

Elmo Gold Drive Firmware Release Notes Version 1.1.11.00 B00

For Elmo Gold Drives

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Chapter 1. General

The following Gold Level release notes include all modifications from version 01.01.10.00 released in December 2015 until version 01.01.11.00 B00 released in December 2015.

Chapter 2. 01.01.11.00 B00

Component	Version
Firmware Version	01.01.11.00 19Nov2015B00
Communication Server	1.1.7.85
PAL	87
ESI	0x00010420 V03

2.1 Details

Subject	Details
Prevent movement when Hard Stop is active	<p>When Hard Stop is active (IL[] command :Soft & Auxiliary stop), if during the motor enable the commutation is not known, the drive discards the enable request with EC 201: "<i>Commutation Sequence Failed</i>". The user is required to reset the input prior to enabling the motor.</p> <p>Note that If the commutation is known, (no commutation search is required) or if the sensor allows absolute commutation (e.g. Halls sensors) the servo can be enabled even when Hard Stop is active.</p>
ECAT Complete Access removed from ESI	<p>Complete Access allows setting or obtaining of arrays and records in a single communication packet. In the Gold drives, this feature is permitted for a limited set of objects mainly Startup and mapping objects. As the Complete Access option is now removed from the ESI (0x00010420), a new EtherCAT configuration can address all objects in a similar fashion. For compatibility reason addressing the limited objects as described above with Complete Access is still permitted.</p>
EtherCAT PDO Padding object	<p>Padding is required during PDO mapping to maintain even octet's memory boundaries. Previously object 0x0002 was used to align 8 bit objects to 16 bits. According to ETG 2000, the padding object for this purpose is 0x00000008, which adds padding of 8 bits. Therefore, the 0x0002 object is replaced with the 0x00000008 object.</p>



Subject	Details
	<p>AS a result of this padding object change, the following PDOs are affected:</p> <ul style="list-style-type: none">• Rx (Inputs): 0x1605, 0x160B, 0x161E (SM3)• Tx (Outputs): 0x1A02, 0x1A03, 0x1A04, 0x1A0B, (SM2) <p>The ESI <i>Elmo ECAT 00010420 V03</i> supports this option.</p> <p>Note that for compatibility reasons object 0x0002 is still valid via the on-line dictionary.</p>
Speed range enhancements	<p>Speed parameters can now be set to 0.</p> <p>Object 0x607F determines the Max Speed via DS-402, which can be set to 0. This means that the speed command is saturated to 0 for all motion modes, when the max. speed is 0.</p> <p>Object 0x6099 (sub index 1 & 2) determines the speed used when DS-402 Homing mode is activated. The object can now be set to 0.</p> <p>The SP is the maximum speed of the Profile Position. From this version, setting between SP[1] to SP[4] to 0, is permitted.</p> <p>If the value of SP is set to 0, the next BG command results in a Stop, similar to the ST command.</p> <p>Object 0x6081 is similar to SP, and sets the Profile Velocity. Setting this object to 0 is permitted. It results in a 'Halt' command when the <i>New Set-Point</i> bit (bit 4) in the Control Word is next set.</p>
DS-402 Homing re-activation enhancement	<p>When a DS-402 homing procedure is interrupted via the control word (0x6040) by setting bit 4 to 0, the homing sequence is considered as "failed" and a Homing Error bit is set to 1.</p> <p>Resetting bit 4 back to 1 initiates the homing procedure again. Previously a re-initialization of the Home Mode via 0x6060 was required.</p>



2.2 Bug fixes 1.1.11.00 B00

Bug	Details
EMCY via EtherCAT, missed bytes	When emergency message was transmitted via EtherCAT, only the first 4 bytes were transmitted properly. This was fixed. Now all 8 bytes are transmitted.
Stop On Fault during Torque motion modes	In Torque modes (Profiled torque and Cyclic Synchronous Torque), when Fault Option Code (0x605E) is <i>Slow Down</i> before disabling the servo, in rare situations the servo was not disabled. This was fixed. Now if Torque modes are operational the servo is disabled immediately.
Position drift when Gantry is homed	In Gantry systems, the reported position after a home is attained, was offset from the actual position. If multiple homing procedures were performed, the absolute position drifted. This was fixed.
Torque increased when a higher CL[1] value is set.	When torque is applied to the motor via TC command and the CL[1] (Continuance Limit) was increased. This actual torque (IQ) was unintentionally increased regardless of the state of the torque saturation. This was fixed. Increasing the CL[1] does not affect the torque that was applied to the motor.
Object 0x20B0 sub 9 incorrect report	Object 0x20B0.9 reports the socket which is used for the Additional Position report (CA[79]). Previously, the object reported the additional position instead of the socket number. This was fixed.
XP[3] added to parameter file	XP[3] sets the filter of the CANopen SYNC message arriving from the host. The value was not uploaded by EASII as part of the Parameter file. This was fixed.
EA[4] indication of the Velocity socket for Emulation	EA[4] indicates the socket used for Velocity PWM emulation. When set to 0, the drive automatically routes the actual velocity socket (defined by CA[46]) to the PWM emulation. Previously, setting EA[4] =0 was not permitted. This was fixed.
Axis continues after reaching software limit in CSP mode.	In Cyclic Synchronous Position, when the motion arrived to a limit switch it continued the movement towards the limit if the set-point was beyond the limit. This was fixed. The motion does not continue beyond the software limits.
Unexpected move when using brake.	Enabling and disabling the motor rapidly when a brake is defined (OL[]) caused an unexpected delay during the brake engage procedure. As a result, in unbalanced systems (e.g. vertical load) the motor moved more than expected. This was fixed. The brake engaged time is as expected via the BP[] command.



Bug	Details
Quick Stop command while brake is engaged	When a DS-402 Quick Stop command is sent while the brake function is defined, and the Quick Stop Option code (0x605A) is <i>Switch On Disabled</i> (0x605A set to 0, 1 or 2), the DS-402 State (0x6041) sometimes indicated an incorrect state. This was fixed. The state is now reported as <i>Switch On Disable</i> .
Lost CAN emergency (EMCY) messages	Sometimes a CAN EMCY message, which was a result of an error code (e.g. wrong command via PDO), was not transmitted. This resulted in situations where the received command failed and the host was not aware of it. This was fixed.



Chapter 3. 01.01.10.07 B01

Component	Version
Firmware Version	01.01.10.07 05Aug2015B01
Communication Server	AA[5]: 1.1.7.77
PAL	87
ESI	0x0010400 V08

3.1 Details

Subject	Details
New G-DRUM & G-EAGLE	G-DRUM & G-EAGLE 60/100, 13/400 60/400 were added.
New G-TWITTER & G-BEE	G-TWITTER & G-BEE R15/200 were added.
New Drive: Baritone	The Baritone drive was added to the Gold family. PAL version 87 is required (VP is 87).
Motion in reset (MS=0) indication in Time depended modes	When Interpolated Position mode and Cyclic Synchronous Position mode are used, the Motion Status indication (MS) will be set to 0 when the speed command is zero. The indication is also available via the 0x1002 object (map-able) and SR command bit 18. Note that the Target reached bit in DS402 status word (0x6041) is not affected by this change and remains as defined in the relevant motion mode.
Motor Temperature measurement (PTC) in G-DUET	The G-DUET includes a motor temperature indicator. This is read via TI[5] or object 0x22A4 (map able via CAN). If the temperature exceeds 110°C, the servo will be disabled with Motor Fault (MF) 0x10000. An Emergency message with error code register 0x4210 via CAN\EtherCAT channels will be transmitted. After the servo is disabled due to the fault, it can only be enabled when temperature drops below 100°C. An attempt to enable the motor before this, will result in error code (EC) 191. Motor Temperature can be recorded by the EASII via "Motor Temperature[C]" (Group: System)
Current Integral Saturation	US[2] limits the current integral. This limit is in addition to the anti-windup limit. The range is in percentage (0..100), where 100 is max voltage output (PWM). For compatibility reasons 0 is interpreted as 100%. Limiting the integral reduces overshoots, allowing a faster settling time and maintaining integral usage for small errors.



