Kollmorgen Automation Suite

KAS v5.00 Release Notes

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Valid for AKD2G Firmware Version: 02-16-00-003
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Part Number: 959720

For safe and proper use, follow these instructions.
Keep for future use.

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Table of Contents

1 Introduction

Welcome to Kollmorgen Automation Suite (KAS) v5.00!

This release contains new features and many improvements.

This document is to help existing users understand the differences between this v5.00 release and the KAS v4.05 release.

If you are new to KAS, we recommend you start with other documents (e.g., the Installation Guide).

This document has these sections:

- "What's New in KAS v5.00" (→ p. 5) - This section is an overview of new features.
- "What's Changed in KAS v5.00" (→ p. 14) - This section identifies how this release may affect some older projects.
- "What's Fixed in KAS v5.00" (→ p. 12) - This section is a list of issues corrected in this release.
- "Known Issues" (→ p. 17) - This section lists issues we are aware of and may include methods for avoiding or working around them.
- "Installation" (→ p. 21) - This section has system requirements and provides firmware, software, and hardware information.

1.1 Digital Signatures

The KAS-IDE Installer and the executables are digitally signed to protect the integrity of these files and identify the distributor of the software components.

The digital signature appears as part of the file properties.

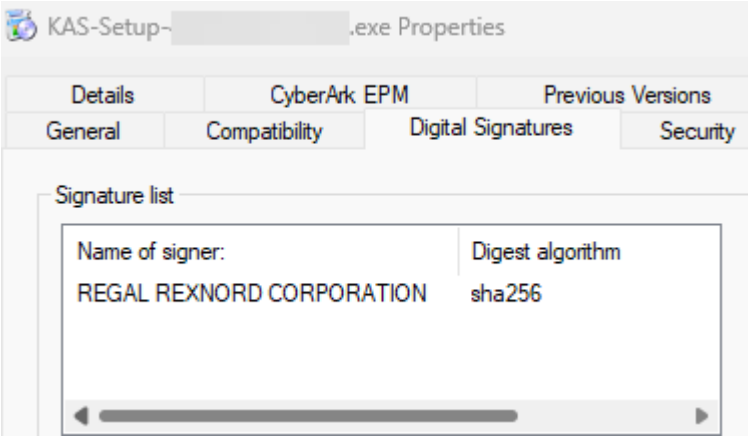


Figure 1-1: Example: KAS Setup Properties Digital Signature

TIP

- Kollmorgen recommends you visit Kollmorgen Support Network (KSN).
- KSN is an online resource providing access to Kollmorgen firmware, software, and documentation downloads.

NOTE

- This PDF contains links to the KAS help system and works best when read from within the KAS-IDE installation directory.
- The links to content do not work if the PDF is located somewhere other than `(install directory)\Kollmorgen\Kollmorgen Automation Suite 5.00.x.y\Help`.

2 What's New in KAS v5.00

These new features have been implemented for this release.

2.1 PCMM2G

2.1.1 PCMM2G Axis Scalable Controller Models and Axis Count Enforcement

The KAS v5.00 release introduces support for new PCMM2G controller models.

- The new models:
  - Have varying axis count capabilities.
  - Utilizes secure software feature licensing mechanism implementation.
- The licensed features are digitally signed and validated on the controller.
  - This ensures the applications operate within the capabilities of the selected controller model.
  - See Controllers for available models.

Capabilities

- The controller validates the configured axis count and generates diagnostics when the application exceeds the licensed limit.
  - See Controller Error and Alarm Descriptions - Error #45.
- Virtual and Simulated axes are excluded from the axis count validation checks.
  - This allows development and testing without consumed licensed capacity.
- The PCMM2G Web server Home page shows the controller model name and licensed axis count.

Important Notes

- Controller model capabilities are configured during the manufacturing process.
- Upgrading a PCMM2G to a higher axis count model after shipment requires coordination with the manufacturing facility.
- Customers and distributors should contact their local Kollmorgen support representative for assistance with controller model upgrades or configuration changes.

2.1.2 Controller Backup Restore Across PCMM2G Models

The controller backup / restore workflow has been enhanced with axis count compatibility validation when restoring backups between PCMM2G controller models.

Capabilities

- When restoring a backup from a higher axis-count model to a lower axis-count model, a warning appears to alert the user of the potential limitation.
- The restore operation is still permitted, but the application does not run if the configured axis count exceeds the controller's supported axis count.
- Clear warning messaging is provided to help users identify and resolve any axis count incompatibilities.

Benefits

- Reduces the risk of deployment issues when migrating applications between controller models.
- Helps identify axis count compatibility issues before commissioning.
- Improves the backup and restore experience through clearer validation and user guidance.

2.1.3 Optimized Code Generation Support

The KAS v5.00 release adds support for optimized code generation on PCMM2G controller.

This enables PLC applications to be compiled into optimized machine code for improved runtime performance and execution efficiency.

Capabilities

- Supports compiling, downloading, and executing PLC applications using optimized code generation on PCMM2G controllers.
- Integrates optimized code generation directly into the KAS project build process.
- Generates controller-specific machine code that is executed directly by the KAS Runtime.

Benefits

- Improves application execution performance for computationally intensive PLC programs.
- Enables more efficient use of controller resources for complex machine automation applications.
- Provides enhanced scalability for applications with demanding control, motion, or data processing requirements.

Limitations

- Optimized code generation is not supported for applications containing Action Blocks (POU).

Important Notes

- Optimized code generation must be enabled in the project compilation settings.
- Applications should be validated after enabling optimized code generation to confirm expected performance and behavior on the target controller.
- See Set the Compilation Options for details and limitations.

2.1.4 PxMM to PCMM2G Migration Support: Transfer Retained Variables Values from AKD PDMM / PCMM Controller to PCMM2G

The KAS v5.00 release adds support for transferring retained variable values from an existing controller and storing them as initialization values within a KAS project.

The feature is designed to simplify migration from legacy AKD PDMM and PCMM controllers to PCMM2G controllers while preserving critical machine data.

Capabilities

- Transfers retained variable values from an existing controller into a KAS project.
- Preserves machine-specific settings, calibration data, configuration parameters, production counters, and other retained application data during controller migration.
- Allows transferred values to be downloaded to the replacement controller and restored through a Cold Start operation.

