KOLLMORGEN
Because Motion Matters™

AKD Firmware Release Notes

These release notes for the AKD drive firmware (the software that executes inside the AKD drive) describe the changes between the previous firmware releases and this release.

Kollmorgen provides five different firmware files. Use the file that matches the model number of your drive.

Drive Type	Model Number	Firmware File
Base Analog	AKD-Bxxxxx-NAAN-0000	AKD-B-NAAN-V01-04-00-009.i00
Positioner Indexer Analog	AKD-Pxxxxx-NAAN-0000	AKD-P-NAAN-V01-04-00-009.i00
Positioner Indexer CANopen	AKD-Pxxxxx-NACN-0000	AKD-P-NACN-V01-04-00-009.i00
Positioner Indexer EtherCAT	AKD-Pxxxxx-NAEC-0000	AKD-P-NAEC-V01-04-00-009.i00

Please update to WorkBench version 1.4.0 when using this firmware.

WorkBench is compatible with all previous AKD firmware versions. WorkBench forward compatibility, however, cannot be ensured. When a behavior in the firmware changes, an older WorkBench version may not function correctly with the new firmware. Kollmorgen recommends that you update WorkBench when you install new firmware. The table below describes compatibility between WorkBench versions and firmware versions. Any new firmware not listed here may have compatibility issues with WorkBench.

	M_01-01-00-xxx	M_01-02-00-xxx	M_01-03-00-xxx	M_01-04-00-xxx
WorkBench Version 1.1.x.x	Yes			
WorkBench Version 1.2.x.x	Yes	Yes		
WorkBench Version 1.3.x.x	Yes	Yes	Yes	
WorkBench Version 1.4.x.x	Yes	Yes	Yes	Yes

Release Summaries

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+ Field Bus Specific Issues

Version: 01-03-13-000, January 26,

Version: 01-04-00-009   Release Date: November 09, 2011

Field Bus Specific Issues
Fixed Bugs

- **DS402: Drive enabled after stopping application (3254)**

  Issue:
  When a specific KAS application stopped running, the drive enabled after a short time and stayed enable afterwards.

  Solution:
  The application didn't look for the DS402 status word before switching states. There should be looked always after feedback from the status word, when the control word changes states! Firmware behaviour changed because of safety relevance.

Version: 01-04-00-007   Release Date: September 26, 2011

General Issues
Feature Changes

- **Resident updated to version 00-00-33-000 ()**

  Issue:
  When downloading user *.i00 files through EtherCAT, the EEPROM contents could be corrupted.

  Solution:
  This has been fixed in the new resident.

Version: 01-04-00-006   Release Date: August 03, 2011

General Issues
Fixed Bugs

- **VBUS.VALUE reported as high number when actual voltage is negative (3132)**

  Issue:
  When the VBUS goes negative due to voltage, or improper calibration settings, the VBUS.VALUE reported may report a negative number resulting in multiple faults: F501, F503, F308

  Solution:
  This has been fixed to display the correct negative number.

Version: 01-04-00-005   Release Date: April 29, 2011

General Issues
Feature Changes

- **Crash dump diagnostic information can now be cleared by the user. ()**

Issue:
When diagnosing drive problems, it is sometimes helpful to clear out old diagnostic information.

Solution:
The command DRV.CLRCRASHDUMP may now be entered in the terminal window in Workbench to clear old diagnostic information.

Fixed Bugs

- **Strange behaviour of axis, when motion task movement is blocked (3020)**
  Issue:
  The current command would reverse several times if a motion was commanded (position mode) and the axis was blocked

  Solution:
  The acceleration limiting method was rolling over. The calculation causing the rollover was revised to correct the problem

- **MOTOR.VMAX Overwrites VL.LIMITN, VL.LIMTP and VL.THRESH When Autoset is True (3025)**
  Issue:
  MOTOR.VMAX overwrites VL.LIMITN, VL.LIMTP and VL.THRESH When Autoset is True (MOTOR.AUTOSET = 1)

  Solution:
  The firmware has been modified so that MOTOR.VMAX does not overwrite the velocity limits.

- **Modbus: Reading velocity parameters returned an invalid value,most of the time a -1. (2995)**
  Issue:
  Reading velocity values, like VL.FBFILTER or VL.CMD, returned a -1.

  Solution:
  Velocity parameters are 64bit values mapped to 32bit values in Modbus. The mapping uses flags, which were not reset correctly.

  Those flags caused the return of the wrong value.

Field Bus Specific Issues
Known Issues

- **Modbus Dynamic Mapping table cannot be read back by user (3020)**
  Issue: (Identified in Version 01-04-00-003)
  A Problem has been identified reading back the dynamic mapping table on Modbus. Setting the dynamic mapping table works fine.

Version: 01-04-00-003   Release Date: April 05, 2011

Field Bus Specific Issues
Known Issues

- **Modbus requests must be sent one at a time. (2903)**
  Issue:
  Modbus has a problem processing multiple requests at once.

  Temporary Workaround:
  Modbus requests must be sent from the controller to the drive in a "request – response, request – response" pattern. If a second request is sent by the controller before the drive has responded to the first requests, the second request will not receive a response.

Version: 01-04-00-002   Release Date: April 01, 2011

General Issues
Fixed Bugs

- **Brake delay for apply and release encountered problems. (1241)**
  Issue:
  Brake handling in earlier versions of the drive firmware had several problems involving the apply or release sequence. The release delay should prevent motion until after the mechanical delay in releasing the brake that is normally seen when power is applied to the brake. Similarly, disabling the power stage may also be delayed until the motor has stopped and the brake has been applied.

  Solution:
  This sequencing has been corrected in this version of the firmware to match the behavior described in the drive documentation (MOTOR.TBRAKEAPP, MOTOR.TBRAKERLS, DRV.DISMODE).

- **Ability to disarm Wake and Shake after arming was added. (2237)**
  Issue:
  There were various problems with Wake and Shake for both mode 0 and mode 1. Faults could not be cleared (2336, 2488), time scale was incorrect, and disarming was not an option (2237).

  Solution:
  These problems were corrected in this release.

New Features

- **Auto-homing for multi-turn feedback added. (2439)**
  New Feature Details:
  When a multi-turn feedback device is initialized it should be automatically homed with no motion, and with the multi-turn absolute position preserved.

  Solution:
  The firmware has been modified so that multi-turn feedback devices will be automatically homed with no motion. The multi-turn position is preserved and the home done flag is set to true. This change will allow software limits to also be active.

Field Bus Specific Issues

Version: 01-04-00-001   Release Date: March 25, 2011

General Issues
Fixed Bugs

- **Blink Drive causes fault F532. (2971)**
  Issue:
  Using the "blink drive" button in WorkBench can cause an F532 fault due to changing the value of DRV.SETUPREQBITS.

  Solution:
  DRV.SETUPREQBITS is no longer modified when the drive display blinks.

Version: 01-04-00-000   Release Date: March 18, 2011

General Issues
New Features

- **Support for SFD sensor fault added. (1921)**
  New Feature Details:
  When the SFD Feedback Sensor (Resolver) does not provide the correct signal to the SFD feedback board, the AKD firmware should generate a signal amplitude fault (Fault 402).

  Solution:
  The firmware has been modified so it will generate a signal amplitude fault (Fault 402) when the SFD Feedback Sensor (resolver) does not provide the correct signal to the SFD Sensor board.

- **Allow writing of motor parameters to encoder memory. (2606)**
  New Feature Details:
  When using Endat and Hiperface encoders, the ability to write the motor parameters to the motor is required.

  Solution:
  The firmware has been modified to allow writing the motor parameters (motor ID) to the Endat and Hiperface encoder memory. The command to write to the memory is password protected. Note that for Hiperface feedback devices, the ability to read motor parameters from the memory has also been implemented. Endat Feedback devices already have the ability to read the motor parameters from the memory. To read the memory contents, the autoset parameter (MOTOR.AUTOSET) must be set to True.

- **Read the availability of a motor-brake from the feedback NV memory. (575)**
  New Feature Details:
  The availability of a motor brake was not read from a feedback device with memory, even if the information was available.

  Solution:
  For feedback devices with factory programmed memory (SFD, EnDat, and Biss) the firmware will read the availability of the motor brake from the feedback NV memory and initialize the corresponding MOTOR.BRAKE parameter.

- **Current loop gain scheduling feature added. (2776)**
  New Feature Details:

  When motors saturate, their effective inductance decreases, which can cause instabilities in the current loop since the current loop gain is dependent on motor inductance.

  Solution:
  Current loop gain scheduling has been implemented under the Current Loop view so that a user can specify a current loop lookup table to change the current loop gain based on a current command level.

Fixed Bugs

- **Hiperface encoder locks up sometimes with clear faults. (2890)**
  Issue:
  Sometimes Hiperface encoders would not be able to clear the "Failed to Set Feedback Fault" (Fault 401) with the clear faults command. The drive had to be power cycled in order to clear this fault.

  Solution:
  The firmware has been modified so that Hiperface feedback devices can clear the "Failed to Set Feedback Fault" (Fault 401) with the clear faults command (assuming that the feedback device is functioning properly). Power cycling is not required to clear this fault.

- **Range specified for MOTOR.KE is too small (0.000 - 1000.000). (2952)**
  Issue:
  The range for the motor back emf constant (MOTOR.KE) is too small. The maximum value that can be set is 1000 Volts/Krpm. This range should be increased to 100,000 Volts/Krpm to cover DDR Motors.