Subject	Details
Speed integral Saturation	US[3] limits the speed integral. This is in addition to the anti-windup limit. The range is in percentage (0..100) of the maximum allowed current. For compatibility reasons 0 is interpreted as 100%. Limiting the integral reduces overshoots allowing a faster settling time and maintaining integral usage for small errors.
DS402 State Machine Option Code via 0x605B & 0x605C	<p>The Shutdown option code (0x605B) and Disable operation option code (0x605C) allows the user to select the behavior of the drive when these transitions are requested via the DS402 state machine (object 0x6040). From this version, setting these objects to value 1, decelerates the motion under servo control before the servo is disabled, preventing motor spin w/o control.</p> <p>The deceleration that is used is the Profile deceleration (object 0x6084).</p>
Interlock indication	<p>The STO (safe torque off) switches are now indicated via the Interlock indication (bit 3) in object 0x60FD. The bit is set to 1 when the STO is disabled and the drive is in safe state.</p> <p>The indication also affects objects 0x2201 & 0x20FD.</p>
Boot Version via EtherCAT	Object 0x200A indicates the Boot version. For example: 1.1.3.35



3.2 Bug fixes 1.1.10.07B01

Bug	Details
False Over Voltage alert	In rare occasions, the Over Voltage was falsely alerted. This was fixed.
Object 0x1000 correction	The object 0x1000 indicates the device type that is supported. In Gold the device type is DS 402. The value of the object did not indicate that the device supports servo drives. This was fixed. The value now is 0x00020192, as DS402 requires.
Uploading procedure via CAN failed to complete	The upload sequence is performed via object 0x2036 (UL command). In situations that the uploading procedure failed, the drive was locked and the CAN communication failed to respond. This was fixed.
Wrong limit indication (ILA bit) when drive encountered Software Position	The ILA bit (bit 11 of the Status Word: 0x6041) is set when internal limit occurs. This indication did not work properly when a Software position limit was reached. Prior to the fix, the ILA indication was set only if the motor was enabled outside the Position Limit boundaries. Now the indication is set whenever the software position limits are sensed. Note that the ILA indication for software limits is reset back to 0, when the motor is disabled and when mode of operation (0x6060) is changed.
Hard Stop input (IL[x]=2/3) enhancement	Hard Stop function is activated when one of the digital inputs is routed via IL[] to this function. When the input is active, the drive stops all motion. Previously, when the drive operated in time-depended motion modes (Interpolated Position mode or Cyclic Synchronous motions mode) and the Hard Stop was activated, the motion was automatically disabled. Now, the drive decelerates to full stop using the SD command and remains enabled. When the Hard Stop is active, the drive discards any motion reference and prevents any movement. This includes any motion commands such as PA , JV , ECAM , velocity and position reference via socket, as well as Yaw reference (Gantry). Note that current reference from socket will not be discarded. If the digital input is reset, the motion resumes immediately. It is recommended to use the “sticky-bit” function as described in IL[] command (Command Reference manual) and set an anti-bouncing filter via IF[] command. The FLS\RLS functionality remains unchanged.
EMCY messages via EtherCAT, wrong byte pattern	The ECMY messages are transmitted when the motor is disabled due to a fault. The ECMY that were transmitted via the EtherCAT channel included a wrong pattern on bytes. This



Bug	Details
	was fixed. The indication of the EMCY is as defined in DS301 manual.
Sync Manager 3 Watchdog	The use of SM3 watchdog caused a jump in the motion after the watchdog recovery. This was fixed. The SM3 is no longer used in the Gold drive. SM3 watchdog should be implemented by the EtherCAT host.
Gantry Yaw reference socket reset.	CA[97] denotes the Yaw reference socket when Gantry system is used. After LD command the variable was unintentionally reset to 0, instead of loading the socket number saved during SV . This reset prevented the Yaw profile from working properly. This was fixed. LD loads and initiates the reference socket.
MS behavior in Profile Torque mode	In Profile Torque mode, the Motion status (MS) was not set to 0 when the Halt command or Quick Stop state were requested via the DS402 state machine. This was fixed. Now, the MS is set to 0 whenever the motor speed is 0. Note that this does not affect the Target reached bit in DS-402 Status Word.
Battery error in Sanyo/Nikon single turn sensors.	When a multi-turn sensor was defined as a single turn and did not include a battery, a battery error (PS_ERR) was invoked. Starting from this version, in such occasions, the error is automatically reset when the sensor is initialized by the drive.
Bad reply for objects which are not in OD	Addressing an Object that is lower or higher than the lowest index or highest index of the object dictionary, caused the EtherCAT stack to lock. This was fixed. Addressing these areas in the object dictionary is now replied with "Object does not exist" abort code.
RS232 communication lost after RS	RS232 communication to the host was lost after an RS command. This happened when the communication parameters of the RS232 (parity, baud rate) were set to values other than the default. This was fixed. The RS232 communication remains after RS or LD commands.



Chapter 4. 01.01.10.05 B04

Component	Version
Firmware Version	01.01.10.05 19May2015B04
Communication Server	AA[5]: 1.1.7.73
PAL	85
ESI	0x0010400 V08

4.1 Details

Subject	Details
Panasonic incremental sensor	<p>Version supports Panasonic incremental of 10,000 counts.</p> <p>Version supports Panasonic incremental 20 bits via Encoder ID 29 (CA[41] to CA[44]) .</p> <p>Capture function on index of this sensor was added. The capture is required for functions such as homing & touch probe.</p>
PWM emulation error report	<p>Feedback emulation as well as PWM emulation are set via EA[1].</p> <p>If an error occurs during the initiation process, EC will be set to 107 while EE[7] or Object 0x2081.7 details the reason for the error.</p>
UM=6, Stepper mode Open Loop, Allow modulo & Position Limit	<p>In Stepper mode (UM=6), open loop, where no sensor is used, the modulo (XM[1]\XM[2]) and the position limit (VH[3]\VL[3]) are influencing the motion. The stepper angle is derived from the profiler output and can be used with User Units (e.g. FC[] command). The profile output in this mode can be copied to the feedback presentation (0x6064 or PU) by setting the "Copy Main Profile" (Sensor ID=15 via EAS Feedback Settings) into position socket.</p>
Master\Slave mode for slaves without feedback	<p>In this mode a master drive can be connected via "Gantry connection" to any number of slaves. The master transmits Current reference and field angle, which the slaves follow.</p> <p>The slave commutation method is set via CA[17]=7.</p> <p>The master commutation angle can be offset via CA[7] & CA[29], so that each slave can adjust the angle offset.</p> <p>Slave must be manually enabled (motor ON). The UM of all slaves should be 1 (current mode).</p> <p>Note that in situations where the motor ON procedure failed for the slaves, there is no indication at the Master drive. The same</p>



Subject	Details
	applies when one or all of the slaves is faulty. The Master is unaware of this situation and will continue to transmit the set point as if all is OK. If a situation occurs where the Master is disabled, the slaves reset the current command to 0, while remaining in servo enabled.
Profile Acceleration and Deceleration range enlargement	<p>The following parameters and objects range were modified:</p> <p>AC[1] to AC[4]: [2147483647...1] , setting 0 results in an error.</p> <p>DC[1] to DC[4]: [2147483647...1] , setting 0 results in an error.</p> <p>The following objects limits were also modified to [2147483647...1]:</p> <p>0x6083, 0x6084, 0x60C5, 0x60C6</p> <p>Note that if 0x6063 or 0x6084 is set to 0, the set point is ignored by the drive. The default values of these commands and objects were also modified.</p>
Profile Speed range enhancements	<p>The SP is the maximum speed of the Profile Position. Starting from this version setting 0 to SP[1] to SP[4] is permitted. If the value of SP is set to 0, the next BG command results a Stop similar to ST command.</p> <p>Object 0x6081 sets the Profile Velocity. Setting 0 to this object is permitted but results 'Halt' on the next setting of the New set-point bit (bit 4) of the Control Word.</p>
Halls only speed calculation enhancement	<p>When using 'Halls only' as the feedback sensor, the speed calculation between 2 Halls transition depends on the speed of the Halls. Previously the detection of Halls transition for the speed calculation was 1 counts every 0.1 Sec. From this version, it was improved by 20 fold, allowing calculation of 1 count every 2 Secs. This allows smoother movement at much lower speeds.</p>
New G-HORNET	G-HORNET 9/200, 3/200, 6/200, 9/200, 12/200 were added.
Offset the stepper angle in Halls Only	CA[29] is used to move the stepper angle. From this version this feature is also permitted while the servo is on.
YM[] default value	YM[] (object 0x207B) denotes the modulo of the additional position reference for e.g. ECAM. The default value is now set to 0 which implies "No Modulo".



