

**Firmware TSD-4.10.x****Summary:** New gantry features, fixes and improvements**CpuFirmware: Build 1.10.15 (4.10.5)****Release Date: Date: 2020-12-17 16:43:02 +0100 (Do., 17 Dez 2020)****SVN Revision: Revision: 36263****Remarks: Use TAM SDK >= 7.14.0 to support "Ethernet over Tria-Link"**

- CHG: (BREAKING) remove obsolete axes[0].parameters.currentController.currentErrorLimit register
- NEW: Activate motor simulation (option 0x9A) and angleSearch directly writes the phasing angle now
- FIX: Allow homing with limit switches
- NEW: Use Axes[].Parameters.PositionController.ExcentricityCompensation (optional)
- NEW: Use Axes[].Parameters.CurrentController.FeedForwardLimit
- NEW: Support Gantry parallel angleSearch phasing and Gantry.Parameters.AlignAfterHoming (optional)
- FIX: bug from 35096 restart phasing must be possible for all encs
- FIX: Finish Phasing and reset pathplanner after phasing for standard enabling sequence, not only encoder-save
- CHG: Start phasing ramp at 20mA instead of 100mA
- FIX: Homing Invalidate did not reset the command
- CHG: (Breaking) New naming convention
- FIX: SaveParametersPermanently
- NEW: PositionLatch and homing feature positionErrorThreshold
- FIX: USB BooleanGaps issue introduced with Vitis migration
- NEW: Homing cmd SetPosition
- FIX: Relocate move of a modulo axis must not use continuous motion
- TEMP: Temporary release for 50mOhm shunt test (36232, 1.10.11 4.10.3-alpha)
- FIX: No abos for TOU1 and TOA1 since 34399/34430
- FIX: USB ASY bug due to BSP interrupts in XUsbPsu\_EpBufferRecv

**FpgaFirmware: Build 1.4.5**

- No changes

**MonitorFirmware:****Release Date: 2020-10-12**

- CHG: lowered motor temperature lower limits to -10°C/-5°C

## Firmware TSD-4.9.x

### Summary:

This firmware update is recommended for all TSD drive types and solves an occasional SafeTorqueOffStartup error caused by an unwanted watchdog reset of the safety monitor during STO pulse tests

### CpuFirmware: Build 1.9.47 (4.9.7)

**Release Date:** Date: 2020-10-15 09:06:34 +0200 (Do., 15 Okt 2020)

**SVN Revision:** Revision: 35096

**Remarks:** Use TAM SDK >= 7.14.0 to support "Ethernet over Tria-Link"

- NEW: RestoreFactory function
- NEW: device commands for persistency save (blocks 180ms), disable and (re)load (blocks 80ms)
- FIX: TCP\_MSS 1440
- NEW: desiredCurrentQ/D for the current controller
- NEW: Position controller active command
- NEW: Encoder Injected position, with linear interpolation
- NEW: Support Files system over USB and Tria-Link
- CHG: (Breaking) move masterPosition from command to signal, MasterPosition source must not be "Ignore"
- CHG: (Breaking) StartCurrentSineStaticVector and StartRotatingVectorConstantCurrent  
now generate a D-current, not a Q-current
- NEW: Support Nikon 8MHz ("16-24-F8MHz", downsampling 2)
- CHG (!) Gantry2 rotative coordinate is now pos0-pos1 instead of (pos0-pos1)/2 (34335, 4.9.0-alpha)
- NEW: Support Gantry3 (34335, 4.9.0-alpha)
- FIX: Pathplanner endposition not precise redmine #913 / #915 (34430, 4.9.0-alpha)
- FIX: Support TOA4 modules (34430, 4.9.0-alpha)
- FIX: Redmine #916 (34430, 4.9.0-alpha)
- NEW: Support product TSP710 (34430, 4.9.0-alpha)
- CHG: (Breaking)Remove parameter modulationMethod (34430, 4.9.0-alpha)
- FIX: Ethernet connection loss during FW update: #919 LWIP (34570, 4.9.1-alpha)
- FIX: Persistence of DigitalEncoders (34794, 4.9.2)
- NEW: Improvements of the Sensorless mode: Notch (34822, 4.9.3-alpha)
- FIX: FPGA-OpenTrialink behavior (34857, 4.9.3-beta)
- FIX: USB issues (34895, 4.9.3)
- NEW: Register currentController.sensorlessBandpassDamping (34910, 4.9.5-beta)
- CHG: Extend amplitudes of 3-phase and 2-phase motors (34910, 4.9.5-beta)
- FIX: BridgeMode no abo/events for slaves (34967, 4.9.6-beta)
- FIX: SetPositionRelative after homing with Xnew at -1.0000000002 (4.9.7)