  Solution:

The range has been increased to 100,000 Volts/Krpm.

Field Bus Specific Issues
New Features

- **CANopen autobaud detection added. (2818)**
  New Feature Details:
  If the two CANopen nodes have a fix, but not the same baudrate, the communication will not work. Autobaud creates a flexible and easy to install CANopen-Bus configuration.

  Solution:
  Instead of using a fix baudrate, the autobaud detection can be configured. A master node can send an initial CANopen-Frame on the CANopen-Bus and the drive measures the bit-rate and initializes the baudrate of the CAN-Controller with the measured baudrate (125, 250, 500 or 1000 kBit/s).

- **New parameters supported via CANopen. (2901)**
  New Feature Details:
  Customer requested support for parameters MOTOR.VRATED, MOTOR.VOLTMIN, MOTOR.VRATED, PLL.SYNCDIST and PLL.SYNCWND.

  Solution:
  The parameters MOTOR.VRATED, MOTOR.VOLTRATED and MOTOR.VOLTMIN are implemented as SDO 3457 sub 1, 2 and 3. The support for the PLL commands is not provided.

Fixed Bugs

- **CANopen SDO request answered before Bbootup message has been sent. (2907)**
  Issue:
  After power on, a CANopen master polls a CANopen object via SDO request before the bootup message of the drive has been sent. The drive does not answer this request until it is fully initialized. This initialization is done when the boot up message has

  been sent.

  Solution:
  A SDO request is not answered until the bootup message has been sent.

- **Bit 10 of the DS402 status word did not work in profile velocity mode. (2805)**
  Issue:
  Bit 10 (target reached) of the DS402 status word did not work in profile velocity mode.

  Solution:
  The objects 606D sub 0 (Velocity Window) and 606E sub 0 (Velocity window time) determine the setting for the surveillance of the velocity demand value. If the velocity reached the window and is in for the defined time, bit 10 will be set.

- **Sometimes the commanded torque value is not taken by the drive. (2830)**
  Issue:
  The object 6071 sub 0 is sent periodically. From time to time, the old value is kept and the new not taken.

  Solution:
  The takeover of the command value via SDO 6071 always works now. The PDO access was not affected.

- **Object 6072 sub 0 influenced only the positive torque limit. (2969)**
  Issue:
  Object 6072 sub 0 (max torque) should set both current limits, but the negative is not changed.

  Solution:
  IL.LIMITN is now also changed.

- **Multiple EtherCAT errors present. (2905)**
  Issue:
  Halt bit in profile position mode only works one time, and writing 0 to object 6098 sub 0 (Home mode) doesn't work correctly (gives a timeout).

  Solution:
  Halt bit (bit 8 control word) works now correctly and value 0 for object 6098 generates now an abort message as well as the other not supported values.

Version: 01-03-16-000   Release Date: February 16, 2011

General Issues
New Features

- **Modulo extension added. (1672)**
  New Feature Details:
  The modulo-axis feature should be completed.

  Solution:
  The following scopable variables are converted into modulo-format (if selected) upon a recorder retrieve command: CAP0.PLFB, CAP1.PLFB, PL.FB, PL.CMD

- **Read motor phase from Hiperface feedback memory added. (2814)**
  New Feature Details:
  Hiperface feedback devices are not aligned to the motor's windings. As a result the commutation offset angle must be read from

the Hiperface feedback memory, and set on the drive using the MOTOR.PHASE parameter.

Solution:
The commutation offset angle will be read from the Hiperface feedback memory. The angle is read from the S-300 drive memory

location which is Datafield 0, bytes 2 and 3. When autoset is true (MOTOR.AUTOSET = 1) this read value is automatically stored in the drive, in the parameter MOTOR.PHASE. Note that AKM motors will have this value programmed into their memory when shipped from the factory. For non-AKM motors, an S-300 drive must be used to program this value in the Hiperface memory. When full motor ID is implemented for Hiperface in the future, the drive will be able to store this angle in the Hiperface memory.

Fixed Bugs

- **Inputs "switch bounce" changes the motion task profile. (2065)**
  Issue:
  More DIN modes were created to enable interruptible and uninterruptible motion task features.

  Solution:
  Bit No 13 and 14 in control word (MT.CNTL) are used to identify the authentication of activation of new motion task externally. If control word bits 13 and 14 are not set, then normal operation occurs. Any motion task is allowed for Activation. If control word bit 13 is set and any motion task is active, then Deny Activate, Otherwise Allow Activation occurs. If control word bit 14 is set and no motion task is active, then Deny Activate, Otherwise Allow Activation occurs.

- **Motor.KT Limit too low for linear motors (2833)**
  Issue:
  The drive firmware limits the value of to 65 Nm/A for rotary motors, and 65 N/A for linear motors. This value is too low, as it is easy to exceed this limit on a linear motor.

  Solution:
  The firmware limit has been changed to 1,000,000 Nm/A for rotary motors, and 1,000,000 N/A for linear motors.

Motion Tasking Issues
New Features

- **Additional options for the registration move added. (2666)**
  New Feature Details:
  Two additional bits were added to the motion task control-word, which both have an impact on the motion-task trigger.

  Solution:
  A motion task can not be interrupted if bit 13 of the MT.CNTL parameter of a running motion task has been set to true. A motion task can not be started from velocity 0 if bit 14 of the MT.CNTL parameter of that motion-task, which is supposed to be started, has been set to true.

Version: 01-03-14-000   Release Date: February 01, 2011

General Issues
New Features

- **Modbus: Mapping of 64-bit parameters to 32-bit added. ()**
  New Feature Details:
  HMI devices or PLCs using Modbus do not always support 64bit variables / parameters.

  Solution:
  An interim solution is provided: Starting at register address 2000, the low 32-bit word of 64-bit parameters are mirrored. The mapping of these registers is described in Modbus documentation.

- **Digital output modes 5 & 6 should function with PL.FB in linear or in modulo scaling, depending on the PL.MODPEN setting. (1672)**
  New Feature Details:
  Certain functionalities of the drive should work with modulo-scaled position variables when a modulo axis is selected.

  Solution:
  The digital output modes 5 & 6 now work with modulo-scaled position variables when a modulo-axis is selected.

- **Software limit switches should function with PL.FB in linear or in modulo scaling, depending on the PL.MODPEN setting. (1672)**
  New Feature Details:
  Some certain functionalities of the drive should work with modulo-scaled position variables when a modulo axis has been selected.

  Solution:
  The software limit-switch functionality now works with modulo-scaled position variables when a modulo-axis has been selected.

Fixed Bugs

- **PLS also should follow modulo scaling if enabled. (2797)**
  Issue:
  Programable Limit Switches also need to be follow modulo scaling.

  Solution:
  The Programable Limit Switch functionality now works with modulo-scaled position variables when a modulo axis has been enabled.

Field Bus Specific Issues
New Features

- **MODBUS.FAULT1 - MODBUS.FAULT10 now return the fault numbers of the active faults. ()**
  New Feature Details:
  It was not possible to determine the fault status of the drive via Modbus.

  Solution:
  Up to 10 active faults are now stored in registers MODBUS.FAULT1 to MODBUS.FAULT10. - If MODBUS.FAULT1 is zero, then no fault is active. - If MODBUS.FAULT1 is non-zero, then the following register may contain further fault numbers. - A fault register with a value of zero marks the end of the fault list.

- **CANopen baud rate can be configured via the rotary switches and button B1. (2583)**
  New Feature Details:
  The user wants to configure the CANopen baud rate without using a PC.

  Solution:
  The new feature supports CANopen baud rate configuration through the rotary switches and button B1. The following sequence will configure a new baud rate and store the setting in non-volatile memory: 1.) Drive must be disabled. 2.) Set the rotary switches to: 91 - 125K bit 92 - 250K bit 93 - 500K bit 94 - 1000K bit (1M) 3.) Push the button B1 and hold it for at least 3 seconds. 4.) To confirm the new setting, the setting of the rotary switches will flash 5 times on the 7seg LEDs 5.) Reset the rotary switches to the original setting. If an error occured, the following error messages will flash 5 times: E1 - Drive is enabled. E2 - Non-volatile storage of the new setting failed. E3 - Invalid rotary switch selection.

Version: 01-03-13-000   Release Date: January 26, 2011

General Issues
New Features

- **Improved motion task blending ("registration move") added. (2666)**
  New Feature Details:
  Users want to interrupt a currently active motion task and start a new motion task via a digital input. When the input is triggered, the actual position value is latched and the second motion task is started, depending on the latched position.

  Solution:
  Users can use CAPx.MODE 4 to continuously capture the actual feedback position, depending on a digital input (configurable via CAPx.TRIGGER). With DINx.MODE 2 or 4, a motion task can be started via a digital input. With MT.CNTL 5 (relative to external start position), the specific motion task uses the captured position as start position of the triggered motion task.

Fixed Bugs

- **Biss Mode C Encoder initializes with incorrect position. (2849)**
  Issue:
  Biss Mode C Resolute Single Turn encoders with 32 bits of precision do not initialize the position correctly. If the starting position is greater than 180 degrees, the position was being initialized to a value of 180 degrees minus the start position.

  Solution:
  Now when the start position is greater than 180 degrees, the position is initialized properly

Capture Issues
New Features

- **CAP0.PLFB and CAP1.PLFB should be converted in modulo format when a modulo axis is selected. (1672)**
  New Feature Details:
  Certain functionalities of the drive should work with modulo scaled position variables when a modulo axis has been selected.