Benefits

- Simplifies migration from legacy AKD PDMM and PCMM controllers to PCMM2G.
- Reduces commissioning time by eliminating the need to manually re-enter retained application data.
- Minimizes the risk of configuration errors during controller replacement.
- Helps ensure continuity of machine operation following controller upgrades or replacements.

Important Notes

- Retained variable values are imported as project initialization values and can be downloaded to the replacement controller.
- A Cold Start is required on the replacement controller to restore the transferred values.
- See Retain Variables > Copy Retained Variables Values to Init Value from another Controller.

2.1.5 Security Improvements

The PCMM2G Web server now uses strengthened security mechanisms for handling credentials.

- Passwords are processed using salted cryptographic hashing before being stored in internal flash memory.
- Credentials are protected using industry-standard, one-way encryption techniques.
  - They cannot be viewed or recovered, even by Kollmorgen.
  - This significantly improves protection against unauthorized access.

2.1.6 Linux OS Security and Stability Enhancements

The Yocto platform used to build the PCMM2G OS distribution has been updated from 4.0.31 to 4.0.35.

Key Improvements

- Numerous security patches across core components (e.g., binutils, curl, glibc, OpenSSL, Python3, etc.) help protect the platform from known vulnerabilities.
- Kernel updates within the Linux Ken5.15 series, improving overall system stability.
- Updated the Python runtime from 3.10.19 to 3.10.20.
- See Release notes for Yocto-4.0.35 (Kirkstone).

Together, these changes:

- Strengthen the overall platform security.
- Reduce exposure to vulnerabilities.
- Establish a more robust foundation for long term product support.

2.2 Recipes

The KAS v5.00 release introduces a comprehensive Recipe Management framework.

- This is used in PLC applications to create, store, modify and apply machine recipes at runtime using standardized PLC function block.
- This new capability provides a structured and scalable approach to:
  - Managing machine configuration data.
  - Reducing engineering effort.
  - Simplifying machine setup, product changeovers, and configuration management.

Key Benefits

- Simplifies machine configuration and parameter management.
- Reduces machine commissioning and product changeover time.
- Minimizes engineering effort by eliminating the need for application changes when switching between product configurations.
- Improves consistency and repeatability across machines and production runs.
- Enhances operational flexibility by allowing operators to quickly select and apply predefined machine settings.

Capabilities

- Create, save, load, update, and delete recipes programmatically from PLC applications.
- Store machine configuration and production parameters in reusable recipe files.
- Apply recipe values at runtime without modifying application code.
- Integrate recipe operations with HMIs, SCADA systems and external applications.
- Supports common PLC data types, including enumerations, bitfields, arrays, and structures for flexible configuration design.
- Supports parameter validation (limits and error handling) for safe application.
- Track recipe-related operations through audit and history logging.

Limitations

These items are not supported:

- CSV, ST, and automatic file format detection.
- Recipe file upload/download and application via KAS-IDE.

See Also

- Recipes
- Runtime-based Recipe Management through Function Blocks
- KAS Recipes User Manual

2.3 Action Blocks for Improved PLC Application Organization

The KAS v5.00 release introduces a new feature called Actions Blocks.

- This feature provides a more flexible way to organize and manage PLC application logic within a program.
- Actions Blocks allows control application engineers to:
  - Break large applications into smaller, logical sections.
  - Improve code readability, maintainability, and development efficiency.
- See Action Blocks (POU).

Key Benefits

- Organize large programs into reusable and manageable logic blocks, while sharing the parent POU's variables and execution context.
- Simplify navigation and maintenance of complex PLC applications.
- Reduce limitations associated with large program implementations by distributing logic across multiple action block units.
- Improve project readability and collaboration among development teams.

Capabilities

- Provides an additional 64KB of executable code.
- Can be created directly from the Project Explorer > PLC > Programs context menu and appear under their parent program.
- Runtime execution works seamlessly on supported targets, including PCMM2G and Simulator.
- Full debugging support is available, including breakpoints, single-step execution, and variable monitoring.
- Import and export Actions Blocks between projects to simplify code reuse.

Typical Use Cases

- Reusing common control logic across multiple projects.
- Organizing large state-machine implementations into logical sections.
- Simplifying maintenance of applications that exceed 64 KB program size constraints.

Limitations

- Actions Blocks creation is **not support** for Sequential Function Chart (SFC) programs.
- Action Blocks creation is **not supported** for sub-programs or UDFBs.

2.4 KAS Web server - Improved User Data Management

The Web server User Data tab has been enhanced to support seamless upload and download of files to and from controller's internal flash memory.

- These usability improvements simplify handling of recipe files and other user data, reducing manual steps and improving workflow efficiency.
- These improvements:
  - Simplify recipe administration.
  - Support more efficient integration with HMI, MES, and other external systems.

2.5 AKD PDMM and PCMM Controllers: End-Of-Life Announcement

Support for the AKD PDMM and PCMM controllers has been discontinued in KAS v5.00 and later.

The decision to retire AKD PDMM and PCMM controllers is based on these factors:

Hardware Component Obsolescence

- Key hardware components are entering or have reached end-of-life.
- Long-term manufacturing and support is no longer sustainable.

Cybersecurity and Regulatory Compliance

- The existing AKD PDMM and PCMM hardware platform cannot adequately support upcoming EU and US cybersecurity regulations.
- Requirements (e.g., secure boot, secure software updates, modern cryptography, and long-term vulnerability management) cannot be fully addressed on this legacy architecture.

Successor Architecture: PCMM2G

- PCMM2G is the designated successor to AKD PDMM and PCMM controllers.
- It provides:
  - A modern hardware platform.
  - Increased use of open-source components.
  - A richer software and development ecosystem.
- PCMM2G enables future KAS feature development, improved maintainability, and regulatory compliance.

2.5.1 Customer Impact and Migration Guidance

Continued Use of Existing Systems

- Customers may continue operating AKD PDMM and PCMM controllers in existing systems.
- Migration to PCMM2G may be planned and executed according to customers schedules and validation requirements.

Last Supported KAS Version

- KAS v4.05 is the final supported firmware release for AKD PDMM and PCMM controllers.

