex6Nano : F6Nano : Increased TABLE backup from 64000 to 128000 points. MC404-Z : Latest MC404-Z FPGA image with improved functionality including hardware HW_PSWITCH.	
2.0308		New Atype (72) added for P374 servo axis and is excluded from total axis counts. Added MOVE_COUNT_INC so that the direction of MOVE_COUNT inc/decrementing can be controlled. Added initial support (simple base profile) for P364 (csp) and P374 (csv) Flexslices.	21st April 2021
2.0307 + MC6NE FPGA image version $0105 + EU408 FPGA image version $407 + MC405 FPGA image version $0212	EnDat FPGA fix for MC405. Fix to enable MC664 run FoE over slot 1 (the built in port). MC404-Z problems using FLASHTABLE, data not always read correctly from flash via mode 2. Changes to MC404-Z RS485, fw now drives GPIO directly for RTS signal. PRMBLK reading IO did not return the correct hex data. If the remote program receives a full buffer of bad data then it does not junk it and instead starts to overwrite past the end of the buffer which is stack data and causes corruption leading to CPU exceptions. Invalid robotic frame data read from flash at startup can cause E09 errors to be generated.	Various EtherCAT axis ATYPE changes are now permitted. MOVETEST command implemented. Added initial support for ability to retain EtherCAT slave devices in operation and enabled, whilst a section of the network is removed, but can also be replaced, brought back up into operational and re-enabled. FORCE_ACCEL and FORCE_DECEL now available within standard VPU mode 0. Speed limiting control for interpolated axes, new V_LIMIT axis parameter added. Added new commands SET_MOTION and SET_MOTIONSP to encapsulate efficient setting of multiple parameters via a single command. Implemented DRIVE_REP_DIST to allow ENCODER/MPOS to behave correctly with	9th April 2021

ECAT : Fixed Kollmorgen AKD profile 5 (drive with second encoder input).

PRMBLK : Increased local variable name buffer so accept the full 32 bytes and array indices.

LOOKUP : E09 fix for boolean data being read.

MC6NE : Updated FPGA image to address EnDat issues.

EU408 : Updated FPGA image to address EnDat issue.

IEC : TC_FLEXLINK could not be selected within MotionPerfect toolbox.

digital drives that wrap their positions at any value that is not necessarily a power of 2.

Frame 34 improvements.

P367 Thermocouple default EtherCAT profile now uses DV_IN, DV_STATUSWORD, NW/NODE_CONTROLWORD and NW/NODE_STATUSWORD

Added 40nsec sync0 timing offset to DX5 drive profile

Device Variable support added for slave devices that handle process data such as Temperatures.

ECAT : Change to ensure error flag raised on all axes associated with a multi axis slave when emergency message received.

MotionPerfect : New MC_FILE field added to help identify when an FPGA does not actually use flash for storing its image.