4.2 Bug fixes 1.1.10.05B04

Bug	Details
Cyclic Position extrapolation recovery	In CSP mode, if the next set-point failed to arrive during the interpolation period due to e.g. lost frame, an extrapolation that calculates the next set-point is used. In such situations, if the master serves as the DC clock (SYNCO) producer (slave mode synchronization), a jump in the position occurred when a valid set-point was received. This was fixed. The motion resumes the desired trajectory.
PWM saturation was not updated after US[x] command.	US[1] is used to saturate the motor PWM command (voltage command). The desired value was updated only after the relevant US[1] was sent twice. This was fixed. The saturation value is now updated immediately after sending the US[1] .
PWM Multiplication	The motor PWM frequency is limited by the current sampling time (TS) and the multiplication factor denoted by XP[2] . The drive prevents setting a combination of TS and XP[2] that might result in a frequency which can damage the drive. In some cases, modifying the TS after the XP[2] resulted in PWM frequencies which are forbidden. This was fixed. Any order for setting these commands is now permitted.
Recorder setting for Output Compare	The OC[1] & OC[2] signals can be recorded via the EAS recorder. The name of these signals is now modified to "generated pulses" instead of "remaining pulses".
XP[3] uploaded via EAS parameter	The XP[3] refer to the Interpolate mode SYNC filter and was not updated by the EAS during parameter upload and download. This was fixed.
Motor failed to move after Inhibit switch release	In rare situations, when the Inhibit function (IL[]) was released, the motion was erratic. This happened when for example a JP was requested after Inhibit is released (Enabled). This was fixed.
Drift in Home setting when User Units are used.	When User Units were used by the host (UU), the position calculated during the homing was not accurate. This was fixed. The improved calculations prevent possible drifts.
Halls only feedback, commutation angle calculations	In cases that the sensor was Halls Only the commutation angle calculation was wrong when rolling from Hall state 4 to 5. This could cause a wrong current output. This was fixed.
LD during Recorder upload caused a communication timeout	When an LD command (load data from flash) was sent during the upload of the recorder data (BH command) the drive stopped responding to the communication causing a communication timeout. This was fixed. Now during BH the LD request returns an error, EC=67 "Recorder Is Busy or Data is



Bug	Details
	uploaded”.
Homing acceleration limit	The homing procedure was not limited by the SD (Stop deceleration) causing an ambiguity in the deceleration trajectory. This was fixed.
Emulating the speed via PWM emulation.	When speed is emulated via PWM, negative speed values were limited to -32000 cnt/sec. This limitation caused incorrect PWM signals when velocities higher than -32000 were required.



Chapter 5. 01.01.10.00 B00

Component	Version
Firmware Version	01.01.10.00 31Dec2014B00
Communication Server	AA[5]: 1.1.7.69
PAL	85
ESI	0x0010400 V07

5.1 Details

Subject	Details
Includes the following internal releases	01.01.09.11 B07 (Absolute Gantry)
Ignoring software position limit via XA[4]	When in Cyclic Position Mode, Bit 2 of XA[4] is used to ignore the FLS/RLS (forward and backwards limit switches). From this version, Bit 2 is also used to ignore the Software Position limits (VL[3]/VH[3]).
Incorrect ECAM setting new indications	<p>When ECAM mode is initiated via EM[1], the complete set of ECAM parameters are checked and processed. If a failure occurs due to a parameters mismatch, the EM[1] command fails (EC=27) and the reason for the failure is retrieved via EE[6].</p> <p>Starting from this version, the following parameters are also prevented from mismatching by the conditions:</p> <p>if EM[7] (last segment shorten size) > EM[4] (ECAM master gap), then EE[6] indicates 9.</p> <p>If EM[5] (ECAM starting index) > EM[2] (ECAM last index), then EE[6] indicates 10.</p>
OS interpreter reply	When the OS interpreter is used, the command is sent via object 0x1023 SI 1 and the reply is performed via object 0x1023 SI 3. If after the request a SDO is sent to the drive, the OS reply will be 0. This happens when the SDO is of VISIBLE STRING type such as 0x1009, or 0x100A objects.
New mapping option to object 0x2203	<p>The 0x2203 object namely, Application Object, can be directed to inform regarding different types of data. By default the object is used for Elmo's proprietary data. Via object 0x2F41 bits 16 to 19, namely Config Bits, the user can select the following:</p> <p>0x20F41 bits 16-19 is 1: This object 0x2203 informs the analog sensor sine cosine amplitude ($\text{Sine}^2 + \text{cosine}^2$) in internal units.</p>



Subject	Details
	<p>The expected range for 1Vp-p sensor is ~2,380,000 to 2,750,000.</p> <p>0x2F41 bits 16 to 19 is 2: This object 0x2203 informs the analog sine & analog cosine signals as follows:</p> <p>(cosine<<16 sine)</p> <p>To convert the internal values to Volts, divide the value by 3085.</p>



5.2 Bug fixes 1.1.10.00B00

Bug	Details
ESI	Some bugs related to wrong variables size, wrong defaults values, and bit offset, were fixed. These modifications will not affect any functionality or integration between EtherCAT host and the Gold drive from a previous version.
Modulo default value modified	The default value of the position limit (VL[3]\VH[3]) and the modulo (XM[1]/XM[2]) is now set to 0. Therefore, the drive will be in 32 bits modulo and the motion behavior (RADO) is “normal” similar to linear motor behavior. The default is set via the RS command.
Ignore Hardware limit switches	XA[4] sets the behavior of the limits during motion modes. The default value of XA[4] is now set to 4 and therefore the hardware limit switches (FLS, RLS & STOP) will be ignored when the drive is either in the CANopen Interpolated Position mode (IP mode), or any of the Cyclic Synchronous modes (CSP, CSV & CST).
New power rates for Gold Twitter, and Whistle	The following power rates were added to the Gold Twitter: 6/100, 1/200, 3/200, 6/200, 9/200 & 12/200 The following power rates were added to the Gold Whistle: 1/200
Homing Gantry absolute sensor	A procedure that homes the Gantry with absolute sensor was not operating properly. As part of the correction CA[110] was added. The CA[110] is an alias to OV[54] which determines the socket which is used for the DS-402 homing. Now, wherever Gantry is defined, the homing works properly and updates the relevant socket as required. NOTE: Further steps are required to perform the Gantry Absolute Homing procedure.
Transition 10 of the DS402 state machine	Commanding Quick Stop via object 0x6040 when the drive was in “Switched On” state (0x33) was ignored by the drive. This was fixed. Setting Quick Stop in this situation will set the state machine (object 0x6041) to the “Switched-on Disable” state (0x250).
CANopen LSS, ignored serial number (DS305)	LSS did not respond to the “Selected Switch” command. This occurred since the serial number of the identification was not handled properly.
Speed command exceeded VH[2] settings	Speed limit, defined by VH[2] , limited only the speed which was derived from the profiler output. This caused a higher speed than expected. From this version the VH[2] limits the total speed command to the controller which includes the



Bug	Details
	profiler output of the speed derived from the external reference (follower, ECAM, socket), and the position controller.
PR command causing an undesired modulo roll over.	When the actual position was close to the modulo limit (XM[1]/XM[2]), the next PR command caused the motor to inadvertently run to the other side of the modulo. This situation happened when a Homing (HM[1]=1) with "stop after home" (HM[4]=0) was commanded prior to the PR command. This was fixed.
Motion roll over rapidly when profile velocity is set to 0.	If the Profile Velocity (Object 0x6081) is mapped to PDO and set to 0, the profile position motion rolls over. This was fixed. Setting 0 to 0x6081 via PDO is now saturated to 1 preventing this roll over.
EA[7] to EA[14] in EAS parameter file	When uploading the parameter file via EASII, EA[7] to EA[14] were not uploaded. This was fixed.
Jog motion near the software limits	When commanding a jog motion via the JP command and the actual position was near the software position limits (VH[3]/VL[3]), in some situations (i.e. position arrived to the limit before the acceleration completed), the motor could not return to the limit as expected.
Profile Position with End Velocity near Position Limit	When a Profile Position motion was used with End Velocity and the actual position was near the Position Limits (VH[3]/VL[3]), the motion moved inside the limit. This was fixed. The motion ends at the defined limit.
Jog motion when modulo mode is active, reaches software limit	When commanding jog motion (JP) and the drive is defined as Modulo (XM[1]>VL[3] & XM[2]<VH[3]), the drive motion was limited due to the software limits (VL[3]/VH[3]). This is fixed. Now the drive ignores the software limits in such situations.
Jog when AC == SD	When commanding Jog motion (JP), if the Acceleration (AC) equals to the Stop Deceleration (SD), the motion incorporated disturbances along the trajectory.
Jog motion with various Acceleration & Deceleration	When commanding jog motion (JP) and the acceleration (AC) differed from the deceleration (DC), in some instances, the direction was incorrectly calculated causing the drive to jog in the other direction.
Incorrect Current Saturation when switching from brush to brushless motor	When switching from a Brushless to Brush motor via CA[28] , the Current Saturation (I²T) was not calculated correctly causing a lengthier peak current period than requested.
Bit 7 in DS-402 Control Word (fault reset) is Ignored	Bit 7 in the Control Word resets the drive from a Fault state according to the DS-402 State Machine (transition 15). The bit was ignored in all other States (e.g. Ready to Switch On, Switch On, Operation Enabled) causing non-requested state