Ongoing Maintenance Support

- Kollmorgen will continue to provide critical bug-fix patches for KAS v4.05.
- Maintenance updates are limited to critical defects, stability issues, and essential fixes.
- No new features or functional enhancements will be added for AKD PDMM and PCMM platforms.

2.5.2 Project Compatibility and Upgrade Behavior

- Projects created with KAS v4.05 or earlier, targeting AKD PDMM or PCMM controllers are automatically updated to PCMM2G when opened in KAS v5.00 or newer.
  - When opening such projects, KAS-IDE prompts the user to back up the existing project.
- Customers are strongly advised to create and preserve backups of all existing projects to ensure recovery capability and traceability during migration validation.
- See Migrate from a PxMM to a PCMM2G Controller for step-by-step migration instructions.

2.6 Kollmorgen Drives Firmware Support

2.6.1 AKD Firmware

The KAS-IDE and KAS Runtime have been tested with Production Release v1-25-00-000.

2.6.2 AKD2G Firmware

The KAS-IDE and KAS Runtime have been tested with Production Release v02-16-00-003.

- The corresponding ESI files and firmware packages are now bundled with the KAS-IDE installation package to ensure seamless integration and configuration.

Firmware Packages for EtherCAT Backup/Restore

- KAS-specific firmware packages supporting EtherCAT backup and restore are available for download here: AKD2G Firmware for KAS.

2.6.3 KED Firmware

The KAS-IDE and KAS Runtime have been tested with Production Release v02-16-00-003.

- The corresponding ESI files and firmware packages are now bundled with the KAS-IDE installation package to ensure seamless integration and configuration.

Firmware Packages for EtherCAT Backup/Restore

- KAS-specific firmware packages supporting EtherCAT backup and restore are available for download here: KED Firmware for KAS.

2.7 New PLC Functions

2.7.1 PLC Application Profiling via Stopwatch Function Block

A new function block, Stopwatch, has been added to assist with PLC application performance profiling.

- The Stopwatch can measure execution times for:
  - Programs
  - Subprograms
  - UDFBs
  - Loops and other logic segments.
- Supported across all execution contexts (FBD, FFLD, ST).
- The Stopwatch supports START, STOP, and RESET actions and reports detailed timing statistics including last value, count, minimum, maximum, mean, and standard deviation.
  - All statistical values can be cleared using STOPWATCH_RESET option.
- See Stopwatch.

3 What's Fixed in KAS v5.00

These issues have been fixed for this release.

Defect	Description
TP-99528	**KAS-IDE Embedded Web Browser does not Connect to Simulator if Open Prior to Entering Simulation Mode** • **Issue**: The embedded web browser in KAS-IDE did not automatically connect to the Simulator when the browser window was opened before entering Simulation Mode. • This prevented simulator-hosted web content from being displayed. • **Resolution**: Enhanced KAS-IDE embedded web browser connection handling to automatically refresh and connect to the Simulator when entering simulation mode.
TP-99437	**The Express Setup View in the KAS-IDE Embedded WorkBench Configuration Window Incorrectly Displays "Tuning" Option while KAS Project is Running** • **Issue**: The Tuning option was incorrectly displayed in the Express Setup view when a project is running. • This option is not applicable in this operating state and should have been hidden. • **Resolution**: Updated the Express Setup view to correctly suppress the Tuning option when a project is running, ensuring that only valid configuration options are presented to the user.
TP-99397	**Watch Window Grayed Out when Opening Certain Legacy Projects with “Save as New Project” Option** • **Issue**: When opening certain legacy KAS projects using the "Save as New Project" option, the Watch Window could become grayed out and unavailable after the project open/save workflow completed. • This prevented users from monitoring variables and using debugging tools within the KAS-IDE. • **Resolution**: Corrected the project open/save workflow to ensure the Watch Window remains enabled and fully functional when opening legacy projects with the "Save as New Project" option, restoring normal variable monitoring and debugging capabilities.

TP-98704	**Previous Coordinated Motion Move is Aborted When Starting Next Buffered Move.**
	• **Issue**: Under specific coordinated motion sequences using Buffered mode, a subsequent coordinated move command could unexpectedly abort the previous active coordinated move.
	  • This was introduced in KAS v4.02 and affected applications that queue multiple coordinated moves for continuous motion execution.
	• **Resolution**: Corrected the coordination motion buffering logic to ensure that queued buffered moves are executed in sequence without aborting active move.
	  • This restores the expected behavior for coordinated motion applications that rely on buffered command execution.

Defect	Description

BZ-8608	**KAS-IDE Window Scaling Improvements on High-Resolution Monitors**
	• **Issue**: On systems with 4K or other high-resolution monitors and Windows scaling greater than 100%, some KAS-IDE windows and UI elements did not scale consistently.
	  • This could cause UI elements to appear incorrectly sized or positioned, leading to reduced readability and usability.
	  • This issue primarily affected environments with high-DPI configurations and mixed-resolution, multi-monitor setups.
	• **Resolution**: The KAS-IDE window scaling logic was improved to better support high-DPI monitors and Windows scaling settings above 100%.
	  • KAS-IDE windows and controls now render more consistently, improving readability and overall usability on modern monitor configurations.
	• **Known Limitations**: If Windows scaling or monitor resolution changes after KAS-IDE has already started, text in certain views may not resize proportionately, though it typically remains readable.
	  • This behavior can occur when moving the KAS-IDE between monitors with different resolutions (e.g., docking and undocking a laptop or moving to a different monitor on a mixed-resolution, multi-monitor setup).

BZ-10865 / TP-98506	**KAS-IDE Fails to Import ESI Files with External File References**
	• **Issue**: The KAS-IDE failed to import ESI files that contained references to additional files (e.g., DiagFile, DictionaryFile or ImageFile16X14 entries).
	  • As a result, some vendor-provide ESI files could not be successfully imported.
	• **Resolution**: Updated the KAS-IDE ESI file import handling to support ESI files that include DiagFile, DictionaryFile or ImageFile16X14 entries.
	  • An ESI file containing these optional entries can now be imported successfully, improving compatibility with a broader range of EtherCAT devices.