### FpgaFirmware: Build 1.4.5

- add Trialink watchdog timer
- double size trialink fifo
- add lsb timestamp to extio:
- Support TSP710
- Current U,V,W with 18 bit resolution
- Serial Encoder (except Endat) with communication error and valid flag(OPT MODULES)
- Add Boot\_Control and A7\_Health\_Monitor to slave\_top.vhd
- add a pulldown resistor to the encoder ext\_io
- saturation for enc\_int.x and enc\_int.y

### MonitorFirmware:

**Release Date:** 2020-09-14

No changes since last Release

## Firmware TSD-4.8.x

**CpuFirmware: Build 1.9.8 (4.8.6+7)**  
**Release Date: \$Date: 2020-04-14 11:42:04 +0100 \$**  
**SVN Revision: \$Revision: 33538 \$**  
**Remarks: Use TAM SDK >= 7.10.1 to support Biss-C**

Changes since last Build:

- NEW: Nikon Encoder. Implement a string -F2.5MHz and -F4MHz to specify the frequency
- FIX: AnalogEndat and Tamagawa Zero function
- FIX: Backlash filter was limited to 20ms: Now sampled at 10 kHz, max 0.2s
- CHG: Ecat: Wait for booting finished at ISO and ASY
- FIX: TOE1 pulldown of EncIn and reboot
- NEW: Support axes[].commands.general.event = ChangeUnits
- CHG: Prio STO > LinkNotReady
- NEW: errorNumber registers supported and General.Signals.DigitalInputBits and internals.linkAddress
- FIX: if position is close to modulo, coupling can throw a false alarm 26.05
- FIX: MotorTempMon VoltageOutOfRange bug
- CHG: Correct limits for currentController.desiredVoltageD
- FIX: USB ISO might be collected with delay by a slow PC hardware
- FIX: BridgeOverCurrent was delayed unnecessarily
- FIX: FeedForward coulomb friction was not correctly merged from 4.4 branch in SVN30354

**CpuFirmware: Build 1.8.0 (4.8.2)**  
**Release Date: \$Date: 2019-12-17 10:11:31 +0100 (Di., 17 Dez 2019) \$**  
**SVN Revision: \$Revision: 32561 \$**  
**Remarks: Use TAM SDK >= 7.10.1 to support Biss-C**

Changes since last Build:

- FIX: Not absolute encoders during init: Do not set offset=0 but position=0
- FIX: USB abo gaps introduced in 4.8.0
- CHG: Ecat Touchprobe: use option positions for touchProbe1 if source & 0x1000 (use 0x100E for Fast Axis0DigIn1)

**CpuFirmware: Build 1.7.13 (4.8.0)**  
**Release Date: Date: 2019-12-09 16:23:33 +0100 (Mo., 09 Dez 2019)**  
**SVN Revision: Revision: 32478**  
**Remarks: Use TAM SDK >= 7.10.1 to support Biss-C**

Changes since last Build:

- NEW: Product TSD81
- NEW: SafetyFOutputs
- NEW: Commutation Angle Parameter
- NEW: Log-File with LogSeverity switches
- FIX: Error recovery of Position controller caused frozen "Enabling" until disable
- FIX: Ecat LinkNotReady did not show up after first boot.
- FIX: TOE1: Build 1.3.6: IncrementalEncoderSaturation
- FIX: Setting Encodertype to Analog for a TOA1 device caused a not recoverable situation
- FIX: Encoderzero for AnalogBiss, PositionLatch of AnalogBiss and AnalogEndat did not consider analogOffset.
- CHG: Use option 0x800 to replace the Ecat state \*27 normally used in standstill and coupled mode by 0x23 and show 0x27 only when coupled. Do not use with CNC-ISG (Post-Homing-Problem).
- CHG: Ecat: Option 0xe7 for legacy enable with Command bit 3.
- CHG: Faster Commit

**FpgaFirmware: Build 1.3.5**  
**Release Date: 2019-09-20**  
 - no changes since 4.7.5

**MonitorFirmware:**  
**Release Date: 2020-09-14**

Changes since last Release:

- FIX: Occasional SafeTorqueOff error (4.8.7), see dedicated Monitor releaseNotes for details

## Firmware TSD-4.7.x

**CpuFirmware:**      **Build 1.6.17 (4.7.5)**  
**Release Date:**      **Date: 2019-10-23 16:17:36 +0200 (Mi., 23 Okt 2019)**  
**SVN Revision:**      **Revision: 32053**  
**Remarks:**          **Use TAM SDK >= 7.10.1 to support Biss-C**