Bug	Details
	transitions. The bug is fixed. When bit 7 is set and the state is not a Fault State, the transition is ignored and the drive remains in the current state.
EtherCAT Sync Manager (SM) counter modified	<p>The SM counter is used to determine retransmission of messages. In some rare occasions if the master started the counter from 0 (for example after network reconnection), the drive lost a message.</p> <p>This was fixed according to ETG 1000-4 table 29. The SM handler now also responds to 0 counter value.</p>
PWM emulation did not include Current Command	<p>The PWM emulation (refer to explanation on PWM Emulation in the section PWM Emulation below) mode via EM[] did not include the option to emulate the Current Command (EM[9]=4) . This was fixed.</p>
UI[] \ UF[] update via Binary Download	<p>When uploading a parameters file using EASII via the Binary upload procedure, and then downloading the same file, the UI[] & UF[] arrays were not updated as expected. Values for all UI[] & UF[] were reset to 0.</p> <p>This was fixed. The values which are uploaded are now updated properly.</p>
Switching between RM=1 and RM=0 several times caused a wrong set point	<p>The RM command sets and resets the auxiliary reference mode. When switching between RM=0 to RM=1 several times, the profiler did not process the next set point properly.</p> <p>This situation is only relevant when the main profiler (DS-402 profiler) was the ECAM master via EM[11] bit 3 is set to 1. This did not occur when the ECAM master reference was from a socket (feedback follower).</p>
PA & JP with smooth factor (SF)	<p>When commanding Point-to-Point motion (PA) with Final Speed (FS) and smoothing factor SF, sometimes the motion moved in an unexpected direction. This occurred when the distance required for the smoothing was more than the set point calculated distance.</p> <p>From this version, in these situations, the motion will not move in other directions. Instead the requested Final Speed will be attained long after the target position is accomplished.</p> <p>In rare situations the same occurs when commanding JP (Jog Position) motion with Smooth Factor. This was fixed. The motion trajectory is always performed to the expected direction.</p>
Motion starts when BG failed	<p>The BG command starts a pending motion (e.g. PA, JV etc) and can be used to activate the “Begin” trigger for the recorder. Sometimes the motion starts even when the command has</p>



Bug	Details
	failed (returning error). This was fixed.
PWM emulation values	<p>The EM[14] & EM[15] parameters set the Current boundaries when PWM emulation (refer to explanation on PWM Emulation in the section PWM Emulation below) on Current is performed (EM[9]).</p> <p>The EA[14] & EM[15] were always loaded to Peak Current (PL[1]) value regardless of the request from the host. This was fixed.</p> <p>Any value can be requested and the only limit applies is: EM[14] < EM[15]</p>
OS interpreter did not reply an error	<p>The CANopen SO interpreter permits addressing to the Elmo interpreter via the 0x1023 SI 1 object. If the command returned an error, the user did not receive any notification. This was fixed.</p> <p>When a command is sent via the OS interpreter return error (EC), object 0x1023 SI 3 reports this error.</p>



Chapter 6. 01.01.09.12 B00

Component	Version
Firmware Version	01.01.09.12 01Nov2014B00
Communication Server	AA[5]: 1.1.7.68
PAL	85
ESI	0x0010400 V03

6.1 Details

Subject	Details
ESI new version	<ul style="list-style-type: none">• Home Method modified to Read Only.• Removing irrelevant parts from the new revision



6.2 Bug fixes 1.1.9.12B00

Bug	Details
Homing attained with Modulo roll over	If during a Homing procedure the Home Attain was performed near the modulo (XM[1] , XM[2]) and the Home Offset caused the final position to roll over the modulo range, an incorrect calculation will be performed, resulting in an incorrect profiler output. This was fixed
Wrong Position (0x6064) calculation with Dual Loop	<p>The object 0x6064 is the Actual Position value in User Units.</p> <p>For dual loop and when the speed sensor is more sensitive than the position sensor, the final position is calculated incorrectly.</p> <p>This causes an incorrect 0x6064 report to the host even if the position sensor is not actually moving. This was fixed.</p>
Handling of Ethernet ARP message	The handling of ARP messages was performed incorrectly causing messages to be lost. This was fixed.



Chapter 7. 01.01.09.11 B07

Component	Version
Firmware Version	01.01.09.11 27Oct2014B07
Communication Server	AA[5]: 1.1.7.67
PAL	85
ESI	0x0010400 V02

7.1 Details

Subject	Details
Includes the following internal releases	01.01.09.11 B00 01.01.09.11 B01
32 bit checksum for parameters integrity	<p>The Checksum of the parameter's database integrity was calculated in 16 bits. From this version the checksum was changed to 32 bits.</p> <p>OV[52] (object 0x2060) includes the checksum value.</p> <p>NOTE: This is compatible to previous checksum calculations. The new calculation is for presentation purposes only. All internal decisions about database integrity were not modified.</p>
Objects 0x2110 to 0x211E	<p>KG[] command includes 15 filters. Each filter includes 63 parameters. These filter parameters are indicated by 945 sub-indices.</p> <p>Objects 0x2110 to 0x211E are used as alias to the KG[] where each filter is represented by a different object.</p> <p>For example: Object 0x2110 includes 63 parameters of the Speed KI filter entries and 0x2111 includes 63 parameters of the Speed KP filter.</p> <p>This allows a CANopen or EtherCAT host to address all the filters via an SDO (CoE) interface.</p>
EtherCAT stack revision number (ESI)	The EtherCAT revision number was modified to 0x0010400.



Subject	Details
Position Error indication for Gantry Yaw & Stepper Closed loop	The Position Error of gantry Yaw controller or Stepper controller is determined via ER[5] . If the position error is violated, MF will be set to 0x400 (1024) and an EMCY message is transmitted. Previously when the fault occurred, MF was set to 0x100.
Auto Focus error bit indication	The Auto Focus is Elmo's proprietary additional sensor that can be read via the drive inputs. Bits 8 & 10 of object 0x2085 are reserved for this special mode.
US[1] modified in motor enable	The US[1] sets the saturation for the PWM (voltage command of the current controller). The value can now be modified even when the motor is enabled.
Dynamic brake enhancement	<p>The Dynamic Brake (DB) reduces the coasting time of the motor after it was disabled. By shortening the lower phases when the free-wheeling speed is lower than VH[1], the coasting time is reduced.</p> <p>Previously this speed was checked only during the motor off interval.</p> <p>From this version, the threshold speed is checked always and not only during the procedure of the motor off. This means that even if the motor is not enabled, the DB will be activated when actual speed \leq VH[1].</p>
Dynamic brake with no sensor	Where there is no speed sensor, e.g. UM=1 with Brush Motor and the VH[1]>0 , the motor enable request (MO=1) will return the Error Code 80.
Adding new power rated for Twitter (GTWI)	Following power rates are added to the GTWI: 6/100 1/200, 3/200, 6/200, 9/200, 12/200
Adding new power rate for Whistle (GWHI)	1/200 module is added.



7.2 Bug fixes 1.1.9.11B07

Bug	Details
Reset the PAL during RS command	The PAL was not reset to its default after the RS command. In rare occasions this caused an absolute sensor initialization issue if no power up cycles were performed after the RS .
Motor off when changing motor type via CA[28]	CA[28] determines the motor type. This cannot be modified during motor enable. This restriction and bug correction is applicable also for the stepper mode.
Position behavior on Stepper Closed loop (UM=6)	In stepper closed loop, the profiler output was not synchronized to the sensor at motor on and the position limits were not set correctly. The user units were also not calculated correctly. This was fixed.
Inhibit/Enable wrong operation	When a digital input was modified from Inhibit/Enable function (via IL[]) switches to any other function (e.g. general purpose) the motor was incorrectly enabled. This caused an unexpected behavior since the function was not defined as Enabled any more. This was fixed.
Phase D lost synchronization with Gantry	When using Gantry with Stepper 2-Phases motor, the current of phase D was losing synchronization. This was fixed.
Object 0x2020.1 out of range	The 0x2020.1 is used during the home on block settings. If a 32 bit long value (e.g. 0x2F00.1) was sent to the drive prior to the 0x2020.1, the drive sometimes replied with an "Out of range" abort message. This was fixed.
Home attained jump while using position FIR filter	The position FIR filter is set via CA[88] . When the filter was activated (i.e. CA[88]>0), the position jumped during Homing. This was fixed.
Absolute offset when analog sensor is used (CA[91] to CA[94])	The CA[9x] is used for absolute sensors offset. An analog sensor is also defined as an Absolute sensor within the single Analog cycle. When an analog sensor is used, the offset during the Homing procedure was calculated from the absolute position (PX) instead from the analog signal. This caused, in some occasions, a wrong offset calculation and as a result a wrong homing position. This was fixed.
Wrong default value for 0x606A	Object 0x606A is the sensor selection object that determines from where the velocity is read. The user can select between the speed of the position sensor and the speed of the velocity sensor. The default was set to 0, meaning the position sensor was read. This was fixed. The default is now set to 1, which indicates that the velocity sensor is read.