  Solution:
  CAP0.PLFB and CAP1.PLFB are converted in modulo format when the modulo axis is selected.

Version: 01-03-12-000   Release Date: January 18, 2011

General Issues
Fixed Bugs

- **Motion task complete does not work with S-curve enabled. (2645)**
  Issue:
  S-Curve Motion task do not set Motion Task complete status bit after reaching target position.

  Solution:
  Motion task complete now works with S-curve enabled.

- **S-curve profiles moving to wrong position. (2732)**
  Issue:
  1:1 S-curve Motion task always reach the specified target position by 360 degrees.

  Solution:
  S-curve profiles move to correct position now.

- **Problems occur when recording using an immediate trigger at a rate other than 16 kHz (2837)**
    Issue:
    When recording data using immediate trigger, the first data point would sometimes be duplicated. Also, REC.RETRIEVE would return data starting at an incorrect index.

    Solution:
    This problem has been identified and fixed.

- **Inputs "switch bounce" changes the motion task profile. (2065)**
    Issue:
    Customers using an earlier version of DIN.MODE-2 requested the interruptible Motion Task feature.

    Solution:
    Digital Input Mode 2 - "Start Motion task" was reverted as interruptible Motion Task and new DIN mode was added (Digital Input Mode 24 - "Start uninterrupted Motion task").

Feature Changes

- **Fault 133 "Instability during autotune" number changed to 138. Fault is now also shown in the display. (2731)**
    Issue:
    Fault was not shown on display.

    Solution:
    Fault number was changed and enabled to show on display.

New Features

- **FB1.MECHPOS should be recordable by the WorkBench scope. (1125)**
    New Feature Details:
    When setting up motor commutation, it is helpful to be able to plot the mechanical position of the motor (FB1.MECHPOS) in conjunction with the Hall switch states. The parameter FB1.MECHPOS should be made "recordable" in order to achieve this.

    Solution:
    The firmware has been modified so that FB1.MECHPOS is recordable.

Field Bus Specific Issues
Fixed Bugs

- **FBUS.PARAM01 was reset to its default value by DRV.RSTVAR and object 1011 sub 1. (2550)**
    Issue:
    With the object or the command DRV.RSTVAR, the CANopen-baudrate was reset to its default value. This leads to problems in working machines.

    Solution:
    FBUS.PARAM01 is no longer reset to default by DRV.RSTVAR and object 1011 sub 1.

New Features

- **Emergency 0x8AF0 added for unreasonable parameter combinations of homing mode and feedback type. (2792)**
    New Feature Details:
    Some combinations of motor feedback types with the selected homing mode are unreasonable. For example, a SFD feedback is used together with homing mode "Find index". In this case a emergency message 0x8AF0 "Homing and Feedback mismatch!" is generated because no index signal is generated by the SFD feedback.

    Solution:
    An emergency is issued when the selected homing mode cannot be used with the feedback device. Use another homing mode.

Version: 01-03-10-000   Release Date: January 04, 2011

General Issues
Fixed Bugs

- **Opmode switching over SDO causes runaway. (2567)**
    Issue:
    When switching opmode via command word in CANOpen, unexpected motion occurs about 10% of the time.

    Solution:
    Code has been corrected so that opmode and command source are cleanly handled from all change sources.

- **Fault reaction time is too slow. (2767)**
    Issue:
    Fault response time is not deterministic and can take over 50 ms in a worst case scenario.

    Solution:
    Response time is now deterministic and under 5 ms.

Feature Changes

- **DIN mode 22 - opmode switching with multiple digital inputs added. (2573)**
  Issue:
  DIN mode 22 was initially implemented with only one input changing. The case of multiple inputs changing was not defined. This implementation extends the original design with the following rule: if more than one input is active at a time, the lowest numbered input will determine the desired opmode.

  Solution:
  Mode 22 works as described above for multiple inputs.

Version: 01-03-09-000   Release Date: December 28, 2010

General Issues
Fixed Bugs

- **Hiperface Type SEL37 does not initialize. (2775)**
  Issue:
  The multi-turn Hiperface feedback device SEL37 does not initialize properly.

  Solution:
  Firmware has been modified so that the SEL37 multi-turn Hiperface feedback will initialize. A delay was added to the firmware to accommodate the longer than typical time to power up the encoder. According to the SEL37 data sheet, it takes 1200 ms for this encoder to power up and initialize. Note that the hiperface specification says that this time is no longer than 900 ms for a typical Hiperface encoder.

- **Hiperface feedback selection initializes properly. (1664)**
  Issue:
  If the user selects Hiperface explicitly (FB1.SELECT = 33), then the absolute position will not be initialized properly for both single turn and multi-turn hiperface encoders.

  Solution:
  Firmware has been modified so that the user can select either auto identify (FB1.SELECT = -1) or explicitly select Hiperface (FB1.SELECT = 33) and the absolute position information will be correct.

New Features

- **Warnings added for unreasonable parameter combinations of homing mode and feedback type. (2792)**
  New Feature Details:
  Some combinations of motor feedback types with the selected homing mode are unreasonable. For example, a SFD feedback is used together with homing mode "Find index". In this case a warning 137 "Homing and Feedback mismatch" is generated because no index signal is generated by the SFD feedback.

  Solution:
  A warning is issued when the selected homing mode cannot be used with the feedback device. Use another homing mode.

Field Bus Specific Issues
Fixed Bugs

- **Velocity set point via SDO 60FF was sometimes not taken. (2793)**
  Issue:
  Sometimes the velocity set point coming via SDO 60FF is not taken into account correctly. The last sent value was often taken again.

  Solution:
  This set point is now handled properly.

Feature Changes

- **Brake delay times were not observed in DS402-state-machine. (2411)**
  Issue:
  The state "Operation Enabled" was signaled too early with motors with brakes. This might have confused controls, when the set points were taken later than intended.

  Solution:
  The times connected to brake now influence the DS402 state machine. The state switches will take longer with brake motors.

- **In DS402 profile velocity mode, scaling objects 604B and 604C have been replaced with 204C. ()**
  Issue:
  Objects 604B and 604C, as implemented, are not appropriate for profile velocity mode.

  Solution:
  Manufacturer specific object 204C has been added to implement unit scaling for this mode.

Version: 01-03-08-000   Release Date: December 07, 2010

General Issues
Fixed Bugs

- **Controlled Stop function (logic state) illegal on startup. (2689)**
  Issue:

After a power cycle the drive is not in the controlled stop state, and the drive can be enabled even though Digital input 1 is configured to generate a controlled stop (DIN1.MODE =13), and the input is in the state that should generate the controlled stop. Note the drive off time during the power cycle must be approximately 90 seconds in order to see this issue.

Solution:
Firmware was modified so that now the drive will be in the controlled stop state (and it cannot be activated when the controlled stop is configured), and the input bit is in the state that will generate a controlled stop.

- **Linear motor acceleration limits are too low. (1777)**

  Issue:
  When linear motors are selected, the limits for allowable command accelerations are too low. When the linear motor type is selected, the maximum allowable acceleration is 833 encoder counts/second^2. For linear motors there are 4294967296 encoder counts per electrical cycle, where one electrical cycle is typically on the order of 32 to 36 millimeters in length, which translates to a maximum acceleration of 6 e-6 mm/sec^2.

  Solution:
  Problem with units conversion for linear motors was corrected. The old conversion was actually poles/sec/sec instead of counts/sec/sec.

- **Hall Switch U, V and W State parameters must be recordable in the WorkBench scope. (1125)**
  Issue:
  The new U, V and W Hall Switch State parameters cannot be recorded and displayed by the WorkBench scope. These parameters are FB1.HALLSTATEU, FB1.HALLSTATEV, and FB1.HALLSTATEW.

  Solution:
  Firmware has been modified so that these parameters can now be recorded by the WorkBench scope.

- **Implementation of DRV.ENDEFAULT corrected. (2695)**
  Issue:
  The user selects DRV.ENDEFAULT=1, HOME.AUTOMOVE=1, HOME.MODE=4. With this combination of parameters the drive should enable automatically after power-up and start immediately afterwards a homing procedure. But instead, the drive immediately creates an undervoltage fault after the boot sequence when trying to start the homing procedure. The root cause was the attempt to move the motor before the inrush relay was closed.

  Solution:
  The DRV.ENDEFAULT feature pays attention to the status of the inrush relay and the drive will only be enabled when the inrush-relay is closed.

- **Inputs "switch bounce" changes the motion task profile. (2065)**
  Issue:
  The multiple raising edges on digital input were triggering the same motion task again and again, which is unexpected.

  Solution:
  Digital Input Mode 2 - "Start Motion task" was modified as an un-interrupted profile, and ignores any sub-sequent activate signals of the same motion task from same digital input. These input signals could be occurring because of bouncing switches.

- **Need to issue two DRV.CLRFAULTS commands in order to clear a safe torque off (STO) fault. (1844)**
  Issue:
  Need to issue two DRV.CLRFAULTS commands in order to clear a safe torque off (STO) fault.

  Solution:
  It is now possible to clear the STO fault after one DRV.CLRFAULTS command.

- **Modbus speed improvements added. (2624)**
  Issue:
  The response time was too slow (sometimes as high as 200ms).

  Solution:
  Response time has been dramatically improved (10ms response typical).

- **Help string not covering Min, Max and Default values for DINx.FILTER parameters. (2766)**
  Issue:
  Min, Max and Default values for DINx.FILTER help are missing.

  Solution:
  Support for Min, Max and Default values for DINx.FILTER added.