BZ-11362	**MLAxisDriveNumber Returns Incorrect Drive Axis number** • **Issue**: In KAS v4.05, MLAxisDriveNumber returned an incorrect drive axis number after being inadvertently changed from a Function Block to a Function. • Similar issues affected MLAxisWriteParam, MLAxisWriteBoolParam, and MLAxisReadBoolParam function blocks, resulting in application compile errors or unexpected outputs depending on usage. • **Resolution**: All affected items have been reverted to Function Blocks, restoring their intended behaviors and resolving the compile issues and incorrect outputs.

BZ-11363	**KAS-IDE Crash During PLCopen / Pipe Network Axis Unit Conversion for Certain User-Unit Configurations**
	• **Issue**: A KAS-IDE crash could occur during PLCopen or Pipe Network axis user-unit to drive-unit (PIN/POUT) conversion under specific axis configuration scenarios.
	  • Certain user-unit per revolution values exposed an unhandled divide-by-zero condition in the internal conversion logic, causing the KAS-IDE to terminate.
	• **Resolution**: Additional validation and divide-by-zero protection were added to the axis unit conversion logic.
	  • Internal calculations now safely handle edge-case configurations are now handled safely, preventing crashes.

4 What's Changed in KAS v5.00

4.1 AKD PDMM and PCMM to PCMM2G Migration Support: Legacy Project Compatibility Options

A compatibility dialog box has been added to assist with opening legacy AKD PDMM and PCMM controller's KAS projects.

- The system automatically detects legacy conditions and presents relevant configuration options for migration.
- This supports enabling non-compliant syntax support and/or single-core compatibility mode, or use of modern defaults.

Key Benefits

- Reduces migration effort and eliminates trial-and-error.
- Improves first-time project compatibility success.
- Increases transparency of configuration settings.
- Minimizes support needs and migration-related issues.
- Accelerates adoption of PCMM2G and newer KAS versions.

See:

- KAS-IDE Project File Compatibility
- Migrate from a PxMM to a PCMM2G Controller

4.2 Security Enhancement: Authentication for Project Downloads from KAS-IDE

To improve controller security and prevent unauthorized modifications, project downloads from KAS-IDE to a PCMM2G controller now require authentication, by default.

- When connecting to a controller, users must login using the existing Web server username and password before they can download, start, or stop a project.
- A new option on the Security tab allows unauthenticated KAS-IDE connections.
  - This option is disabled by default and must be explicitly enable by the system owner or machine builder.
  - When authentication is disabled, a clear warning message is shown to indicate the reduced security posture.

4.2.1 Key Features

- Credentials are prompted to Connect to Controller when authentication is enabled.
- Download the Project and Device Control actions (e.g., Project Start and Stop) remain locked until login succeeds.
- Invalid credentials block the operation with a clear error message.
- Online monitoring and non-download workflows (e.g. EtherCAT scanning) are unaffected.

Limitations

- Changes to the web server login credentials apply only to new KAS-IDE connections.
  - Any existing KAS-IDE connections with controller remain active.
- Project can currently be started and stopped from the KAS-IDE Embedded Web Browser without authentication.

4.3 Copy Retained Variable Values to Init Values (structs and arrays)

The existing Copy Retained Variable Values to Init Value feature has been enhanced to support array and structure retained variables.

- The runtime values for complex data types can be saved directly as Init Values in the KAS project.
- This enhancement makes it easier to preserve commissioning, tuning, and calibration data for applications that rely on arrays or structured retain variables.
- By saving these values into the project, applications become more deterministic and easier to deploy across cold starts, controller replacements, or new machines.
- The workflow remains unchanged.
  - While connected to the controller and running a valid application, you can copy retained runtime values to Init Values directly from the Variables view.
  - The updated Init Values are saved in the project and take effect after recompiling and downloading.
- See Retain Variables.

4.4 Internal Defines Display in KAS-IDE

A new Internal Defines (Constants) node is now available under the PLC node in the Project Explorer.

- This read-only view provides direct visibility into global system constants used by the controller platform.
- See Internal Defines.

Key Benefits

- Provides convenient, in-IDE access to system constants, removing the need to search documentation or installation directories.
- Encourages consistent and correct usage of platform-wide constants across all projects.
- Imporoved code readability and maintenance.

5 Known Issues

These are the known issues for this release.

Defect	Description
TP-99473	Intermittent KAS-IDE crashes after monitor disconnection or display configuration changes.
TP-99413	KAS-IDE crashes when loading certain user-installed Windows fonts during project creation (Crash# 646).
TP-98695	PCMM2G Recovery from USB flash drive image failed to restore the controller first time.
TP-98694	High CPU load and missed PLC cycles on PCMM controller due to large number of PDO-mapped variables.
TP-98693	MC_MoveAdditive that compiled single-core compatibility mode doesn't work properly.
TP-98686	Subsequent AKD2G firmware upgrades fail if EtherCAT network is not rescanned.
BZ-11336	Unable to read / write PLC variables mapped to manually added PDO entries in EtherCAT device MDP-generated PDOs.
BZ-11320	KAS-IDE Crashes during new project creation when installed in non-ASCII directory paths.
BZ-11309	PROFINET GSDML file does not work with Siemens TIA Portal V20.
BZ-11267	KAS-IDE O-Scope window update rate slows down with 7 (or more) traces.
BZ-11265	Intermittent PCMM shared directory connection failure at power-on w/ static IP.
BZ-11258	KAS-IDE Program Cycle view drag-n-drop stops working after moving multiple programs.
BZ-11252	Deleting variables with KVB option causes **[[MODBUS-S]:(...) Unknown Symbol** compile errors.
BZ-11247	KAS-IDE crash reports are sometimes sent with zero file size crash dump and no user information.
BZ-11241	O-Scope PLCProgExecTime trace displays incorrect value with multi-core controllers if PLC execution time is close to EtherCAT cycle time.
BZ-11169	Multiple **MC_MoveLin/Circ** calls with velocity blending and short path distance may exceed specified deceleration rate.
BZ-11143	KAS-IDE has long delay when mapping variables to Safety PDOs.
BZ-11139	KAS-IDE PLCopen digitizing axis w/ multi-turn has incorrect user units.
BZ-10458	PLC Variable Creation Wizard don't show the mapping.
BZ-10451	Cannot start application with direct Ethernet connection.
BZ-10419	Drag-n-drop variable from UDFB instance to watch window does not display the value.
BZ-10275	PCMM2G controller bus time not synchronized with DC master time.
BZ-9928	ESI file list not updated when good and bad ESI files added at the same time.
BZ-9835	Non-ASCII characters in projects not handled properly in the KAS-IDE.
BZ-9834	Import/export from/to non-ASCII file names does not work correctly.
BZ-9359	PDO objects not defined in the object dictionary (or 24-bit size) do not work properly with MLSmpXxxxx(...) functions.
BZ-8659	PLCopen move blending with jerk. If the blending move is commanded with an unreachable velocity, the move may abruptly decelerate to the final position within one sample, exceeding the specified deceleration rate.