Chapter 8. 01.01.09.10 B03

Component	Version
Firmware Version	01.01.09.10 12Aug2014B03
Communication Server	AA[5]: 1.1.7.61
PAL	85
ESI	0x000103F6 V07

8.1 Details

Subject	Details
Allowing parameters reset while features are active	<p>The RS command resets the drive parameters to their factory default. The RS is now available when the following features are active:</p> <ul style="list-style-type: none">• Output Compare (OC command),• Position Error (PC command)• Emulation (EM command) <p>NOTE: The feature will be disabled when RS is activated.</p>
Emulation Saturation works as gain as well	<p>EA[16] & EA[17] are used to saturate the PWM emulation signals. From this version it can be used additionally as gain. Therefore when the PWM emulation exceeds EA[12], then EA[16] is used. When the PWM exceeds EA[13], EA[17] is used. When the PWM emulates the Velocity then EA[16] and EA[17] are used instead of EA[14] and EA[15].</p>
Gold Clarinet Drive	<p>Introduces the Gold Clarinet drive which is similar to the Gold Bell stepper drive. The Power rates are similar to the Gold Bell.</p>
Disabling the Profile Acceleration limiter (XA[4])	<p>The acceleration (and deceleration) limiter denoted by the SD command, prevents rapid speed changes. In time depended modes, for example Cyclic Position, Interpolated Position and when using object 0x2005 where the set-point reference is controlled by the network master, the acceleration limiter is automatically ignored allowing the host to set any required acceleration. In other modes which are not time depended such as Profile Position mode, the acceleration limiter can be override by setting bit 1 of XA[4] command.</p>
Ignoring Hardware limits (FLS, RLS & hardware Stop)	<p>When the motion mode is time dependant, the hardware limits can be ignored by setting bit 2 of XA[4]. The hardware limit override is relevant when 0x6060 is set to modes 7, 8, 9</p>



Subject	Details
	and 10. In all other modes the hardware limits cannot be ignored.
Absolute sensor CRC error	If a serial sensor is used and a CRC error is reported, the remaining status data is ignored. This modification prevents extraneous status info, because the sensor data is no longer valid.
Specific serial and incremental sensor errors must be manually cleared	If a Serial Sensor reports an error, the motor is automatically disabled. The next motor on will not be allowed until the error is cleared via the TW[20] command (Object 0x20FC sub index 2). The value must be set to the relevant sensor socket e.g. TW[20]=1 , resets the errors of sensor in socket 1. The relevant sensors are: EnDat 2.2, Panasonic Absolute, Panasonic Incremental, Tamagawa, Sanyo/Nikon
Battery warning indication via 0x2085	Object 0x2085 bit 6 will be set if the sensor reported a battery warning alert.
Masking errors indications of specific serial and incremental sensors	CA[8] can be used to mask status bits of the following sensors: Panasonic Absolute, Panasonic Incremental, Tamagawa, Sanyo. Setting CA[8] to -1 masks all the errors
Gurley sensor validation bit	The Gurley sensor must be moved before the position data is validated. When Bit 9 of object 0x2085 (OV[61]) is set to 1 , it indicates that the Gurley sensor data is valid.
Warning bit of DS-402 Status word indicates threshold exceeded	Extra Status register (Object 0x2085 or OV[61]) indicates when these thresholds of selected data were violated. The threshold are set via the XT[] command. If bit 2 to 5 or bit 6 in 0x2085 is set, than bit 7 ("Warning") of the DS-402 status register (0x6041) is automatically set.
PWM Follower new indication	WS[39] indicates the PWM follower Duty Cycle /150 in MHz WS[40] indicates the PWM follower Period Time /150 in MHz WS[41] indicates the Duty Cycle in %
PWM Follower value when signal is faulty.	When the PWM follower signal is out of range and considered as "cable disconnected" (Duty Cycle 0% or 100%), the actual PWM by default will be set to 0. This can be modified via CA[109] . CA[109] is defined in units of mili ampere, or cnt/sec depending on the CA[101] index that selects the PWM type.
G-TWI & G-BEE increased threshold temperature	The threshold temperature for G-TWI & G-BEE products with max current (MC) <=6 was increased from 85° to 92°.



Subject	Details
Current Step shaping	Enhanced current step shaping was added to improve the current control step response.

8.2 Bug fixes 1.1.9.10B03

Bug	Details
0x30xx objects with extended indices	The 0x30xx objects are aliases to the Elmo's legacy Commands. For these objects, sub-indices which were higher than 254 could not be addressed. This was fixed. All the indice range are applicable to the host.
Sine\Cosine synchronization	In Port-B when the sine / cosine sensor is used, the drive rolls over at very high speeds (>3e6 cnt/sec). This was fixed.
Peak Continuance current limit at motor off do not reset the filter	At motor off (MO=0) the filter of the current limit saturation (CL[]\PL[]) was reset. In this situation, the current limit protection (I ² C) did not work properly. This was fixed. The filter of the current protection is now active regardless whether the motor is enabled or not.
Start Position of Output compare function is not detected (first pulse)	The monitoring of the first pulse for the Output Compare mode is not detected, if the difference between the hardware counter (Quadrature module) and the user position (PX) is larger than 2 ³¹ .
Limited acceleration for the field angle	When the difference between two commutation cycles was greater than 60 electrical degrees (Rate limiter), the field angle was saturated. This limit was removed, allowing a faster commutation response. Note: When Hall sensors are used for commutation, an error is produced when the difference between two commutation cycles was greater than 60 electrical degrees.
JP[4] was not allowed if motor is disabled	JP[4] sets the jog reference to the socket profiler. During motor off (MO=0) this setting was rejected. This was fixed. The socket profiler can be activated regardless of the MO status.
FLS/RLS limits the wrong speed command	FLS & RLS limited the speed derived from the software command. The speed derived from the external reference was not limited. This is now fixed. FLS & RLS limits are now working on the superimposed values of the software and external speeds.
RM=0 causing wrong set-point calculations	When switching from RM=1 to RM=0 , the external command was ignored, causing the reference signal to skip. This was fixed.



Bug	Details
Jog Position in negative direction	JP[2], JP[3] and JP[4] are used to set a jog reference to the superimpose, phasing and socket profilers. In these modes, when the command was negative, the profiler ignored the value. This was fixed. A negative value can now be set.
Long motion with low acceleration using simple profiler	When using superimpose, phasing or socket profiler with a lengthy motion ($> 2^{31}$ bits) and low acceleration, the position calculation lost counts. This was fixed.
Interpolation Profiler vibrations	In rare situations the Interpolated Position mode vibrates causing small interruptions in the motion. This was fixed. This did not affect any other motion modes.
Speed residue when FIR filter used	When a Velocity FIR filter was used, the speed residue was not correctly cleared causing continuation of slow movement regardless of the set-point. This was fixed.
Wrong state indication in DS-402 status word	Object 0x6041 indicates the Status of the DS-402 state machine. In some occasions when transitions 3 and 4 were used at the same cycle (switching from “Ready-to-Switch-On” to “Operational Enable”), the Status word indicated 0x235 which is an illegal state. This was fixed.
OV[61] wrong indication	The OV[61] indicates the Extra Threshold register (object 0x2085). In rare situations, a negative value was displayed. This was fixed.
0x30xx objects with extended indices	The 0x30xx objects are alias to the Elmo’s legacy Commands. In these objects, sub-indices which were higher than 254 could not be addressed. This was fixed. All indices ranges are applicable to the host.
Hiperface sensor was not read correctly	This was fixed with PAL 85.