- **Restoring parameters for a linear motors may not work correctly. ()**
  Issue:
  If you used DRV.NVLIST to save parameters for a system with a linear motor and you tried to restore these parameters to a new drive some of the position, velocity and acceleration parameters were not restored correctly.

  Solution:
  DRV.NVLIST has been changed to output the MOTOR.TYPE parameter at the top of the list of parameters output by DRV.NVLIST.

- **New digital input mode 23 added. (2676)**
  Issue:
  The user wants to change the algebraic sign of the measured analog voltage upon a rising edge on the digital input in order to change the direction of motion. The user wants to zero the measured voltage upon a falling edge on the digital input.

  Solution:
  A new digital input mode (mode 23) has been added.

- **DRV.DISMODE should not be writable when the drive is enabled. (2779)**
  Issue:
  Kollmorgen recommends that you do not change the disable mode when the drive is enabled due to complex interactions

Kollmorgen recommends that you do not change the disable mode when the drive is enabled due to complex interactions.

Solution:
The drive must now be disabled before changing DRV.DISMODE.

New Features

- **Multi-turn Hiperface support added. (1664)**
  New Feature Details:
  Current AKD firmware treats multi-turn Hiperface encoders as single turn Hiperface encoders. The multi-turn information is ignored.

  Solution:
  Firmware has been modified so that the multi-turn information is used.

Field Bus Specific Issues
Fixed Bugs

- **The first event Tx-PDO or event Rx-PDO will not get processed. Starting with the second event PDO, the processing is executed. (2674)**
  Issue:
  The first event Tx-PDO or event Rx-PDO will not get processed. Starting with the second event PDO, the processing is executed.

  Solution:
  A minor bug in event RxPDO processing prevented the first RxPDO from being executed.

Feature Changes

- **DS402 status work now displays the status of the Safe Torque Off input.**
  ()
  Issue:
  The STO status should be displayed in the status word.

  Solution:
  Bit 8 of the DS402 status word now reflects the STO state.

- **HOME.IPEAK SDO35E2s0 should be scaled in mA not in Amps. (2345)**
  Issue:
  Amps is not a useful scaling for HOME.IPEAK.

  Solution:
  The value is now in mA.

Version: 01-03-07-000   Release Date: November 23, 2010

IO Issues
New Features

- **Added "switch bounce" conditioning to the digital inputs. (2065)**
  New Feature Details:
  Digital Input debounce switches create problems such as multiple activations, multiple triggers, etc. based on the mode of the Digital Input assigned.

  Solution:
  FPGA is built with configurable filters for Digital I/O channels. New user command "DINX.FILTER" is added as user command which can alter the configuration of DIN filter. DINX.FILTER simply returns the present value of the filter of channel X. DINX.FILTER followed with data will alter the value of the filter. The data allowed is 0 to 3. 0 - No filter setting (40ns) 1 - Fast filter setting (10.24μs +/- 0.64μs) 2 - Standard filter setting (163μs +/- 10.24μs) 3 - Slow filter setting (2.62ms +/- 0.16384ms)

Fixed Bugs

- **When the value of AIN.DEADBAND is non-zero, the value of AIN.VALUE is affected. (2741)**
  Issue:
  If the AIN.DEADBAND value was set to a value, then the value of AIN.VALUE would reflect AIN.DEADBAND applied to the actual value of the analog input. This is incorrect; AIN.VALUE should always return the actual value on the Analog Input.

  Solution:
  Firmware was modified so that AIN.DEADBAND does not affect the value of AIN.VALUE

General Issues
Fixed Bugs

- **Provide specific warning messages for various types of motion task errors. (2466)**
  Issue:
  Clearing of motion task warnings to be done on successful activation of motion.

  Solution:
  Clearing of motion task warnings implemented on successful activation of motion. Also, users can clear these warnings by DRV.CLRFAULTS command.

- **Controlled stop should ramp down from present actual velocity to zero, not from present velocity command. (2717)**
    Issue:
    Controlled stop would ramp down from present commanded velocity to zero. If the commanded velocity was very high, the ramp would cause the motor to accelerate rather than decelerating when in controlled stop!

    Solution:
    The present actual velocity is now used for the start of the controlled stop ramp.

- **Add parameter for states of the individual Hall switches U, V and W (1125)**
    Issue:

    During setup of non-catalog motors with Hall switches, the user needs to be able to see the states of the individual Hall switches using the WorkBench scope.

    Solution:
    Parameters were added to report the states of the three Hall switches U, V and W. These parameters are FB1.HALLSTATEU, FB1.HALLSTATEV and FB1.HALLSTATEW.

- **Differentiate the warnings for motion tasks, add new emergency error codes for CANopen and EtherCAT. (2466)**
    Issue:
    A general motion warning was shown to the customer. This warning was not informative enough.

    Solution:
    New emergency error codes corresponding to the new warnings:

Warning number	emergency error code	warning
n151	0x8686	Not enough distance to move; Motion Exception
n152	0x8687	Not enough distance to move; Following Motion Exception
n153	0x8688	Velocity Limit Violation, Exceeding Max Limit
n154	0x8689	Following Motion Failed; Check Motion Parameters
n156	0x868a	Target Position crossed due to Stop command
n157	0x86a0	Homing Index pulse not found
n158	0x86a1	Homing Reference Switch not found
n159	0x86a2	Failed to set motion task parameters
n160	0x86a3	Motion Task Activation Failed
n161	0x86a4	Homing Procedure Failed

- **Wrong behavior in DS402-quickstop-state, when new set point was given. (2716)**
    Issue:
    When the state machine of DS402 was in the state of quick stop, the drive moved, when getting a new set point in profile velocity and profile torque mode.

    Solution:
    The drive does not take set points now in states other than Operation Enable.

Feature Changes

- **No full access to MT.CNTL via SDO. ()**
    Issue:
    Bit 0 of MT.CNTL is reserved for the use via the DS402-control word.

    Solution:
    Now, if the full access is needed, bit 6 of FBUS.PARAM05 can be set to 1 to get it.

Version: 01-03-06-000   Release Date: November 09, 2010

General Issues
Fixed Bugs

- **Homing Mode 10 does not work. (1635)**
    Issue:
    The user starts a homing mode 10 in any direction and hits a mechanical stop. Instead of changing the direction and searching for the index signal, the drive states that a "homing procedure error" occurred.

    Solution:
    The homing mode 10 now works properly.

- **Wrong exception handling for 1:1 profile handling. (2677)**
    Issue:
    The total time calculation is using maximum velocity instead of target velocity.

Solution:

The calculation has been corrected.

- **Provide specific warning messages for various types of motion task errors. (2466)**

    Issue:

    The warning numbers assigned are clashing with some Error numbers.

    Solution:

    Warning numbers are changed to 150 series. The updated list can be found in log for release version "01-03-05-000".

- **Drive unexpectedly enables when clearing a fault while in dynamic braking and DISMODE=2. (2673)**

    Issue:

    Certain faults cause the drive to enter dynamic brake mode regardless of the value of DRV.DISMODE. This is expected, but when clearing these faults, it was possible for the drive to unexpectedly enable.

    Solution:

    The drive no longer enables in this situation when faults are cleared, but instead enters the software disabled state as expected.

Feature Changes

- **DRV.EMUERES EEO output resolution too low. (2600)**

    Issue:

    The existing resolution of 65535 lines/revolution for the emulated encoder output (DRV.EMUERES) is too low for some customer applications.

    Solution:

    The FPGA and firmware have been modified to increase the resolution from 65535 (16 bits) to 16777215 (24 bits).

- **VL.FB now includes AR Filter 3 and 4, added VL.FBUNFILTERED to return raw velocity signal. (2678)**

    Issue:

    Previously, a user was unable to filter the velocity feedback; this was counterintuitive since two filters are listed as feedback filters.

    Solution:

    The value of VL.FB has been updated to return the actual velocity, after it has passed through Feedback Filers 3 and 4. An additional drive parameter, VL.FBUNFILTERED, has been added which returns the raw feedback value.

New Features

- **New homing mode required. (2607)**

    New Feature Details:

    A new homing mode was requested (homing to mechanical stop + motion to a home switch).

    Solution:

    A new homing mode 12 has been implemented.

- **Require new parameters for linear motor support. (2697)**

    New Feature Details:

    Drive parameters LOAD.INERTIA and MOTOR.KE have been added. LOAD.INERTIA is in units kg*cm^2 for rotary motors and kg for linear motors. MOTOR.KE (Back EMF Constant) is in units of Vpeak/k-rpm for rotary motors and Vpeak / m/s for linear motors.

    Solution:

    Added LOAD.INERTIA and MOTOR.KE as drive parameters

- **Added VL.FBUNFILTERED and VL.FBFILTER to available Analog Output options. (2556)**

    New Feature Details:

    VL.FBUNFILTERED (raw velocity feedback), and VL.FBFILTER (10Hz filter applied to raw velocity feedback) have been added as AOUT.MODE 10 and 11 (respectively).

- **Analog Input Deadzone feature added. (2469)**

    New Feature Details:

    The existing operation of the AIN.DEADBAND value holds the output at zero when the input is less than the deadband; once the value has exceeded the deadband, the full input is used to calculate the output. This new AIN.DEADBANDMODE = 1 changes this operation

    When AIN.DEADBANDMODE = 1, while the input is less than the deadband the output will be held at zero, once the input exceeds the deadband, the output will be calculated: Output = (Input - Deadband) * Scaling.