Defect	Description
BZ-8645	Adding ESI file after scanning results in no selected PDOs.
BZ-8643	EtherCAT scan fails after a AKD drive firmware download failure with a wrong EtherCAT topology.
BZ-8636	Recovered projects don't recover imported libraries (.KAL files).
BZ-8605	**MLInitTrig** does not configure the AKD Capture engine correctly for a negative edge trigger.
BZ-8588	EtherCAT network restore fails to recover from drive firmware download failure.
BZ-8565	There is no compile error when user has too many retain variables.
BZ-8212	Modified cam file is not downloaded when forcing an Online Change.
BZ-7985	KAS-IDE disconnects from the controller after several days.
BZ-7728	KAS-IDE animation with non-matching project versions.
BZ-6240	KAS-IDE always reports the project has been modified.

6 Known Limitations

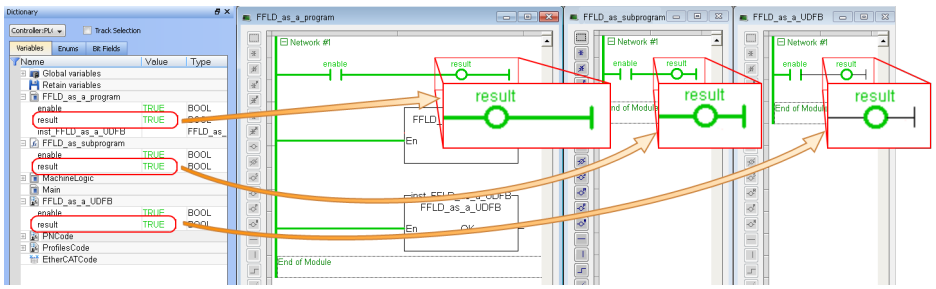
- RGM is not supported.
- The undo action is not possible for all operations.
- Find/Search/Replace function:
  - Search and Replace function is not supported in Pipe Network.
  - Search and Replace for HMI are supported only with local <CTRL+F>.
- In SFC programs, breakpoints can only be set on transitions (i.e., in First Level diagram) and not in steps or conditions.
  - With a breakpoint set on transition, you can debug cycle by cycle.
- SFC programs are limited to 64k byte size due to the bytecode engine.
  - If the SFC program exceeds 64k bytes, the compiler generates a warning message: **Warning: limit is 64KB!**.
- Plugging the EtherCAT cable to the OUT port is not detected and is not reported as an error.
- PLC Variable mapping:
  - Each PLC variable can be mapped to an EtherCAT IO and exclusively to either:
    - External driver.
    - Modbus for an HMI.
    - Controller Onboard IO.
  - Example: A PLC variable cannot be mapped to Modbus and Controller Onboard IO at the same time.

6.1 EtherCAT Limitations

- **Cabling**: Plugging the EtherCAT cable to the OUT port is not detected and is not reported as an error.
- **External EtherCAT Configuration**: If an external EtherCAT XML file needs to be used, the file `AKD-for-KAS.xml` should be used as the ESI file for AKD.
  - This ensures proper operation with KAS.
  - The file is located here: `C:\Users\<user.name>\AppData\Local\Kollmorgen\KAS\Astrolabe\ESI\`.

6.2 FFLD Animation Limitation

- The FFLD animation for UDFBs has a limitation, where the ladder rung is not fully animated.
  - Example: In a program and sub-program, the rung is fully animated, where in the UDFB it is not fully animated.



6.3 PCMM2G Limitations

The PCMM2G with EtherCAT configured for a 4kHz (250usec) Cycle Time may experience cycle jitter or a missed receive frame (A38) in +24hrs of operation with:

- 16 (or more) Axes.
- Large memory usage from PLC variables.

Detect Excessive Cycle Jitter

- Use the IDE Oscilloscope to monitor the TraceTimes **CycleJitter** channel.
- Check the controller logs for an EtherCAT Warning message with **Cycle jitter:[xx]us...**.

Reduce Cycle Jitter

- Reduce the PLC memory size by:
  - Delete unused programs, functions, and UDFBs.
  - Delete unused variables.
    - See the Find and Replace tab - **Find Unused Variables** (#3).
  - Size arrays appropriately to meet to their actual maximum usage.

7 Installation

Use this information for KAS installation:

7.1 System Requirements

These are the minimum system requirements for the KAS-IDE.

Component	Description
Supported Operating Systems	• Microsoft Windows 11 (64-bit). • Microsoft Windows 10 (32-bit or 64-bit). • For optimal performance, verify the operating system is fully updated with the latest patches.
Connectivity	• 1 Ethernet port or WiFi connectivity, at either 100 MB or 1 GB. • See Note #2.
Display	• WXGA+ (1440 x 900) or higher-resolution monitor with 24-bit, 16.7M colors. • See Note #1.
Hard Disk	Free space required on hard disk: • 32-bit hard disk: 16GB • 64-bit hard disk: 20GB
Network	Internet connection for downloading and updating WebView2 Runtime.
Processor	Intel Pentium M or equivalent processor at 1.5GHz or greater.
RAM	• 32-bit: 1GB RAM • 64-bit: 2GB RAM or greater • Recommended for complex applications.
Software	• Microsoft Edge WebView2 Runtime (Evergreen) version 133.0.3956.59 or newer. • .NET Framework 4.8.1 or newer.
Web Browser	• A modern web browser is required to access the controller Web server and online help. • We recommend Microsoft Edge.