Chapter 9. 01.01.09.08 B08

Component	Version
Firmware Version	01.01.09.08 12Jun2014B08
Communication Server	AA[5]: 1.1.7.57
PAL	82
ESI	0x00103F6 V07

9.1 Details

Subject	Details
Absolute sensor daisy chain	If GO[14] to GO[16] are set to 8, then the absolute sensor is buffered to PORT C (daisy chain) as follows: Port C 'A': Buffer clock out of the sensor Port C 'B': Buffer Data input of the sensor Port C 'Index': Buffer Data output of the sensor
Extended frequency for SSI sensors	CA[36] in addition to the present clock frequencies for the Absolute Sensor, now allows the frequency of the SSI sensor to be set to 312KHz
Polarity bit modified (object 0x607E)	Previously, the polarity bit of the DS-402 (object 0x607E) modified the direction of the velocity or position commands to the relevant controller. Now, due to an expected change in the DS-402 standard, and in order to allow modifying the polarity value while motor is enabled, the polarity affects the set-point instead of the command.
Stepper Commutation for unbalanced system with and without mechanical brake.	The stepper commutation is now also capable of commutating in unbalanced systems where for example the gravitation affects the load. The total time allowed for the commutation process is now set to 20 seconds. New variables were added to the SC[] command for this purpose. Note that SC[4] and SC[9] are now reserved. Any setting to SC[4] will result in 0 and any setting to SC[9] will result 1. This is for compatibility reasons. The new commutation procedure is also possible in commutating against a block where movement is limited or not permitted at all.
Commutation verification for	The user can now request to run verification after Binary



Subject	Details
Binary search	Commutation. This is done via the SC[12] command.
During Stepper commutation drive returns to the initial position.	When drive is in Position Mode after the Stepper commutation is complete, it returns to the initial position. Note that in Velocity and in Current modes the drive remains in the final position after the commutation and does not return to the initial position.
Stepper Closed Loop	<p>Stepper closed loop mode via UM=6. The sensor ID is 34. This includes the following:</p> <ul style="list-style-type: none">• The Position command source is now set via CA[98]• Feedback socket is set via CA[99]• The relevant controllers are KP[4,5], KI[4], KV[81..90] and FF[2]• KP[6] converts from encoder counts to stepper angle units (512 per period)• CA[53] determines the source of stepper angle to this socket. <p>The Stepper closed loop can also be used to close any sensor for emulation purposes.</p>
XP[8] : Improved Gantry Master Slave synchronization	The XP[8] command has been introduced for the Phase Offset to improve the synchronization in gantry systems between the master and slave.
PWM reference as input to the drive	<p>A PWM reference can be used via socket. The sensor ID is 35. CA[100] to CA[108] are used to determine the Duty Cycle factors and relevant parameters for this mode.</p> <p>The mode includes protection for slow amplitude and protection from cable disconnection (0% or 100% duty).</p>
PWM Emulation	<p>The Emulation function that emulates signals to an external host via PORT C can now be used with PWM duty cycle.</p> <p>Pulse & Direction or +/-50% modes can be used.</p> <p>The PWM can be set with a Gain & Offset.</p> <p>New EA[] command entries are used to program the desired functions of this feature.</p> <p>WS[11] informs the duty cycle. TW[70] can be used to manually set the PWM value mainly for debug purposes.</p>
Sanyo & Nikon feedback reset	Single-turn & Multi-turn position resets are now available with these sensors via the commands TW[18] and TW[19] (Objects 0x20FC SI 1, and 0x20FC SI 2) respectively.



Subject	Details
"Motor failed to start" error is reported via EC command	<p>When the motor is enabled via MO=1 or DS-402 and failed to start, the abort code is reported as: "Motor failed to start" via MF command (0x20000000).</p> <p>The reason for the failure is now reported via EC command. The EE[5] and Object 0x2081.5 reporting this abort previously, are not in use and always reports 0.</p>
Inhibit Function and RM command	<p>The Inhibit function is not dependent on setting the RM anymore. Previously RM=1 was required.</p> <p>From this version when the Input is defined as "Inhibit/Enable" it will enable and disable the motor regardless of the RM value.</p>
DD command reports the drive CAN controller status	<p>The DD command reports the drive CAN controller state indication; BUS off, Errors counter, error type and more.</p> <p>This can be used to monitor the state of the CAN bus.</p> <p>Object 0x2082 can also be used for this purpose.</p> <p>NOTE: In a situation of BUS off the CAN Bus is no longer active, and can only be monitored via the DD command.</p>
Jump in motion In Cyclic Position mode (CSP)	<p>If the communication was interrupted during Cyclic Position Mode the drive extrapolates the motion, when communication is returned (host sent new set point) and reconnected, the position was calculated wrongly. This occurred when, in the course of the disconnection, the extrapolated position passed the modulo point.</p>
Homing direction for Home On Block modified	<p>The homing direction for home on block is modified:</p> <ul style="list-style-type: none">-1 positive direction-2 negative direction
Adding Serial number to the USB 3	<p>For USB 3 compliant tests, a serial number was set during the enumeration stage. Note that this is causing the Windows System manager to allocate a different COM port than was used previously.</p>
BOOT Strap LED indications	<p>Adding a green blinking LED when the EtherCAT BOOT strap state is requested. LED is toggled in 200Hz (50mSec).</p>
EtherCAT switches lo added for Gold TWI/BEE	<p>EtherCAT switches is allowed with Gold TWI\BEE drives in all hardware configurations of the drives.</p>



9.2 Bug fixes 1.1.9.8B08

Bug	Details
Motor Enabled when EtherCAT state is in SafeOP	<p>The motor can be enabled by various methods. When in EtherCAT field bus, the servo is enabled via the DS-402 Control Word (0x6040). This typically occurs when the EtherCAT state is in OP (Operational) mode. If in these situations, MO=1 command is sent via other communication channels (e.g. USB or RS232), the command will be overridden by the object 0x6040.</p> <p>When the EtherCAT state is in SafeOP, the MO=1 command was ignored. This was fixed.</p>
Final Speed (FS) negative value	<p>The FS command accepted negative values. This was fixed. Positive values are only permitted.</p>
CAN baud of 1M – sampling method	<p>The SAM bit of the CAN network was modified from 3 sampling points to 1 as requested by the CANopen standard.</p>
XA[2] was wrongly calculated	<p>In a high resolution sensor the hot-plug speed threshold (XA[2]) allowed enabling of the motor where it should be prevented. This was fixed.</p>
UM=3 user unit	<p>In Unit mode 3, the reference command (e.g. PA) was calculated with User units. This was fixed, and User units are ignored when UM=3.</p>
Sine amplitude 0 allowed movement	<p>When the Sine amplitude was set to 0, the profiler ignored any other requested movement. This was fixed.</p>
JP command not working when switching modes	<p>When switching from Torque or Velocity mode to JP mode (Jog under position mode), the mode switch did not operate correctly, resulting in no jog movement. This was fixed.</p>
Wrong Position presented after PX exceeds 31 bits	<p>In some situations, when the PX exceeds 31 bits the calculation of the presented position (PU) was wrong. This effected only the representation via the recorder but not the motion. This was fixed.</p>
Use CA[80] & CA[81] only if not 0	<p>CA[80] defines the socket for the Gantry slave and CA[81] for the Gantry master. The use of these parameters is only valid, if the value is not set to 0.</p>
Profile Torque switch – torque drop to 0	<p>When switching to the profile torque mode the first torque command dropped to 0. This was fixed. The first torque command is now derived from the user set-point via object 0x6071.</p>



Bug	Details
Cyclic Position Mode recovery	Wherever the set-point in CPS mode was not received, the drive extrapolated the last command according to the speed and acceleration. If the extrapolated position switched 32 bits, the next target position was not calculated correctly, causing a jump in the motion.
Hall commutation in 1:1:1 mode	When Hall commutation was used with Halls only feedback and the control mode (XA[5]) was set to 1:1:1, an incorrect commutation was calculated.
OS interpreter	When the OS interpreter produced an error which resulted in an EC, the '?' were set to the SDO data segment causing a redundant byte in the OS response.
Stop By Switch with wrong deceleration	In Cyclic Sync Position mode (CSP) and Interpolated Position modes the Stop-by-Switch caused a deceleration according to Quick Stop without taking into account the SD . This was fixed. The deceleration is now calculated by the lower value between Quick Stop and SD .
Objects 0x22A2 & 0x22A3 sub 1 mapping	These objects, indicate the temperature of the drive, are only map-able to a tPDO via CAN.
Digital input auto routine event are missed	Digital Inputs can be read via the AUTO routine programmed by using the User Program. The AUTO routine is programmed to react when the desired DIN is set to '1' (e.g. AUTO_I1 for digital input 1). Occasionally the AUTO routine missed an Input event. This was fixed.
EC command missed from EAS report	The EC reports errors that occur during command interpretation. Some of the EC were missed from the EAS personality which resulted in an "unknown error" report. This was fixed.
PC[3] default value modified	PC[3] determines the table which will be used for the Position Error correction. The default value was set to the NF table, is now switched to ET[] allowing 2046 entries.
CANopen Heartbeat correction	When the Node ID for the Heartbeat consumer is set to 0, the function is no longer activated. Previously, the heartbeat consumer was still reacting to messages causing a wrong EMCY messages if heartbeat was activated. The heartbeat starts only if the time is defined via 0x1016 is > 0 and the node ID is a legal node address (1 to 127). Otherwise the mode is not active.
IP mode caused a crash	When switching to Interpolated Position mode the drive may crash. This was fixed.
Wrong mapping causing a crash	In rare situations when an object was wrongly mapped to a PDO, the drive may crash. This was fixed. In such cases an Abort message will be transmitted and the EC will be set to 31.