Field Bus Specific Issues
Fixed Bugs

- **Add several available CANopen objects to EtherCAT xml file. (2682)**

    Issue:

    Objects 0x3440sub1 (CS.DEC), 0x3440sub2 (CS.VTHRESH), 0x3440sub3 (CS.TO) and 0x3440sub4 (CS.STATE) should be in the EtherCAT xml file.

    Solution:

    The xml file has been updated.

Version: 01-03-05-000   Release Date: October 26, 2010

General Issues

Fixed Bugs

- **Units need to be correct for Linear Motor mode. (2652)**
  Issue:
  When putting the AKD into Linear motor mode, Motor units are returned in rotary units.

  Solution:
  MOTOR.KT set to [N/Arms] and MOTOR.INERTIA set to [kg], MOTOR.PITCH default value changed to 32mm. MOTOR.VMAX units set to [mm/s].

- **Provide specific warning messages for various types of motion task errors. (2466)**
  Issue:
  There is only a single warning type for motion task problems. It can be difficult to debug the source of the problem.

  Solution:
  Several warnings were added for motion tasking. Note that the way to reset these warnings is by using DRV.CLRFAULTS command. Emergency Stop Fail 150 MT exception 151 Following MT exception 152 Target Velocity Limit 153 MT Next Fail 154 Target Position Overstep 156 Home Index Fail 157 Home Ref Switch Fail 158 MT Set Fail 159 MT Activation Fail 160 Home Procedure Fail 161

Version: 01-03-04-000   Release Date: October 19, 2010

General Issues
Feature Changes

- **The resolution of acceleration parameters is too coarse. (1271)**
  Issue:
  The resolution of acceleration parameters is 1.86 rpm/sec. This resolution is too coarse.

  Solution:
  Resolution has been increased to 0.224 rpm/sec for all acceleration parameters.

Field Bus Specific Issues
Feature Changes

- **CANopen SDO object 606C (position feedback) scaling is reverted to maintain backward compatibility. (2427)**
  Issue:
  The scaling of this object was changed in the previous beta release, breaking backward compatibility.

  Solution:
  The change is reverted to maintain backward compatibility.

Fixed Bugs

- **SDO 1010 sub 1 stores parameters on read access. (2549)**
  Issue:
  The object 1010 has one subindex, which gives the right response on read access (line 11 of trace), but it takes one second to respond. Investigation showed that the parameters are stored, when reading subindex 1. This should only happen for write access with the special value 0x65766173 (meaning "save"), which works also.

  Solution:
  SDO1010 sub 1 triggered an NVSAVE on a read request, because the code did not check for a read access. The code always assumed a write access. Separate read-write access was implemented and tested and resolved this issue.

- **SDO 1011 sub 1 does not work. (2550)**
  Issue:
  Writing of this SDO should reset all parameters. The drive returns an abort code of 0606 0000, which means SDO hardware fault.

  Solution:
  Only the infrastructure of SDO1011 was implemented. The actual functionality was missing. This functionality was added and tested to reset parameters to default values.

- **CanOpen DS301 nodegard is not responding. (2113)**
  Issue:
  The drive did not process node guarding messages (Index: 701, RTR, zero length). The incoming message was ignored.

  Solution:
  Processing of RTR messages was not built into the CANopen controller interface. To resolve this issue, the following were implemented: - Configuration of CANopen controller to accept incoming RTR messages (node guarding only). - Include RTR flag in message data, so that the port code recognizes the node guarding message.

- **CANopen Interface: NMT reset creates no bootup message. (2113)**
  Issue:
  CANopen specification requires a message after nmt reset (DS301). This message is currently not provided.

  Solution:
  Port code triggered bootup message transmission, but the request was not forwarded to the application code (CCanOpen). A new flag was added to forward the request.

General Issues
Fixed Bugs

- **The maximum value in DRV.HELP for IL.KP is not correct. (2110)**
  Issue:
  The maximum value from DRV.HELP IL.KP should be 2,000 but it was reported incorrectly.

  Solution:
  The firmware has been modified to report the maximum value correctly.

- **On a 24A drive DRV.HELP WS.IMAX reports an incorrect maximum value. (2598)**
  Issue:
  When using a 24A drive and setting the MOTOR.IPEAK to a large value (greater than about 30A), you can not set WS.IMAX to a value larger than 6A.

  Solution:
  The firmware has been changed to report and use the correct maximum value.

- **DRV.DBLIMIT can not be set to ICONT of drive. (2595)**
  Issue:
  Using a 24A drive and with the MOTOR.IPEAK set to a value larger than 65.535A will give a incorrect maximum value for DRV.DBILIMIT. This will prevent you from entering a large value for DRV.DBILIMIT.

  Solution:
  The firmware has changed to report and use the correct maximum value.

- **Motor jumps when transitioning from analog velocity to digital position mode. (2477)**
  Issue:
  When using a digital input to change opmode and cmdsource, the motor will sometimes jump when transitioning from analog velocity to digital position mode.

  Solution:
  The motor no longer jumps when transitioning modes.

- **Fix the unexpected "Global Motion Task Warning" for motion tasks in negative direction. (2448)**
  Issue:
  A motion task in negative direction was triggered and the motion task was stopped in the middle via a DRV.STOP command. The n123 warning (Global Motion Warning) was accidently shown.

  Solution:
  A bug was present in the source code responsible for creating the n123 warning when crossing the target position of a motion

  task upon a DRV.STOP command. This bug is fixed.

- **Modify CS.VTHRESH min and default value, and use filtered velocity for controlled stop. (2371)**
  Issue:
  Velocity threshold and default value for controlled stop are too high, and the velocity is too noisy.

  Solution:
  CS.VTHRESH min value was changed to 0, and default value was changed to 5 rpm. Velocity filtered by 10 Hz LPF (like VL.FBFILTER) is used for controlled stop.

- **Bode would sometimes fail due to negative limits. ()**
  Issue:
  Bode would sometimes fail.

  Solution:
  Negative limits are now written correctly on power up, removing the issue.

Feature Changes

- **Reduce minimum value for DRV.DISTO so that the disable timeout can be disabled. (1819)**
  Issue:
  There is no way to disable the disable timeout.

  Solution:
  The range of DRV.DISTO minimum value is modified to allow setting it to 0, which disables the disable timeout.

- **VBUS.VALUE will be changed to float type, and recording it will show the value calculated based on the last 2 samples done at 16Khz. (1853)**
  Issue:
  User read only parameter VBUS.VALUE is an integer data type and this means the reportable value is quantized to 1 Volt, which is not enough. Second VBUS.VAULE variable is so filtered it is too sluggish to accurately catch rapidly rising bus voltages.

  Solution:
  VBUS.VALUE has been changed to float, and the deep moving average changed to averaging last 2 values sampled in 16Khz.

Field Bus Specific Issues
Fixed Bugs

- **Small changes were made to CANopen code to pass conformance tests.**
  ()

Issue:
The drive would fail the conformance test due to small configuration issues.

Solution:
Configuration issues fixed in EDS file and in firmware.

Feature Changes

- **SDO object 606C is now scaled in units of 0.001 rpm. (2427)**
    Issue:
    The PDO and SDO of object 606C are scaled differently.

    Solution:
    Both the PDO and SDO of object 606C are now scaled in units of 0.001 rpm

- **Changed operation of the EtherCAT master mailbox counter to allow communication with master devices which are not standard conformant. ()**
    Issue:
    Some EtherCAT masters, which are not fully conformant to the specification, cannot communicate with the drive.

    Solution:
    Non-conformant drives can now communicate with the drive.

New Features

- **Added object 0x3473 for CANopen access to the rotary switch. ()**
    New Feature Details:
    The rotary switch cannot be read via CANopen.

    Solution:
    Subindex 1 provides access to DIN.ROTARY, and subindex 2 gives access to DIN1.INV-DIN7.INV via bits 0 to 6.

- **Added object 0x35D2 for access to FB1.MECHPOS. ()**
    New Feature Details:
    An object is not provided for accessing mechanical position of feedback 1.

    Solution:
    This value is now available via object 0x35D2.

Version: 01-03-01-000   Release Date: September 17, 2010

General Issues
Fixed Bugs

- **Change the syntax for fault F106. (1540)**
    Issue:
    Users should be made aware that Fault 106 might happen after a firmware download.

    Solution:
    The phrase "(might occur when downloading firmware)" is added to the fault message.

- **Fix FB1.MEMDUMP Command for Biss feedback. (2578)**
    Issue:
    parameter FB1.MEMDUMP does not work properly for Biss analog feedback devices.

    Solution:
    parameter FB1.MEMDUMP for Biss Analog Feedback devices is now functioning properly.

- **The drive will intermittently not setup properly when using EnDat feedbacks. (2451)**
    Issue:
    When the drive powers on and you are using EnDAT feedback and MOTOR.AUTOSET is 1 the drive intermittently does not get the motor identification data from the feedback device and will not setup the drive correctly. The drive will report a 534 "Failed to read motor parameters from feedback device" fault. This fault can be cleared and the drive will continue to operate correctly.

    Solution:
    The firmware is fixed so that data read from the EnDAT device is now consistently read correctly.

- **Drive will intermittently not setup up encoder resolution (FB1.ENCRES) properly when using EnDat 2.1 (2453)**
    Issue:
    When the drive powers on and you are using EnDAT 2.1 feedback, the drive intermittently does not get the correct value for the

    encoder resolution (FB1.ENCRES). The drive will not report any faults, but the motor commutation will not work properly. As a result when motion is commanded, the motor will not move, and the drive may generate a 503 fault - Bus Capacitor Overload. This problem can be cleared by toggling the feedback selection between 30 (Endat 2.1) and -1 (auto identify), or by power cycling the drive.

