ThermoFisher
SCIENTIFIC

AutoScript TEM

Release Notes

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Contents

1 Introduction

1.1 Purpose

This document describes the Thermo Scientific AutoScript TEM software releases.

1.2 Audience and scope

These release notes are intended for users of the Thermo Scientific AutoScript TEM software and those who manage the installation of Thermo Scientific AutoScript TEM software on the microscope computer.

This document describes the content of the most recent and few historic AutoScript TEM releases.

1.3 Hardware Requirements

The AutoScript TEM Server software must be installed on the Microscope PC.

The AutoScript TEM Client software can be installed on either the Microscope PC, or on the Support PC or Network PC

For successful installation and use, the AutoScript TEM Client software requires the following hardware specifications:

Specification	Minimum	Recommended
CPU	Intel Core i5 with at least 4 cores, or an equivalent AMD processor.	
RAM	16 GB	
Disk	20 GB HDD	100 GB SSD for fast loading and saving.
Graphics	*No special requirements*	
Operating System	Windows 10 (64 bit)	

1.4 System, software and configuration compatibility

The following tables show the compatible microscope software versions, the preferred AutoScript TEM software versions per microscope software version, and the system configuration compatibility.

Although the AutoScript TEM software is backward compatible with a limited range of microscope software versions, some of the new features and improvements may be available only for the most recent supported microscope software version(s).

1.4.1 Compatible microscope software versions per AutoScript TEM version

It is recommended to use the highest supported version of AutoScript TEM.

AutoScript TEM	Titan	Talos	Remarks
1.0.0	3.4 - 3.7	2.4 - 2.7	
1.1.0	3.4 - 3.9	2.4 - 2.9	
1.2.0	3.6 - 3.11	2.6 - 2.11	
1.3.0	3.6 - 3.13	2.6 - 2.13	
1.4.0	3.10 - 3.15	2.10 - 2.15	
1.5.0	3.11 - 3.16	2.11 - 2.16	
1.6.0	3.12 - 3.17	2.12 - 2.17	
1.7.0	3.13 – 3.18	2.13 – 2.18	
1.8.0	3.14 – 3.19	2.14 – 2.19	
1.9.0	3.15 – 3.20	2.15 – 2.20	
1.10.0	3.16 – 3.21	2.16 – 2.21	
1.11.0	3.17 – 3.22	2.17 – 2.22	
1.12.0	3.18 – 3.23	2.18 – 2.23	

1.4.2 Compatible microscope software versions per AutoScript TEM version

AutoScript TEM	Titan	Talos	Remarks
1.0.0 and later	Spectra 200	F200X	
	Spectra 300	F200S	
	Spectra Ultra	F200i	
		F200E	
		F200C	
		L120C	
1.6.0 and later	Krios G4		

1.4.3 Compatible cameras for AutoScript TEM

Camera	AutoScript TEM	Remarks
Ceta 16M / -D / -M / -S	1.0.0 and later	
Ceta Speed Enhancement (Ceta-2)	1.0.0 and later	
Falcon 3EC	1.2.0 and later	
Falcon 4	1.2.0 and later	Bottom-mounted (BM) and filter-mounted (EF)
Falcon 4i	1.2.0 and later	Bottom-mounted (BM) and filter-mounted (EF)
EF-CCD	1.6.0 and later	

Note The compatible cameras may not all be supported by the compatible microscope software versions. See the TEM Server Release Notes for a definitive list of supported cameras.

1.4.4   Compatible cameras and filters for AutoScript TEM

Energy filter	AutoScript TEM	Remarks
Selectris / Selectris-X	1.3.0 and later	
Gatan Energy Filters	1.3.0 and later	Only in embedded configuration.

Note   The compatible energy filters may not all be supported by the compatible microscope software versions. See the TEM Server Release Notes for a definitive list of supported energy filters.