Bug	Details
Undesired movement in Stepper modes (UM=3)	In stepper mode, the profiler did not start from 0 causing an undesired movement. This was fixed. The profiler sets 0 at the first cycle.
ECAM output jumps	If the ECAM output passed the 32 bits. A jump occurred.
EtherCAT ID switches after firmware update	After firmware update via FoE the ID switches were not read correctly. This was fixed.
Hot plug speed calculation for serial sensors	The speed for the hot-plug (XA[2]) was wrongly calculated, preventing the drive to servo enable even at low speed.
Wrong checksum calculations for the non-volatile parameters	Object 0x2060 reports the checksum of the non-volatile parameters. In some occasions the calculated checksum included variables which were not part of the non-volatile parameters. This resulted in an incorrect checksum. This was fixed.
FoE firmware downloading failure	In rare situations the FoE procedure caused an internal loss of synchronization which resulted in a timeout. This was fixed.
Wrong WS[30] reported	In some situations WS[30] which reports the drive type was wrong. This affected mainly the Gold TWI drive.



Chapter 10. 01.01.09.04 B01

Component	Version
Firmware Version	01.01.09.04 07May2014B01
Communication Server	AA[5]: 1.1.7.53
PAL	81
ESI	0x00103F6 V07

10.1 Details

Subject	Details
Adding Gold TIGER to the Gold family	The Gold Tiger was added to the Gold family.
USB 3 ACK	Acknowledging the end-point is required by the USB 3 (was not required by USB 2).
KL[2] to terminate user program	KL command (or KL[1]) terminates the User Program and disables the motor. KL[2] terminates the User Program while leaving the motor enabled (if enabled before the command)

10.2 Bug fixes 1.1.9.4B01

Bug	Details
EMCY was transmitted once	After a failure, an emergency message via CANopen or EtherCAT was transmitted only once. This was fixed. If the event occurred again the EMCY will be retransmitted.
EMCY was not sent during motor on failure	The EMCY message is also sent when the motor enabled failed. If during motor enabling a fault is detected, the expected EMCY message was not transmitted. This was fixed.
Wrong asynchronous PDO event reaction	CANopen PDO can be transmitted in various events as defined by object 0x2F20. The "Home Attained" event was wrongly switched with the "Auxiliary Home" event and the "Motion Complete" was wrongly switched with the "Motion Started" event.



Chapter 11. 01.01.09.00 B00

Component	Version
Firmware Version	01.01.09.00 09Mar2014B00
Communication Server	AA[5]: 1.1.7.51
PAL	81
ESI	0x00103F6 V07

11.1 Details

Subject	Details
Includes the following internal release	01.01.08.02 B00
Fault reaction for feedback faults	The Fault reaction option code (0x605E) allows the user to determine the behavior of the motion when a fault occurs. If the fault is related to feedback (e.g. Digital hall sensor, commutation) the drive aborts immediately regardless of the selected option code in Object 0x605E.
XA[3] default value modification	The Default value of XA[3] was modified to 600 µSec. For firmware compatibility reasons setting the XA[3] to 0 will automatically be modified to 600.
STO version change	Working with Dynamic brake caused the STO diagnostic to fail. This was fixed. Starting from this version the VS is modified to: 1.0.12.0



11.2 Bug fixes 1.1.9.0B00

Bug	Details
Position indication jumped around hardware modulo	When the PX exceeds 31 bits, the calculation of Absolute Position PU or Object 0x6064, and the Position Demand (0x6062) was incorrect. This was fixed
Calculation of the Position in non-position modes	A wrong position calculation in Profile Velocity and Profile Torque caused a jump when switching between these modes to profile Position. This was fixed.
Modulo when setting PX	When the user sets the PX value, the actual value is calculated with modulo. These calculations were sometimes wrong. This was fixed. PU (0x6064) and PX are now reported correctly.
Communication lost during upload personality with CAN	When uploading personality with CAN drives and TS > 60, the communication was sometimes interrupted. This was fixed.
Output compare undesired pulse	When setting OC[1]=1 and OC[1]=0 sequentially, sometimes a pulse was generated by the drive. This was fixed.
Control Word recording delay	The DS-402 Control Word (0x6060) arriving from the host can be recorded by EASII. The recorded signals represent a delayed value from the value that is handled by the drive. This was fixed. The actual Control word handled is now also recorded.
Jump in speed when switching modes	When switching to Profile Position mode, the previous velocity is used instead of the Profile Velocity. This caused a jump in speed after a few servo cycles. This was fixed.



Chapter 12. 01.01.08.00 B00

Component	Version
Firmware Version	01.01.08.00 13Feb2014B00
Communication Server	AA[5]: 1.1.7.8
PAL	81
ESI	0x00103F6 V07

12.1 Details

Subject	Details
Includes the following internal release	01.01.07.20B01 01.01.07.19B01 01.01.07.19B00 01.01.07.17B00 01.01.07.16B08
Differences between SR register and CAN status register (0x1002)	The SR is reflected in object 0x1002 and should provide the same value at the same cycle. The bug was that the 0x1002 was updated a cycle after the SR . This was fixed. Values are updated at the same cycle.
Motion continues when switching from profile velocity or profile torque to profile position	When switching motion modes (0x6060) from profile velocity (or profile torque) to profile position, the drive continues to coast according to the last Velocity set-point. This was fixed. The drive now decelerates when switching modes, using Quick Stop Deceleration.
AN[2] read wrongly via EtherCAT	The object 0x2205.2 which reflects AN[2] reported wrong value. This was fixed. The value of AN[1] & 0x2205 SI 2 are similar.
AN[2] : Analog input 2 indication	The analog input 2 can be retrieved via the AN[2] command. The expected values are from 0 to 4095 which are correlated to 0 to 3V. An offset can be used via AS[2] . This Offset has a range from -4096 to + 4095.
XA[3] : Current exceeded time protection	This variable sets the protection where the current exceeds the peak limit range but has not reached the “short” threshold. When the current is within this range for XA[3] time, the motor will be disabled.



Subject	Details
	For compatibility reason setting XA[3] to 0 will automatically be changed to the default 600 µSec.
XA[2]: Hot plug In protection	<p>When the motor is freewheeling at high speed, enabling the motor (namely hot-plug) may damage the drive.</p> <p>XA[2] limits the freewheeling speed which is allowed when enabled.</p> <p>By default the value is set to 5, indicating that when the servo is enabled, the motor speed must be lower than 5 electrical angles/sec, for the servo to be enabled.</p>
Gold Tuba drive	The Gold Tuba drive was added
Includes the following internal release	01.01.07.16B08
Gold Bassoon new power rated version	Bassoon 3/200 was added
Elmo commands via SDO interface (CoE)	<p>The 0x30xx object allows addressing of Elmo Legacy Commands. This interface is now open for all Elmo users.</p> <p>This is done by using the two letters legacy method to determine the command offset starting from object 0x3000.</p>
Asymmetric current limits via 0x2005	<p>Object 0x2005 can be used to address various functionalities of the drive.</p> <p>By setting GS[12]=3, the host can set asymmetric torque limits to the current controller. The low 16 bits are used for the low limits and the high 16 bits to the high limit. The limits affect the current command derived from the velocity controllers to the current controller.</p> <p>Units are 1/1000 of rated torque.</p>
Changing default of IL[6] & IL[7]	Digital Inputs default was modified to "Ignore" instead of General purpose.