- FIX: Absolute Encoders: Set persistence of hom and comm only on saving
- FIX: Absolute Encoders: Biss-B stored the wrong commutation offset
- FIX: STO inconsistent required two clearFaults instead of one
- FIX: Delay BridgeVoltageOutOfRange after bridgeMonitor ready to allow ADC settling
- FIX: Ecat register read/write Triamec-URIs was accidentally removed in 4.7.0
- BREAKING: Ecat state \*27 instead of \*23 in not coupled operation (CNC-Homing-Problem), use option 0x2000 for legacy behavior

**CpuFirmware**          **Build 1.6.12 (4.7.3)**  
**Release Date**          **Date: 2019-09-17 14:09:07 +0200 (Di., 17 Sep 2019)**  
**SVN Revision**          **Revision: 31847**

- NEW: Support revision4 FPGA option modules with Monitor activation, FIX TOU1 issue
- CHG: If domainName parameter is empty, choose "TSD-NNN" with NNN=serialNumber
- CHG: EtherCAT Upgrade SSC11 from V5.11 to V5.12 (Tool 1.4.2)
- FIX: "ERR63.71 HttpGet FileNotFound" caused TCP errors
- FIX: Sensorless pathplanner tracking and phasing bug
- NEW: Position unit "turns"
- NEW: Reboot function
- NEW: Leave Operational notEnabled with (STO, linkNotReady and BridgeVoltageOutOfRange).
- FIX: Motor temperature settings after STO, and persistency bug with STO
- CHG: SignalProcessor is turned off if mode is turned off even without setting start
- NEW: Encoder short errors

### Absolute Encoders

- NEW: Commutation Commands (see AN108)
  - StartPhasingAndSaveEncoder and enabling method AbsoluteEncoderOffsetEncoder
  - StartPhasingAndZeroEncoder
  - InvalidateEncoder requires disabled axis, changed enum from 6 to 10
- NEW: Support Biss-C and fix Biss-B nameplate read and analog bug
- CHG: AnalogEndat and AnalogBiss SubresolutionCheck enabled using dataFormat "M1"
- CHG: Digital encoder without nameplate should not init to zero, but to real absolute position
- FIX: AnalogEndat Legacy commutation Nameplate not handled and analogCount bug
- NEW: Nikon: Status info at Diagnostics.state 0x0F00000, read only during encoder start
- BREAKING: use 16 bit Nikon nameplate
- NEW: AbsoluteEncoder commutation based on mode zero

### FpgaFirmware: Build 1.3.5 (4.7.5)

**Release Date:**    **2019-09-20**  
 - FIX: endat position with sign extension

### FpgaFirmware: Build 1.3.4 (4.7.3)

**Release Date:**    **2019-08-28**  
 - FIX: software controlled switch on of the TAD SPI DRIVERS (Option modules).  
 - FIX: Global latch digital input inverted

### MonitorFirmware:

**Release Date:**    **2019-09-04**

Changes since last Release:

- see dedicated Monitor releaseNotes for details

## Firmware TSD-4.6.x

**CpuFirmware: Build 1.5.9 (4.6.6)**

**Release Date: \$Date: 2019-09-04 10:22:58 +0200 (Mi., 04 Sep 2019) \$**

**SVN Revision: \$Revision: 31717 \$**

**Remarks: Use TAM SDK >= 7.10.0 to support TOF1, bridge mode and static IP registers**

Changes since last Build:

TSD 4.6.3:

- NEW: CSV-Mode based on integrated B-spline, PV-Mode and CSP with velocity based modulo estimation  
use 0x1604/0x1a04 or 0x1600/0x1a00 for cyclic telegrams with velocity  
0x6502 contains info of CSV and PV modes
- FIX: Triamec.xml: TwinCAT cannot handle type double in startup list (0x23EE=ReferencePosition)
- NEW: restart AnalogEndat after encoderError
- NEW: Ecat: Register for axes[0].parameters.pathPlanner.streamInterpolatorMode
- NEW: New nameplate for DigitalEndat
- FIX: StreamReceiver: Support stop from coupled
- NEW: AxisCommandError "Pathplanner couple" if streamX is not within positionErrorLimit
- FIX: fixed Bug#689 'wrong acceleration when modulo-limit is set during move'
- CHG: improved calculation of deceleration move ratios
- FIX: Option encoders did not show amplitude errors (bug introduced in 4.4)
- NEW: homing persistent offset used on encoder finish, use legacy if OptionEncoderDrivePersistency.
- NEW: errorMessage strings
- NEW: general.signals.etherCAT.cyclic.pdo1c12 and pdo1c13
- NEW: (Re-)StartPhasing tested from Disabled/Operational
- CHG: In the standalone case, EtherCAT must not disable axes
- FIX: Tamagawa and Nikon require a wakeup time of 10ms. 5ms -> 50ms
- FIX: init of tama VMs (1.4.8)