NOTE

1. Better results are achieved with OpenGL and 3D cards.
2. A 100MB or 1GB network is required to allow the KAS-IDE to Runtime communication to work in all conditions.
   The AKD WorkBench AutoTuner and Scope both require 100MB of bandwidth to function properly.

TIP

- See Connect Remotely about the ports used by the KAS.
- The ports may need to be opened to support connecting to a controller from an external network.

7.2 Firmware and Software Requirements

KAS is comprised of several software components integrated together to provide a complete motion system.

We recommend these component software versions for best performance and compatibility.

7.2.1 Computer Software

Software Images	Recommended Version
KAS-IDE	5.00.0

7.2.2 Firmware Requirements

7.2.2.1 Controller Firmware

This is the controller firmware to use with this KAS release.

Description	Type	Name
PCMM2G	KAS Runtime	KAS Runtime for PCMM2G (KAS-PCMM2G-Cx-08) **NOTE** This firmware filename is the same for all PCMM2G models.

- Supported drives include:
  - AKD2G, AKD-P (Motion Tasking Drive or Position Indexer)
  - AKD-C, AKD-N
  - Kollmorgen Essentials Drive
  - MKD-C
- The recommended firmware version is dependent on the drive's model and revision.
- Controller firmware is available at Kollmorgen Support Network.

7.2.2.2 Drive Firmware

NOTE

- AKD firmware is available at AKD Firmware.
- AKD2G firmware is available at AKD2G Firmware.
- Kollmorgen Essentials™ Drive firmware is available at: Kollmorgen Essentials Drive (KED) Firmware.

This is the drive firmware to use with this KAS release.

Description	Type	Name
AKD Drive Firmware	AKD-N	AKD-N-xxEC-01-25-00-000.i00
AKD Drive Firmware	AKD-P	AKD-P-NBxC-01-25-00-000.i00
AKD Drive Firmware	Resident	R_00-00-71-000.i00
AKD2G Drive Firmware	Non-Safety (FS1)	AKD2G-S-(E)A-02-16-00-003.i00s
AKD2G Drive Firmware	Safety Certified (FS2 and FS3)	• Drive Firmware: AKD2G-S-(E)-A-02-12-00-105.i00 • SMM Firmware: R_02-07-000
Kollmorgen Essentials Drive (KED) Firmware	All Kollmorgen Essentials Drive Models	KED-S-(M)-(A)-02-16-00-003.i00s

7.2.2.3 Firmware Compatibility

7.2.2.3.1 F106 Error

An F106 error may appear after upgrading the AKD firmware.

- This indicates that non-volatile parameters are not compatible between the two firmware versions.
- Resetting the drive to the default memory values using Parameter Load will fix this error.

7.2.2.3.2 FBUS.PARAM05 Bit 5

`FBUS.PARAM05` bit 5 should be set to 0 (zero); this is the default value.

- This prevents an error E33 and EtherCAT not starting.
- If it is not set to 0 (zero), the rotary switch of the drive is used to set the EtherCAT Station Alias.
  - This can conflict with the address that KAS is writing.

7.2.3 Mandatory Resident Firmware for AKD

- The recommended resident firmware for all AKD family drives is v71.
- To reliably support the EtherCAT firmware download, resident firmware must be at least v35.
  - Contact Kollmorgen for any AKD Drive with resident firmware lower than v35.
    See "Support and Services" (→ p. 39).

7.2.4 Kollmorgen Visualization Builder (KVB)

7.2.4.1 Software Images

Software Images	Recommended Version	Download
KVB	2.40 [2.43.17.0]	Kollmorgen Visualization Builder IDE

7.2.4.2 Installers

The installation package contains both the IDE and runtime for TxC panels.

The KVB .ZIP file contains two different installers:

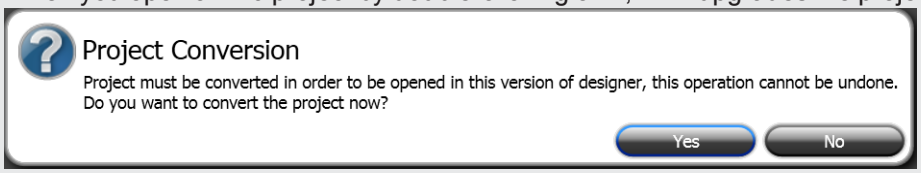
Install Type	File	Notes
New installation	setup.exe	This is the complete package which will install all prerequisite components.
Runtime	RuntimeSetup.exe	This package contains runtime software for TxC panels.

7.2.4.3 Hardware / Software

Hardware / Software	Versions
Operating Systems	Windows® 10, Windows 11
Controllers	PCMM2G
HMI	All Kollmorgen AKI panels

NOTE

The KAS-IDE creates projects using KVB 2.0.
When you open a v2.0 project by double-clicking on it, KVB upgrades the project to v2.40 [2.43.17.0].



IMPORTANT

KVB 1.2 projects are not compatible with KVB 2.x.
An attempt to open a v1.2 project with v2.x results in an alert message.
If accessing v1.2 projects is important, we recommend keeping both versions installed on your system.
New panels automatically use KVB 2.0.

TIP

Contact Kollmorgen if you have a KVB 1.2 project that needs to be updated in KVB 2.x.
See "Support and Services" (→ p. 39).

7.2.5 BBH Safety Software

These BBH Safety software and firmware minimum versions are required to operate with these products and KAS-IDE software:

- AKD2G
- AKT2G-IO-SDI-04-000
- AKT2G-IO-SDO-04-000
- PCMM2G

Contact BBH for the latest software and firmware release information and details.

Description	Type	Minimum Version
SCU-1-EC FSoE Master firmware	Firmware	03.00.00.62
SafePLC2 safety programming software	Software	1.8.3.10256

7.3 KAS Controls

KAS Runtime is verified compatible with these hardware models:

IMPORTANT

- Controller model capabilities are configured during the manufacturing process.
- Upgrading a PCMM2G to a higher axis count model after shipment requires coordination with the manufacturing facility.
- Customers and distributors should contact their local Kollmorgen support representative for assistance with controller model upgrades or configuration changes.

NOTE

- The maximum axis count specified for each controller model applies only to physical axes.
  - This includes both PLCopen and Pipe Network axes.
- This limit **does not** apply to virtual axis or digitizing axis.