12.2 Bug fixes 1.1.8.0B00

Bug	Details
EMCY messages are not transmitted	The Object 0x2F21 is used for the EMCY mask when CANopen is employed. The Object was initialized properly causing the EtherCAT interface to block all EMCY. This was fixed.
Wrong "In Torque" calculation	The "target reached" and the MS command value in Profile Torque mode were calculated based on an incorrect variable. This was fixed. The calculation is now based on the current feedback.
Target Torque missed resolution	The integer calculations of the Target Torque were truncated to the lower value, sometimes causing a wrong set-point to the Current profiler.
FF[4] : phase advance in 1:1:1 mode	The phase advance was not working properly when switching to 1:1:1 mode (XA[5]). This was fixed.
Touch Probe position	When using touch probe the reported position did not consider the User Unit factor (e.g. FC[]). This was fixed.
Halls indication in EASII do not match the recorder indication	The Halls are indicated via the SR command. The EASII recordings of the Halls differ from the SR indication. This bug was fixed. The indications are now identical.
Motion did not fault when serial feedback disconnected	When absolute feedback was disconnected from the drive, an incorrect reading of velocity caused a very high speed indication which was not correlated to the actual speed. This was fixed by ignoring the reading in cases of CRC and by reading the filtered speed. This behavior is only relevant when the Fault Option Code object 0x605E is set to 1 or 2 (Stop to 0 speed and then disable).
Position Offset in Homing	During Home Attain, the final Homing position differed from the desired position offset.
Quick Stop command wrongly handled	During the Quick Stop request the initial position for the profiler stop is calculated. This calculation is sometimes incorrect causing undesired motor movement. This was fixed.
STO error during drive power up	After powering up the drive, when the Dynamic Brake is used (VH[1]>0), the STO diagnostic procedure indicates a failure in the STO mechanism.



Chapter 13. 01.01.07.15 B00

Component	Version
Firmware Version	01.01.07.15 01Jan2014B00
Communication Server	AA[5]: 1.1.7.5
PAL	80
ESI	Elmo ECAT DriveGcon_v70

13.1 Details

Subject	Details
	01.01.07.14B14 01.01.07.14B08 01.01.07.14B00
EMCY mask object modification	Object 0x2F20 is used to mask unrequired EMCY messages for the CANopen. Bit 1: is now defined as “mask motor on EMCY” and will prevent the EMCY when the Motor On fails. Bit 2: is now defined as “mask un-configured PDO EMCY” and will prevent EMCY messages when the drive receives rPDO which are not mapped.
Phase advance to stepper closed loop	Phase advance (FF[4]) allows increasing the speed by advancing the stepper angle relative to the motor speed. This mode is now applicable to UM=6 open loop as well. The phase is advanced relative to the velocity command.
Improving the speed response in Stepper Modes	The speed modification of the stepper mode was limited to 30 electrical degrees in a single cycle. This was now improved to 60 electrical degrees, allowing faster response.
Resetting absolute position	TW[18] command is used in the Absolute Sensor to reset the single turn absolute position reading to a desired value. For: <ul style="list-style-type: none">• Tamagawa & Panasonic sensors only 0 is permitted• EnDAT2.2 any value is permitted• Setting others sensors will result in an error code (EC=99)
SSI 2 via digital output 3, 4	SSI sensor can be read via digital inputs 3 and 4 as single ended sensor (sensor ID: 33). This configuration allowed the handling of 3 sensors in parallel. Note that a single absolute sensor can be read by the drive



Subject	Details
Auto Focus mode	The Auto Focus is an Elmo proprietary additional sensor that can be read via the drive digital inputs If error occurs when using this special mode, then bit 8 in object 0x2085 will be set.
JP[4] is enabled at Motor Off	JP[4] sets a jogging trajectory to the socket profiler. The socket profiler can be activated regardless whether the motor is enabled or disabled. Setting JP[4]=x ; BG[4] causes the socket profiler to jog. Note: more variables are required for socket profiler activation.
Addition of Gold Falcon drive	The Gold Falcon drive was added to the Gold line.
Nikon sensor support 20 bits	The Nikon sensor single turn now supports 20 bits. This was added to the 16 bits multi turn resulting in a 36 bits sensor (20 + 16)

13.2 Bug fixes 1.1.7.15B00

Bug	Details
Floating point resolution	Some fractional values were not calculated correctly, e.g. 0.99999 resulted in 0.1 instead of 1. Now the fractional values has been improved to correct the results.
Quick stop transition from Fault state	When the drive is in fault state and a Quick Stop is requested, the state indication was wrong. This was fixed. The drive ignores requests to Quick Stop when in Fault state.
Target reached (MS=0) after mode of operation switch	When switching from any mode to cyclic mode, the target reached indicated a wrong value. MS reported 0 where 2 is expected. This was fixed.
User Program size limited to 16K	The user program size is now enabled to 32K.
Set BG in motor off modified the Motion Status	Setting BG command when the motor is disabled modified the MS from 3 to another value. The MS value must remain 3, when the motor is disabled. This was fixed. NOTE: When motor is disabled, the Begin Motion trigger in EASII can be activated via the BG .
Double Torque in CST mode	In Cyclic Torque Mode (CST) the torque command is doubled relative to the Torque set point. The torque is now corrected.
Object 0x6074 (Torque Demand value) returns	The Torque Demand reported a value to the



Bug	Details
wrong value	Current Controller derived only from the profiler output. This was fixed. The Torque Demand now reports the summation of all the Torque inputs e.g. Torque external reference.
DV[2] reported wrong speed command	DV[2] reported a value to the Velocity Controller derived only from the profiler output. This was fixed. DV[2] now reports the summation of all the Velocity inputs e.g. Velocity external reference.
Interpolated Position Mode	When the IP active bit was set to 0 by the host the motion continued. This was fixed. Drive now stops the motion.
Motion persisted when switching Profile Velocity to Position mode	When switching from Profile Velocity to Profile Position mode, the motion continued with the Profile set point.
NRZ sensors do not transmit EMCY when in error	If an NRZ sensor e.g. Panasonic sensor, is in error state, the motor enable command fails without a proper emergency message. This was fixed. A message is now transmitted in such occasions.
In Cyclic Torque Mode first torque is always 0	When switching to Cyclic Torque mode the initial cycle uses zero torque set point, causing the torque command to drop its value regardless of the set point (object 0x6071). This was fixed and the initial cycle now uses the desired set point.
In 1:1:1 mode (XA[5]) calculates the incorrect speed	When using the 1:1:1 control mode the velocity is calculated incorrectly. This was fixed.
Default IP address	The IP address default values were reported incorrectly This was fixed. The default values are now shown as follows: IP: 192.168.1.49 (AA[10]) Subnet mask: 255.255.255.0 (AA[11]) Default GW: 192.168.1.1 0 (AA[12])
0x1003 sub index 0 is static	Object 0x1003 reports up to the last 16 EMCY messages. Sub index 0 of this object is used to indicate the number of EMCY that were reported. The value was set to 16 regardless of the actual number. This was fixed.



Bug	Details
0x603F was not updated via ECAT interfaces	Object 0x603F reports the last EMCY. The object was not updated correctly nor transmitted to the host. This was fixed.
Current continued when the torque command is 0	When using acceleration feed forward (FF[1]), sometimes the control loop received a torque command without having any target torque. This was fixed.
Sine signal launching (TW[80])	When sine movement is initialized, and both signals of the sine are 0, the profiler continues the motion at constant speed. This was fixed.
Change SD during MO=1 double caused a jump	When SD is changed during Motor On, an incorrect deceleration is calculated, causing a jump in motion. This was fixed.
Analog sensor jumped when LD is requested	After the LD command is requested, if the sensor is analog sine/cosine sensor or Hiperface sensor, the following motor enable request will cause the motor to jump. This was fixed.
Hiperface position reading after LD is requested	When the Hiperface sensor is used, and the LD command is requested, the position reported is incorrect. This was fixed.
HL[2] negative values	HL[2] parameter sets the threshold to the velocity feedback. Negative values were permitted. This was fixed.
ST[N] did not work properly	The ST[N] is use to stop the N profiler. The N refers to the Main, Superimpose, and phasing or socket profilers (1 to 4 respectively). Previously ST stopped all four profilers. This was corrected so that ST[4] stops the socket profiler and ST[1] or ST stops the other profilers.
Wrong behavior at Low speed and High acceleration.	Excluding the main profiler, the other profilers; Superimpose, Phasing and socket profilers behave erratically when at low speed and high acceleration. This was fixed.



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