TSD 4.6.4

- BREAKING: Ecat product revision is now 2 for Revision4 drives (1 for revision3 drives)  
Use Triamec1.6.xml or option 0x100 to force old behavior
- NEW: File upload /put.html and directory /dir
- NEW: Axes[].Parameters.PathPlanner.InterpolatorDelay delays interpolator signals in microseconds. Use -24.0 for legacy behavior.
- NEW: Bridge Mode Ethernet to TriaLink
- NEW: Ethernet parameters for static IP
- NEW: Support new option modules TOA2, TOF1 (FFT)
- FIX: Persistent boot: MotorTemperatureSensor parameters must be copied on success only
- FIX: 1.5.6 Sensorless damping worked only, if a standard encoder was used before (4.6.2-beta, 31292)
- FIX: 1.5.7: Sensorless must disable pathplanner tracking (normally done in disabled) (4.6.3-beta, 31306)
- FIX: 1.5.8 There was a peak of desiredCurrentQ at the beginning of the phasing ramp (4.6.4)
- FIX: 1.5.8 TOF1-Modul interface (merge with 1.5.8, 4.6.4, SVN31361)

TSD 4.6.6 (4.9.2019)

- FIX: 1.5.9 Large encoderCountsperMotorRevolution caused bad commutation wrapping

**FpgaFirmware: Build 1.3.2**

**Release Date: 2019-07-01**

Changes since last Release:

NEW: Node addresses can be changed by local bus

NEW: Dedicated node addresses for bridge mode by USB or Ethernet over a drive.

NEW: drive can overtake the trialink master role (rings without trialink controller card)

**MonitorFirmware:**

**Release Date: 2019-05-17**

Changes since last Release:

- see dedicated Monitor releaseNotes for details

**Firmware TSD-4.4.12 (19.3.2019)**

**If option modules are present, TSD-4.2.0 must have been installed before this!**

**CpuFirmware: Build 1.2.12 (4.4.12)**

**Release Date: Date: 2019-03-13 14:11:04 +0100 (Mi, 13 Mrz 2019)**

**SVN Revision: Revision: 30312**

**Remarks: Use TAM SDK >= 7.9.0 to support coulomb friction registers and stream filter**

Changes since last Build:

- NEW: Ecat Stream Mode turned on with option 0x200000
- NEW: FeedForward coulomb friction
- NEW: Position Stream Filter
- FIX: TSD80: motorTemperature Configuration lost during STO
- NEW: Prototype of logfile <http://triamec-NNN/1:/log.txt> (option = 0x1000)
- CHG: Min EtherCAT cycle time is now 100us instead of 200us
- FIX: Clearing a hidden STO safe fault was blocked in some cases
- NEW: Encoder: Tamagawa, Analog-Biss-B and Biss-B error reaction  
no absoluteCommutation so far
- FIX: DigitalEndat: modulo wrap
- !BREAKING! DigitalEndat: new scale (1.0 per turn)(ROT) or (1.0 per count)(LIN)
- NEW: EtherCAT: Support Explicit Device Id with Trialink1.4.xml  
add error UnspecifiedPositionUnit on booting with unspecified scaling factor

**FpgaFirmware: Build 1.2.11**

**Release Date: 2019-02-06**

Changes since last Release:

- FIX: option modules transmit data with a downsampling of 79  
due to a bug inside the new Zynq SERDES calibration unit.
- NEW: first TSP710 support with 2-Level Pwm
- NEW: Nikon encoder support
- NEW: Tamagawa encoder support
- NEW: Extended encoder error messages (not yet completed)
- CHG: Serial encoder rework
- NEW: Serial encoder without bit filter
- FIX: Pll error counters was not clearable

**MonitorFirmware:**

**Release Date: 2019-02-19**

Changes since last Release:

- see dedicated Monitor releaseNotes for details

## Firmware TSD-4.3.4 (18.1.2019)

**If option modules are present, TSD-4.2.0 must have been installed before this!**

**CpuFirmware: Build 1.0.8**

**Release Date: \$Date: 2019-01-18 13:54:17 +0100 (Fr, 18 Jan 2019) \$**

**SVN Revision: \$Revision: 29556 \$**

**Remarks: Use TAM SDK >= 7.8.0 to support new product naming and new homing method**

Changes since last Build:

- **!BREAKING!** SerialEncoder Persistency (Position-Offset) requires parameters.homing.method = AbsoluteEncoderN!
- CHG: Products: Changed strings, support orthogonal scheme and remove obsolete products (SCN 006)
- FIX: USB: Delayed BIOS boot of attached PCs, Support USB3 plugs (Windows USB Stack 3)
- CHG: Adjust continuous current i2t time from 2s to 20s and temperature limits
- CHG: Encoder: change analogEndat mode readposition mode for endat 2.2 encs
- NEW: Ethernet: AUTO-IP hard-coded to 0x169.254.222.222 (AN123)
- FIX: Ethernet: improve plug disconnect behavior during publish
- NEW: resetDiagnosticCounters
- NEW: DigitalBissB encoder
- NEW: Latching of (slow) digital inputs with 100us resolution
- NEW: Support analog sensor input of encoder
- NEW: Axes[]/Signals/PathPlanner/StreamGapCount counts missing stream packets  
use TwinCAT CAxis2::simulateStreamError to force a missing packet
- FIX: TSD350: wrong units of Axis[1] motorTemperature
- FIX: Option module axis1 wrong amplitudeState

**FpgaFirmware: Build 1.1.11**

**Release Date: 2019-1-18**

Changes since last Release:

- **FIX:** option modules unintended downsampling of 79 due to a bug
- CHG: encoder amplitude error and warning passed through a bit filter
- NEW: encoder error handling
- NEW: biss b, biss c and ssi encoder
- CHG: endat local bus rework
- NEW: encoder error signals on cyclic interface
- CHG: pll not locked behaviour (debouncing of the errors)
- see dedicated FPGA releaseNotes for details

**MonitorFirmware:**

**Release Date: 2019-01-11**

Changes since last Release:

- see dedicated Monitor releaseNotes for details

**Firmware TSD-4.2.0 (14.11.2018)****CpuFirmware: Build 2329 (TSD-4.2.0-proto)****Release Date: \$Date: 2018-11-13 10:53:30 +0100 (Di, 13 Nov 2018) \$****SVN Revision: \$Revision: 28759 \$****Remarks: Use TAM SDK >= 7.6.0 to support Ethernet connections**

Changes since last Build:

- **MANDATORY FIX:** MotorPeakCurrent > DrivePeakCurrent can cause hardware damage
- **FIX:** FW update of an Option module in backup-mode
- **CHG:** etherCAT object 0x6092 (feed) is not writable in OP, recalculate on unit change
- **NEW:** units mm and degree
- **NEW:** add objects 0x1623 and 0x1a23
- **NEW:** digital endat: Set position zero if no persistency data
- **CHG:** Ecat Homing does not stop anymore if cmd 0x10 disappears, use Option 0x200 for legacy behavior

**FpgaFirmware: Build 1.1.4****Release Date: 2018-11-12**

Changes since last Release:

- **MANDATORY FIX:** TriaLink PLL-not-locked issues
- see dedicated FPGA releaseNotes for details

**MonitorFirmware:****Release Date: 2018-11-08**

Changes since last Release:

- see dedicated Monitor releaseNotes for details

**THIS RELEASE DOES NOT CONTAIN FPGA OPTION MODULE FIRMWARE  
USE NEXT RELEASE FOR OPTION MODULE UPDATE**



**Firmware TSD-4.1.2 (08.11.2018)****CpuFirmware: Build 2327****Release Date: Date: 2018-11-06 08:05:47 +0100 (Di., 06 Nov 2018)****SVN Revision: Revision: 28696****Remarks: Use TAM SDK >= 7.6.0 to support Ethernet connections**

Changes since last Release:

- FIX: Ethernet Ungraceful Disconnection handled
  - FIX: Ethercat eeprom station alias not persistent
  - FIX: Option Module FW download solve retries
  - NEW: Show Factory FW Release number and TSD130 string
- KNOWN ISSUE: FW Download of an Option Module that is running in backup-mode

- see dedicated FPGA releaseNotes for details

**FpgaFirmware: Build 2211****Release Date: 2017-12-18**

Changes since last Release:

- see dedicated FPGA releaseNotes for details

**MonitorFirmware:****Release Date: 2018-11-08**

Changes since last Release:

- see dedicated Monitor releaseNotes for details