    Solution:
    The firmware has been fixed so that data read from the EnDAT device is now consistently read correctly.

- **Drive will intermittently issue a signal amplitude fault with Endat 2.1 or Biss analog feedbacks. (2426)**
    Issue:
    When the drive powers on or you switch feedback types using FB1.SELECT when using an EnDAT 2.1 or Biss Analog feedback device the drive intermittently will get a signal amplitude fault (fault 402). The fault cannot be cleared with a clear faults command

devices the drive intermittently will get a signal amplitude fault (fault 452). The fault cannot be cleared with a clear faults command in WorkBench. It can only be cleared by power cycling the drive.

Solution:
A new FPGA was created that will prevent this from occurring. The new FPGA that corrects this issue is version FP0004_0100_00_02

- **The Homing complete output is "on" when the drive is first powered up. (2546)**
  Issue:
  When the drive powers on when an absolute feedback device is connected (SFD, Endat, Biss, Hiperface or Resolver) the home "found" bit is true. As a result, the homing complete output is on as well. The intent of this was so that absolute feedback devices could execute a motion task without having to first be homed.

  Solution:
  The firmware has been modified so that absolute feedback devices are not considered "homed" when they first power up (reference bug 2439). The ability to execute a motion task without first homing is now handled by the new parameter MT.HOMEREQUIRE (reference bug 2038).

- **Infrequent watchdog error upon receipt of drive discovery message from WorkBench. (2130)**
  Issue:
  The drive would occasionally experience watchdog errors upon receipt of a drive discovery message when WorkBench was opened on a connected computer.

  Solution:
  This issue has been corrected.

- **Running multiple instances of WorkBench can cause some drives not to appear in the Connect screen. ()**
  Issue:
  If using multiple copies of WorkBench on a network, drives sometimes disappear from the Connect screen.

  Solution:
  Drives now respond properly to discovery messages when multiple instances of WorkBench are on the network.

- **F703 occurs after disabling the drive for the first time. (2435)**
  Issue:
  The drive issues an F703 fault (emergency timeout) when it receives a disable command for the first time after the boot process.

  Solution:
  A variable was not initialized and therefore the disable function did not work properly. This issue has been resolved and the fault does not occur.

- **All homing modes should move to home position + home distance. (2191)**
  Issue:
  When home distance is set to zero, motion should stop at the home position. Instead, the motion stops at a different position due to deceleration distance.

  Solution:
  The target position is now set to home position + home distance, even when the home distance is set to zero.

- **Default value for VL.OBSBW is incorrect. (2205)**
  Issue:
  The default value for VL.OBSBW is below the stated minimum value.

  Solution:
  The default value has been updated from 0.3 Hz to the correct value of 30 Hz.

- **Units for IL.FF and IL.BUSFF are incorrect. (1539)**
  Issue:
  IL.BUSFF and IL.FF units should be Arms.

  Solution:
  IL.BUSFF and IL.FF units are now shown as Arms.

- **Drive issues wrong error message for IL.DLIMITP minimum value. (1593)**
  Issue:
  When IL.DLIMITP is set to -1, the user gets a message stating "Argument bigger than maximum".

  Solution:
  A signed integer compared to an unsigned integer caused this bug. This issue has been resolved.

- **Analog command does not work properly in position mode. (1600)**
  Issue:
  When setting AIN.PSCALE to a value equals or greater than 2^32, the actual scale is wrong. The scale resembles a numerical overflow or truncation. -->DRV.EN -->AIN.PSCALE 4294967296 -->AIN.PSCALE 4294967296.000 [Counts/V] -->AIN.OFFSET 1.000 [V] -->AIN.VALUE 1.016 [V] -->PL.CMD 4362692968.000 [Counts] -->AIN.OFFSET 2 -->AIN.VALUE 2.016 [V] -->PL.CMD 4362158398.000 [Counts]

  Solution:
  The position command variable was 64 bits long and casting of this variable to 32 bits lost all data of the higher 32 bits. The casting was removed and now the command works properly.

- **Current sensor short cannot be reset. (1803)**
  Issue:
  When the drive issues Fault 526: "Current sensor short", the WorkBench Disable and Clear Faults buttons do not clear this fault.

  Solution:
  When the drive was in dynamic brake mode, the clearing of the relevant fault bit in the FPGA did not occur, because the drive was considered enabled. This issue has been fixed.

considered enabled. This issue has been fixed.

- **Record reports the value of MT.VCMD incorrectly. (2117)**
  Issue:
  When using WorkBench to record MT.VCMD, the value is off by a factor of 4.

  Solution:
  Recording is now correct for MT.VCMD.

- **DCT capture result is incorrect when near zero. (2491)**
  Issue:
  Capture of the EtherCAT Distributed Clock (DCT) was not correct when the result was near zero.

  Solution:
  DCT is now accurate near zero.

- **Drive failure occurred when running feedback auto-identify on devices that do not support auto-ID. (2511)**
  Issue:
  The drive could intermittently fail during the auto-ID process.

  Solution:
  The issue has been resolved.

- **Wrong minimum and maximum values for BODE.IAMP. (2202)**
  Issue:
  The drive reported incorrect minimum and maximum values for BODE.IAMP, which could cause problems in WorkBench.

  Solution:
  These values are now reported correctly.

New Features

- **Customer Profile Tables (1689)**
  New Feature Details:
  Users would like to download various S-Curve profiles and other customer defined profiles to be executed as motion tasks by the drive.

  Solution:
  Customer profile tables can now be loaded and executed by the drive.

Field Bus Specific Issues
Fixed Bugs

- **EtherCAT Stability Improvements (2435)**
  Issue:
  When using EtherCAT communications the drive would perform erratically and the ASCII SDO would take a long time to respond to the master.

  Solution:
  Several performance improvements and stability changes were made to the firmware allowing the drive to operate reliably.

- **The drive allows an EtherCAT mailbox size of only 512 bytes. (2449)**
  Issue:
  Users should be able to configure a mailbox size of 40 to 512 bytes. The drive, however, allows a mailbox size of only 512 bytes for the SyncManagers 0 and 1 mailbox. The drive should allow a mailbox size of 40 to 512 bytes for these state transitions.

  Solution:
  The drive now accepts even-numbered mailbox sizes between 40 and 512 bytes for the SyncManagers 0 and 1.

- **Scaling of PDO20A6 is not the same as PDO6063. (2344)**
  Issue:
  The fixed mapping for TxPDOS 0x1B23 contains the actual internal position feedback and the captured position (CAP0.PLFB, AKD.xml name: Latch 1 pn). The scaling is different, but should be the same.

  Solution:
  PDO20A6 now has the same scaling as PDO6063.

- **Small changes were made to EtherCAT communication to pass the conformance test. (1335)**
  Issue:
  EtherCAT communications were not fully conformant.

  Solution:
  Changes were made to fix the non-conformant issues.

New Features

- **Support Modbus block read/write and single register access. (2464)**
  New Feature Details:
  Many Modbus HMIs require block read/write access.

  Solution:
  Block read/write is now supported, as well as reading individual registers (16 bits) out of 32 or 64 bit parameters.

- **Support PDO Free-Mapping for EtherCAT. (1677)**
  New Feature Details:
  Users would like to create dynamic PDO maps rather than relying on fixed mappings.

  Solution:
  Free mapping is now supported.

Version: 01-03-00-004   Release Date: August 02, 2010

General Issues
Feature Changes

- **Add drive support for the Modbus TCP protocol. (1669)**
  Issue:
  Modbus TCP is a common communication protocol used primarily for HMI interfaces and low-priority communication.

  Solution:
  The drive now fully supports access to drive parameters over Modbus TCP, in addition to the existing Telnet interface and WorkBench software. See the User Guide and parameter reference for usage instructions. This feature does not currently support block read/write. A future update will include block read/write access. This feature also does not currently support partial reads of 64-bit parameters. A future update will include the ability to read 64-bit variables as 32-bit variables to help support more devices and programs.

- **Add support for single-ended pulse command inputs on X7 high-speed opto inputs. (2135)**
  Issue:
  Support for single-ended pulse command inputs was needed for the X7 high-speed opto inputs (pins 9 and 10).

  Solution:
  Support for single-ended pulse command inputs for the X7 high speed opto inputs has been added. This support was added to the firmware using the parameters FB2.XX. The new parameters are the source (FB2.SOURCE), the mode (FB2.MODE) and the resolution (FB2.ENCRES). The emulated encoder input (X9 connector) modes can be defined using these keywords also, or with the previous keywords (DRV.EMUEMODE, DRV.EMUERES).

- **Add support for Endat 2.2 feedback. (1776)**
  Issue:
  Support for Endat 2.2 encoders is required. Support is required for rotary single turn and multi-turn encoders and linear encoders.

  Solution:
  Support for Endat 2.2 encoders has been added to the firmware. Rotary single turn and multi-turn encoders are currently supported. The drive does not support linear Endat 2.2 encoders yet.

- **Add Mode 22-Command source/opmode change. (1603)**
  Issue:
  Applications require command source and opmode changes during operation via digital inputs.

  Solution:
  DINx.MODE 22 (command source/opmode change) was added.

- **Add support for Programmable Limit Switches for turning on outputs at programmed positions. (1673)**
  Issue:
  Additional support needed for Programmable Limit Switches.