Notice

- The PCMM2G firmware image is common across all available controller models.
- Model-specific functionality and axis count limits are determined by the controller configuration and licensing, not by separate firmware images.

NOTICE

- The PCMM2G firmware image is common across all available controller models.
- Model-specific functionality and axis count limits are determined by the controller configuration and licensing, not by separate firmware images.

Controller	Description	Model Number	Main Characteristics
PCMM2G Essentials	1.5GHz Quad-core	PCMM2G-C2-08-008-00-000	• 0 to 8 axes. • 2nd Generation, Multi-Axis Controller
PCMM2G	1.5GHz Quad-core	PCMM2G-C2-08-024-00-000	• 0 to 24 axes. • 2nd Generation, Multi-Axis Controller
PCMM2G	1.5GHz Quad-core	PCMM2G-C2-08-064-00-000	• 0 to 64 axes. • 2nd Generation, Multi-Axis Controller

Controller	Description	Model Number	Main Characteristics
PCMM2G (Non-preferred)	1.5GHz Quad-core	PCMM2G-C2-08-008-00-000	• 0 to 24 axes. • 2nd Generation, Multi-Axis Controller **NOTE** • This is a non-preferred legacy model. • Do not use this model with new applications.

7.4 Allow Simulator to Use HTTP Communication

The Simulator needs to open HTTP ports to allow communication.

The first time Simulator is run, Windows prompts you to block or unblock the KAS application.

Allow access to all of these requests to ensure correct behavior.

The Simulator uses Port 80 for the web server.

Simulator automatically assigns an available free port to the webserver to listen to the incoming HTTP requests if another service is using Port 80.

See Start the KAS Simulator.

8 AKD Firmware Notes

- The AKD Firmware v1-16 (and later) supports a new drive parameter, ECAT.LEGACYREV, to enable a backwards compatibility RevisionNo (0x2).
  By default, AKD-Series drives ships with the latest production release firmware, with ECAT.LEGACYREV = 1, for backwards compatibility.
- The AKD Firmware v1-16 (and later) supports a 3rd FMMU if the ECAT.LEGACYREV = 0.
  The advantage of using a 3rd FMMU is 30% performance improvement with the KAS-IDE embedded Workbench communication.
- EtherCAT RevisionNo: EtherCAT provides an optional field to identify a vendor specific RevisionNo for a device and a field to specify the logic to CheckRevisionNo for device compatibility.
  - The KAS-IDE and Runtime supports multiple RevisionNos for the same Vendor/ProductID.
  - In previous KAS versions, the EtherCAT initialization would generate a device mismatch error, if the device's RevisionNo and the project's RevisionNo did not match.
  - If the device's ESI file does not specify the CheckRevisionNo logic then, by default, the KAS Runtime allows any RevisionNo at EtherCAT initialization.
  - The IDE allows you to map physical devices to project devices with different RevisionNos and keep the project device configurations.
- Limitation: The CheckRevisionNo options **equal or greater than** (EQ_OR_G, LW_EQ_HW_EQ_OR_G, and HW_EQ_LW_EQ_OR_G) are not supported.
  They are evaluated as **equal** (EQ).

9 Third-party EtherCAT Device Support

This section summarizes the known capabilities and limitations with KAS support for third-party EtherCAT devices.

See:

- Add and Configure Third Party EtherCAT Devices in the online help for directions on integration.
- Set Up FSoE Master and an AKD2G with SafeMotion Monitor if integrating a different third-party FSoE master into a KAS system.

9.1 Requirements

- All third-party devices must have an ESI file containing the device information, features, and settings.
- MDP devices must support automatic module discovery at EtherCAT network scan.

9.2 Limitations

- KAS has limited support for third-party drives that follows the CANopen DS-402 standard.
  - See Configure a Third-party Drive about configuration restrictions.
  - Contact your Kollmorgen representative for details.
- MDP fieldbus gateway devices that require MDP gateway profiles, implemented to the ETG 5001.3 specification, may not be discovered.
  - This includes gateway protocols: CAN, CANopen, DeviceNet, Interbus, and IO Link.
- PDO upload is not supported.
- Manual slot configuration is not supported with MDP devices.
- 3rd-party drivers for network gateway devices are not included.

10 Kollmorgen Documentation Legal Information

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- Kollmorgen Essentials Cable
- Kollmorgen Essentials Drive
- Kollmorgen Essentials Motor
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- AKD2G
- AKD PDMM
- AKM
- AKMA
- AKME
- AKMH
- BLM
- Cartridge DDR
- DDL
- DDR
- Goldline
- Kollmorgen Automation Suite
- KAS
- Kollmorgen Visualization Builder
- KVB
- MKD
- Motioneering
- P8000
- PCMM
- PCMM2G
- PowerMax
- Servostar
- SafeMotion Monitor
- SMM
- TBM
- TBM2G
- WorkBench

10.3 Kollmorgen Patents

Any of these Kollmorgen patents may be used and/or identified in Kollmorgen products, firmware, and/or software.

- US Patent 2017/0211640 (method and apparatus for power saving, fail-safe control of an electromechanical brake), patent pending.
- US Patent 8,154,228 (Dynamic Braking For Electric Motors).
- US Patent 8,214,063 (Auto-tune of a Control System Based on Frequency Response).
- US Patent 8,566.415 (Safe Torque Off over network wiring).
- US Patent 10,374,468 (System and method for improved DC power line communication).
- US Patent 10,520,050 (Method and apparatus for power-saving, fail-safe control of an electromechanical brake).
- US Patent 10,840,696 (Method and apparatus for limiting the output voltages of switch mode power supplies).
- US Patent 16,247,478 (method and apparatus for limiting the output voltages of switching mode power supplies), patent pending.

10.4 PCMM2G

The PCMM2G's Operating System (OS) and boot loader (U-Boot) are based on free and open-source software.