  Solution:
  Added support for Programmable Limit Switches for turning on outputs at programmed positions.

- **Add DRV.HWENMODE. (1744)**
  Issue:
  A rising edge on the hardware enable input would always clear any faults on the drive. If you are using the drive with an EtherCAT or CANopen master, you may want to control the clearing of faults independently using the network.

  Solution:
  A new parameter DRV.HWENMODE has been added. This parameter controls whether or not the rising edge of the hardware enable clears any drive faults.

    - 0 (default) = The rising edge of the hardware enable clears the drive faults.
    - 1 = The rising edge of the hardware enable does not clear the drive faults.

  The high/low state of the hardware enable is always used to control the active enable state of the drive.

- **Increase the maximum allowed position delta between two fieldbus position command values. (2136)**
  Issue:
  The motor moves in the wrong direction when the position delta between two fieldbus position command values is larger than 0.5 motor rev, which corresponds to $2^{\wedge}$(FB1.PSCALE)Fieldbus-Counts.

  Solution:
  Instead of only considering the position delta within one revolution (the lower FB1.PSCALE bits in the fieldbus position command value), the whole 32-bit position delta is now used for calculating a position delta within the drive. Thus the maximum position delta for the fieldbus command values is 0.5*2^(32-FB1.PSCALE)motor rev, which corresponds to $2^{\wedge}31$ Fieldbus-Counts.

- **Added DRV.CDMDELAY to add delays in the command buffer for commands which take time to execute (such as DRV.EN). (2177)**
  Issue:
  Some command actions do not occur immediately (such as DRV.EN). When using the command buffer, this delay causes the en->move command sequence to fail.

Solution:
By adding DRV.CMDDELAY, you can insert a delay command into the command buffer. For DRV.EN, this delay allows the drive to enable before the motion command is given.

- **Update of the AKD XML File to version 1.09. (1335)**
  Issue:
  TwinCAT did not behave according to the EtherCAT conformance test tool during a Mailbox access (SDO exchange). The mailbox counter was not incremented by TwinCAT.

  Solution:
  The AKD XML file has been updated in order to activate the missing feature in TwinCAT (incrementing the mailbox counter for each mailbox access).

- **Add DS402-mode 8 - cyclic synchronous position mode. (1432)**
  Issue:
  The EtherCAT-conformance tool demands one of the cyclic set point modes (position, velocity, or torque). This mode works in user-scaled positions, whereas the interpolated position mode works in motor incremental units.

  Solution:
  This new mode is now implemented. Two new fixed PDO-mappings have been created for this mode: In the receive direction the

  mapping (0x1724) includes the object 0x607A sub 0 as target position. In the transmit direction (0x1B24), the mapping includes the object 0x6064 sub 0 as position actual value. This mode is supported starting with version 1.08 of the AKD.xml-file.

- **STO fault behavior change. (1384)**
  Issue:
  The STO fault appears upon power up, which causes a safety-chain deadlock.

  Solution:
  The STO fault will not occur unless software and hardware enable are on.

- **DS402-state machine should be influenced by the hardware-enable input. (1743)**
  Issue:
  No change of the state machine occurred if the hardware-enable signal was taken away and the drive was disabled.

  Solution:
  The default behavior is changed. If the hardware enable goes to 0, then the state of the state machine goes to "Switch On Disabled". This behavior can be switched off by setting bit 0 of FBUS.PARAM05 to 1.

- **Add DS402-support for parameters DOUTx.MODE, PL.ERRWTHRESH, IL.IFOLD, MOTOR.PHASE, REGEN.POWER, DRV.DISMODE, and MT.SET. (1796)**
  Issue:
  This feature addresses a customer request for SDO access to parameters.

  Solution:
  New objects:

parameter	object (index/subindex)
DOUT1.MODE	0x35AF sub 0
DOUT2.MODE	0x35B2 sub 0
PL.ERRWTHRESH	0x3483 sub 0
IL.IFOLD	0x3425 sub 0
MOTOR.PHASE	0x359C sub 0
REGEN.POWER	0x3416 sub 0
DRV.DISMODE	0x35FF sub 0
MT.SET	0x3431 sub 0

- **Add DS402-support for parameters VL.KVFF, MOTOR.INERTIA, MOTOR.KT, VL.ERR, WS.MODE, WS.IMAX, WS.DISTMIN, WS.DISTMAX, WS.T, WS.TDELAY1, WS.TDELAY2, WS.TDELAY3, WS.VTHRESH, WS.STATE, and IL.KACCFF. (1719)**
  Issue:
  This feature addresses a customer request for SDO access to parameters.

  Solution:
  New objects:

parameter	object (index/subindex)
VL.KVFF	0x354B sub 0
MOTOR.INERTIA	0x35AB sub 0
MOTOR.KT	0x3493 sub 0
VL.ERR	0x3407 sub 4
WS.MODE	0x3864 sub 0
WS.IMAX	0x3494 sub 1
WS.DISTMIN	0x36D1 sub 0
WS.DISTMAX	0x3494 sub 2
WS.T	0x36D0 sub 0
WS.TDELAY1	0x3863 sub 0
WS.TDELAY2	0x3865 sub 0
WS.TDELAY3	0x3494 sub 3
WS.VTHRESH	0x3494 sub 4
WS.STATE	0x3494 sub 5
WS.NUMLOOPS	0x36E2 sub 0
IL.KACCFF	0x3426 sub 0

- **Add DS402-support for parameters AIN.PSCALE, AOUT.PSCALE, MOTOR.CTF0, MOTOR.LQLL, MOTOR.POLES,**

MOTOR.R and WS commands. (2168)

Issue:
This feature addresses a customer request for SDO access to parameters.

Solution:
New objects:

parameter	object (index/subindex))
AIN.PSCALE	0x3472 sub 0
AOUT.PSCALE	0x3471 sub 5
MOTOR.CTF0	0x3454 sub 0
MOTOR.LQLL	0x3455 sub 0
MOTOR.POLES	0x359D sub 0
MOTOR.R	0x3456 sub 0
PLS.P1 .. PLS.P16	0x34A0 sub 1..8
PLS.WIDTH1 .. PLS.WIDTH8	0x34A1 sub 1..8
PLS.T1 .. PLS.T8	0x34A2 sub 1..8
PLS.EN	0x34a3 sub 1
PLS.RESET	0x34a3 sub 2
PLS.MODE	0x34a3 sub 3
PLS.STATE	0x34a3 sub 4
PLS.UNITS	0x34a4 sub 0

- **Allow EtherCAT firmware download with 512 byte and 1024 byte mailbox size. (2243)**

Issue:
The software download via KAS was not possible because the EtherCAT state transition from Init -> Bootstrap was denied by the drive. This state was denied because, originally, a reconfigured mailbox size of 1024 bytes was required.

Solution:
The drive now allows a mailbox size of 512 bytes and 1024 bytes when switching from Init to Bootstrap state.

- **Correction of the electronic gearing behavior when hitting a hardware limit switch. (2362)**

Issue:
The electronic gearing class continued counting master pulses when hitting a hardware limit switch in a certain direction. This behavior let the following error grow. While this situation was pending, it would be problematic to release the hardware limit switch, since the position loop tries immediately to move the motor to PL.CMD. It appears as a runaway problem in the drive.

Solution:
The electronic gearing class no longer considers master signals, which try to move the motor in direction of an active hardware limit switch.

- **SDO access needed for WS.ARM. (2412)**

Issue:
SDO-Access needed for WS.ARM.

Solution:
SDO 0x3494 sub 6 implemented for WS.ARM.

- **Added new homing mode. (1709)**

Issue:
This feature was added to address customer requests that a new homing mode (Homing Mode 11) be added to the already

existing homing modes. This new mode searches for the index signal without the need to identify a hardware limit switch, a home switch, or a mechanical stop prior to the index-signal detection.

Solution:
The new homing mode searches for the index. The motor starts rotating in the homing direction as soon as the homing is triggered. If the limit switch is active before the index, the motor turns its direction of rotation and searches for the index. As soon it finds the index, home position found status should be set. The actual position and command position is set to the home position.

- **VBUS.OVWTHRESH was changed to R/W. (1251)**

Issue:
The over voltage warning was not operative.

Solution:
VBUS.OVWTHRESH changed to be R/W with default 0 (which inhibits the warning). The user can define this parameter to allow the warning to appear.

- **Increase the fault log size. (1594)**

Issue:
The fault log size is too small.

Solution:
Fault log size was increased to 50 entries.

- **VBUS.UVFTHRESH was changed to R/W. (1790)**

Issue:
A customer requested an option to execute a controlled stop when main loss is discovered.

Solution:
VBUS.UVFTHRESH was changed to be read/write type and can now be stored on the NV. VBUS.UVFTHRESH default value is the value set on the EE (which is also the parameter minimum value) and its maximum value is VBUS.OVFTHRESH.

- **Changed active disable behavior on INMODE 13 and on DRV.DIS. (1874)**

Issue:
Confusion around the behavior of INMODE 13 and DRV.DIS resulted in a request to unite CS.TMAX and DRV.DISTO.

Solution:
CS.TMAX was removed and DRV.DISTO is activated whenever active disable is requested.

Fixed Bugs

- **Digital input mode 1 (fault reset) would clear the software enable. (1744)**

  Issue:
  When you used only the digital inputs to control the drive, if you cleared a fault with a digital input configured as mode 1, the software enable would also be cleared and you could not enable the drive without sending a command using Telnet.

  Solution:
  DIN.MODE 1 (fault reset) was changed so that it does not clear the software enable.

- **DRV.HELP returned an inconsistent response. (1871)**

  Issue: (Identified in Version 01-02-00-000)
  DRV.HELP for FB1.HALLSTATE, DRV.SETUPREQLIST, and DRV.ONTIME returned a response that did not match the original command.

  ```
  -->DRV.HELP FB1.HALLSTATE
  Help for: PFB.HALLSTATE [Info] [Recordable]
  -->
  ```

  Solution:
  DRV.HELP for FB1.HALLSTATE, DRV.SETUPREQLIST, and DRV.ONTIME now returns a consistent response.

- **Long strings would crash the drive. (1308)**

  Issue: (Identified in Version 01-01-00-000)
  If you send a long string to the drive using Telnet the drive crashed, either immediately or the next time you try to connect to the drive.

  Solution:
  The firmware now detects long strings (greater than 256 characters) and returns "Error: Command was not found.".

- **RxPDOs were not configured as event-triggered by default. (1881)**

  Issue:
  All RxPDOs should be event-triggered by default.

  Solution:
  The default configuration of the transmission type has been set to event-triggered. Additionally, a bug in the event detection algorithm was fixed.

- **Electronic gearing was aborted when a HW or SW limit switch is triggered. (1974)**

  Issue:
  The drive moves a motor in "Electronic Gearing" mode and triggers a limit switch while the motor is in motion. The electronic gearing was aborted and therefore it was not possible for the drive to move the motor out of the limit switch.

  Solution:
  The electronic gearing function now remains active even if a limit switch has been triggered. This active state allows the drive to leave the limit switch in the opposite direction.

- **False brake fault conditions reported during brake enable/disable. (1857)**

  Issue:
  When enabling or disabling a motor brake, a 306: Brake Short Circuit Fault condition occurred intermittently on a working brake.

  Solution:
  The false brake faults no longer occur.

- **DRV.ENDEFAULT was not working on CANopen drives. (1328)**

  Issue:
  DRV.ENDEFAULT was ignored on CANopen drives regardless of CMDSOURCE value.

  Solution:
  The drive now prevents CANopen from disabling the drive upon power up. DRV.ENDEFAULT is now considered even if DRV.CMDSOURCE=1.

- **User could not enter maximum value of acceleration/deceleration parameters. (2098)**

  Issue:
  The user was not able to enter the maximum value of acceleration parameters in UNIT.ACCROTARY=3.

  Solution:
  The CUnitsConversion class has been corrected in order to allow setting the maximum allowed acceleration value, which is displayed in the DRV.HELP information.

- **Delay occurred when starting a Motion Task from the digital inputs. (2211)**

  Issue:
  The user has a 2 to 12 ms delay in starting a motion task from the digital inputs. This delay occurs in digital inputs modes 2 and 4.

  Solution:

  Digital input mode 2 and mode 4 were corrected to have a maximum delay of 1 ms.

- **Analog position mode correction. (2224)**

  Issue:

A problem existed with the interpolation mechanism of the analog position mode.

Solution:
A bug existed in the interpolation mechanism of the analog position mode. The flag for new position command was missing, causing the interpolation to repeat on the same command.

- **DRV.STOP behavior corrected for motion in opmode 2. (1907)**
  Issue:
  A problem occurred when a motion task was running with a very low PL.KP gain and a DRV.STOP command was triggered while the motion task was in the deceleration phase. The software scope exposed that the motion task was triggered again, although a stop-procedure had been triggered.

  Solution:
  A race-condition was the root cause of this bug. The motion task class displayed that the sto -procedure is finished although the underlying trajectory generator was still active. Consequently, the motion task was triggered again when PL.CMD was set to PL.FB at the end of the stop procedure even though the motion task was not completed by the trajectory generator. This condition has been fixed.

- **Corrected the "target position reached" bit in DRV.MOTIONSTAT. (2239)**
  Issue:
  The user adjusts a sequence of motion tasks that are consecutively called (one motion task calls the next one). The error was that the "target position reached" flag in DRV.MOTIONSTAT was high after finishing the first motion task, although further motion tasks follow. This behavior also adversely affected digital output mode 3, which considers this particular bit in DRV.MOTIONSTAT.

  Solution:
  The line in the motion task class source code, which sets the target position reached flag too early, has been identified and has been removed.

- **Analog input low-pass filter blocked input. (1730)**
  Issue:
  If the low pass filter is set to any value below 4, then the input signal is blocked and no response occurred to a changing input signal.

  Solution:
  The minimal value allowed to be written to low-pass filter is now 1.

- **PDO scaling of DS402-object 0x606C sub 0 was wrong. (1681)**
  Issue:
  A still motor returned large values for the actual speed in PDO.

  Solution:
  The scaling was not correct for negative values. The value is now scaled in rpm/1000.

- **DRV.DISMODE=2 enables the drive automatically when HW-enable is set to 1. (2037)**
  Issue:
  The drive was creating motion when the hardware enable was set to 0. After stopping motion and setting the hardware enable to 1 again, the axis was enabled automatically. This happened only with DRV.DISMODE=2.

  Solution:
  The definition of DRV.DISMODE=2 is "Use a controlled stop to ramp down and then disable the drive". This setting is now fixed.

- **When the TwinCAT-EtherCAT-master is re-started, the axis does not move (when set to operation enabled in profile velocity mode). (2170)**
  Issue:

  When the TwinCAT-EtherCAT-master is re-started, the axis does not move (when set to operation enabled in profile velocity mode). The drive gets a communication fault and cannot be re-started.

  Solution:
  The fault situation was not handled correctly. This problem is fixed and the axis moves.

- **Correction of the motion abort when moving out of the limit switches. (2246)**
  Issue:
  You create a motion in DRV.OPMODE 2 (service motion) into a hardware limit switch and afterwards the motion stops. When you try to move out of the hardware limit switch via a service motion in the opposite direction, the motion is immediately aborted after starting that motion due to the behavior of the hardware limit switch code.

  Solution:
  The hardware limit handler now aborts only motion in direction of the limit switch and does not abort the motion when the motor leaves the limit switch.

- **The DS402-state machine does not change its state when software enable is removed via Telnet. (2102)**
  Issue:
  The external software disable does not change the state of the DS402-state machine from operation enable.

  Solution:
  The state of the DS402-state machine is now changed by an external software disable. This behavior can be switched off by setting bit 3 of FBUS.PARAM05 to 1.

- **Some objects in the fixed EtherCAT-PDOs are not scaled. (1915)**
  Issue:
  The actual position given by object 6063 and object 60C1 sub 1 and the latched values 20A0 to 20a3 are not scaled by FB1.PSCALE. Also, the object 60F4 (following error) is not scaled correctly.

  Solution:
  The objects 6063, 60C1 and 20A0 to 20A3 are now scaled via object 608F sub 1, which is connected to the parameter FB1.PSCALE, and gives the increments per motor revolution (power of 2).

- **Bit 5 of the DS402-control word does not work correctly in profile position mode. (2223)**

  Issue:
  If you try to start more than one motion task, the first works correctly, but the next ones are not stored to motion task 0.

  Solution:
  The bit 5 set to 0 works now correctly. When a first motion task is running and a second one is started with bit 5 = 0, the execution of it is delayed until the first reaches its target position.

- **Bit 13 of the DS402-status word was not supported. (1720)**

  Issue:
  Bit 13 in the DS402-status word was not supported.

  Solution:
  Bit 13 is set when the following fault (F439) occurs. This condition can happen in all positioning modes (profile position, homing, interpolated position mode, cyclic synchronous position mode)

- **Position mode capture returns raw data results instead of position values that are adjusted for scaling and homing. (2262)**

  Issue:
  CAPx.PLFB returns raw data values that are not scaled or adjusted for homing as PL.FB is.

  Solution:
  The value returned by CAPx.PLFB is now scaled and homed. It will match what the user expects from PL.FB.

- **Wrong maximum value check returned for the MT.TNUM parameter. (2347)**

  Issue:
  A maximum value of 8 for the MT.TNUM parameter was allowed, but the AKD returns an error when sending the motion task with MT.TNUM=8 to the drive via the MT.SET command.

  Solution:
  The maximum value check has been changed from 8 to 7 for the MT.TNUM parameter.

- **CANopen SDO objects for the velocity channel biquad filters were not responding. (1929)**

  Issue:
  CANopen SDO objects for the velocity channel biquad filters were not responding to read or write requests.

  Solution:
  The SDO objects have been fixed and now function properly.

- **HOME.SET prevents motion in electronic gearing mode. (2269)**

  Issue:
  HOME.SET should not prevent any subsequent motion if the drive is enabled.

  Solution:
  Issuing HOME.SET no longer suppresses motion in electronic gearing mode.

- **DCT capture feature was incomplete. (2133)**

  Issue:
  Capture of the EtherCAT Distributed Clock (DCT) was not implemented.

  Solution:
  Capture of the EtherCAT Distributed Clock is now supported.

- **SDO-access to object 60FD sub 0 does not work. (2327)**

  Issue:
  The read access to 60FD sub 0 delivers 0 instead of the read value of the PDO.

  Solution:
  The read access to 60FD sub 0 now delivers the correct value.

- **Safe torque off warning is missing. (1384)**

  Issue:
  Safe torque off does not issue a fault until the user tries to make the drive active. As soon as the user tries to make the drive active, the drive faults. The drive should issue a warning when the drive is inactive and the safe torque is off.

  Solution:
  Added a warning to the state in which the drive is inactive and safe torque is off.