- The individual copyright notices, license texts, and disclaimers of warranty for the software components are located in the controller, under the directory: /usr/share/common-licenses/.
  - For more information about accessing the PCMM2G's files, see SSH Login to a Controller.
- The OS, bootloader, and their software component's source codes including modifications, copyright notices, license texts, disclaimers of warranty, and the compilation scripts to build the OS image are available at the Kollmorgen webpage PCMM2G Operating System (OS) License Sources.
- The OS image and its corresponding sources file is identified by an "OS-Sources" designator, followed by its version number: OS-Sources-x.xx.x.xxxxx.
- The compilation scripts and sources file are available at the Kollmorgen webpage PCMM2G Operating System (OS) Build Sources.
- See PCMM2G - File Naming Conventions in the KAS online help.

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- CANopen: CAN in Automation (CiA).
- DRIVE-CLiQ: Siemens Aktiengesellschaft.
- EnDat: Dr. Johannes Heidenhain GmbH.
- EtherCAT und Safety over EtherCAT: Beckhoff Automation GmbH.
- EtherCAT: Beckhoff Automation GmbH.
- EtherNet/IP Kommunikationsstack: Rockwell Automation.
- EtherNet/IP: ODVA, Inc.
- Ghostscript: Artifex Software, Inc. (unter der AGPL Lizenz verbreitet).
- HIPERFACE DSL: SICK AG.
- HIPERFACE: SICK AG.
- HUMMEL: HUMMEL AG.
- Hysol: Hysol Huawei Electronics Co,.LTD.
- Instapak: Sealed Air Corporation.
- INTERCONTEC: INTERCONTEC Pfeiffer Industrie-Steckverbindungen GmbH.
- LOCTITE 640: Henkel AG & CO. KGAA.
- LOCTITE: Henkel AG & CO. KGAA.
- Modbus: Schneider Electric USA, Inc.
- MOLYKOTE: DDP Specialty Electronic Materials US 9, LLC.
- Mylar: DUPONT Teijin Films U.S.
- P3-topax: Henkel KGaA.
- PHOENIX CONTACT: Phoenix Contact GmbH & Co. KG.
- PLCopen: An association registered with the Chamber of Commerce in The Netherlands (Reg. 40240111).
- PROFINET: PROFIBUS Nutzerorganisation e.V.
- Scotch-Weld 2214: 3M Company.
- sercos: Sercos International E.V.
- SIMATIC: Siemens Aktiengesellschaft.
- SpeedTec: Liqui-Moly GmbH or TE Connectivity Industrial GmbH.
  If SpeedTec is used as a lubricant, it belongs to Liqui-Moly GmbH.
  If SpeedTec is used as a connector, it belongs to TE Connectivity Industrial GmbH
- Teflon: The Chemours Company FC, LLC.
- Viton: The Chemours Company FC, LLC.
- Windows: Microsoft Corporation.

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Library	Product	License
7-zip	https://www.7-zip.org/	7-zip - License
Adafruit core graphics library	https://github.com/adafruit	https://github.com/adafruit/Adafruit-GFX-Library/blob/master/license.txt
Adafruit display library	https://github.com/adafruit	https://github.com/adafruit/Adafruit-ST7735-Library/blob/master/README.txt
Arduino Map function	http://creativecommons.org	http://creativecommons.org/licenses/by-sa/3.0/
C++ Mathematical Expression Library	http://www.partow.net/programming/exprtk/index.html	MIT License
civetweb: Embedded C/C++ web server	https://github.com/civetweb/civetweb	MIT License
CoreSight Library	http://www.apache.org	http://www.apache.org/licenses/LICENSE-2.0
curl software library		curl license
DockPanelSuite	http://sourceforge.net/projects/dockpanelsuite/	https://opensource.org/licenses/MIT
EtherNet/IP Communication Stack		Software Distribution License
FatFs	https://github.com/abbrev/fatfs	https://github.com/stm32duino/FatFs/blob/master/Licence.md
FileHelpers	http://sourceforge.net/projects/filehelpers	https://opensource.org/licenses/MIT
Font Awesome	https://fontawesome.com	https://fontawesome.com/license/free
Ghostscript	https://ghostscript.com/index.html	AGPL
Google Fonts Roboto Condensed	http://www.apache.org	http://www.apache.org/licenses/
GSL - Guideline Support Library	https://github.com/Microsoft/GSL	https://github.com/Microsoft/GSL/blob/master/LICENSE

Library	Product	License
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jsoncpp software		jsoncpp License
log4net	http://logging.apache.org/log4net/	http://www.apache.org/licenses/LICENSE-2.0
LVGL	https://github.com/lvgl/lvgl	https://github.com/lvgl/lvgl/blob/master/LICENCE.txt
LwIP	https://savannah.nongnu.org	https://savannah.nongnu.org/projects/lwip/
mbed Microcontroller Library	http://www.apache.org	http://www.apache.org/licenses/LICENSE-2.0
mbed TLS	http://www.apache.org	http://www.apache.org/licenses/LICENSE-2.0
Microsoft Edge WebView2	https://developer.microsoft.com/en-us/microsoft-edge/webview2	Microsoft Edge WebView2 Runtime LICENSE
MigraDoc	http://www.pdfsharp.net/migradocoverview.ashx	http://www.pdfsharp.net/MigraDoc_License.ashx
Mongoose Library	https://github.com/cesanta/mongoose/tree/	Mongoose license
MVVM Light Toolkit	https://github.com/lbugnion/mvvmlight	https://galasoft.ch/license_MIT.txt
OpENer EtherNet/IP	https://github.com/EIPStackGroup/OpENer	http://eipstackgroup.github.io/OpENer/de/d7e/license.html
PdfSharp	http://www.pdfsharp.net/migradocoverview.ashx	http://www.pdfsharp.net/PDFsharp_License.ashx
Qt Framework	https://www.qt.io/product/framework	terms of the LGPL3
Qwt project	http://qwt.sourceforge.net/	Qwt
SharpZipLib	https://github.com/icsharpcode/SharpZipLib	https://github.com/icsharpcode/SharpZipLib/blob/master/LICENSE.txt
SNMP		http://www.net-snmp.org/about/license.html
SQLite	https://system.data.sqlite.org	https://system.data.sqlite.org/index.html/doc/trunk/www/copyright.wiki
U-Boot	http://www.denx.de/wiki/U-Boot	GNU General Public License 2.0
Zed Graph	http://sourceforge.net/projects/zedgraph/	https://opensource.org/licenses/LGPL-2.0
Zlib software library	https://www.zlib.net/	Zlib License

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