1.4.5   Compatible detectors for AutoScript TEM

Detector	AutoScript TEM	Remarks
HAADF	1.0.0 and later	
BF/DF Retractable	1.0.0 and later	
BF/DF Retractable Mk2	1.0.0 and later	
Panther STEM BF-S/DF-S	1.0.0 and later	
DF4	1.6.0 and later	

Note   The compatible detectors may not all be supported by the compatible microscope software versions. See the TEM Server Release Notes for a definitive list of supported detectors.

2   AutoScript TEM 1.12.0

2.1   Mandatory and breaking changes

None identified.

2.2   New Features

Feature	Description
Bi-prism control	Allows user to control all bi-prisms through scripting: BiPrism.name BiPrism.voltage BiPrism.rotation BiPrism.recover() BiPrism.enable() BiPrism.disable() BiPrism.is_enabled BiPrismRotation.is_available BiPrismRotation.rotate(angle) BiPrismRotation.Value BiPrismRotation.limits BiPrismVoltage.value BiPrismVoltage.limits microscope.optics.aperture_mechanisms.bi_prisms.get_available_bi_prisms() microscope.optics.aperture_mechanisms.bi_prisms.get_bi_prism()
Python upgrade	AutoScript Python environment is upgraded to version 3.11. All Python packages are up-to-date. Installation upgrades to new version. Package manager creates Python 3.11 environments.
Beam stopper control	User can control beam stopper through scripting: microscope.optics.beam_stopper.insertion_state microscope.optics.beam_stopper.halfInsert() microscope.optics.beam_stopper.retract()
Enhanced Toolkit	Added new functions in AutoScript Toolkit: ● Draw point - draw a single or multiple point to the given image. ● Draw rectangle - draw a single or multiple rectangles to the given image. ● Select point - select a single or multiple points by clicking on an image. ● Select rectangle - select a single or multiple areas by click-dragging on an image. ● Average images - create an average of the list of images.

3 AutoScript TEM 1.11.0

3.1 Mandatory and breaking changes

Breaking changes relative to the preceding version 1.10.0:

Following focus controls removed:

- microscope.optics.focus
- microscope.optics.defocus
- microscope.optics.reset_defocus() and replaced by new focusing group.

3.2 New Features

Feature	Description
Python packages upgrade	Python packages upgraded to their latest versions
New focusing group	Added finer controls for focusing: microscope.optics.focusing.tem.focus microscope.optics.focusing.tem.defocus microscope.optics.focusing.tem.reset_defocus() microscope.optics.focusing.stem.objective.focus microscope.optics.focusing.stem.objective.defocus microscope.optics.focusing.stem.objective.reset_defocus() microscope.optics.focusing.stem.intensity.focus microscope.optics.focusing.stem.intensity.defocus microscope.optics.focusing.stem.intensity.reset_defocus()
New function to save EMD file	Allows user to save EMD file through AutoScript
Saving StemFeature	Allows user to create Velox StemFeature and save it to opened or created EMD file through AutoScript.

3.3 Improvements

Change	Description
Pycharm upgraded	Upgraded PyCharm to version 2024.1.5.
Extended documentation	Reference Manual now includes new materials for Vision toolkit features.

3.4   Solved Issues

Issue	Description
Setting scan_field_of_view out of limit now returns an error -	Setting scan_field_of_view out of limits no longer silently fails The system now returns an error when attempting to set values beyond limits.
Setting for pixel cutoff for OptiSTEM fixed	Both pixel cutoff and spatial cutoff have the correct default value set. OptiSTEM nsettings are now corretly applied.
Beam tilt units are now correct	Units for beam tilt are now documented in reference manual
Auto comma correction error fixed	Auto comma correction can now be used also on thermionic source systems without throwmig error

4 AutoScript TEM 1.10.0

4.1 Mandatory and breaking changes

Breaking changes relative to the preceding version 1.9.0:

● OptiSTEM autofunction default settings are dependent on system configuration.
● Availability of the EFTEM mode is now checked when setting EFTEM mode to true.

4.2 New features

Feature	Description
Python packages upgrade	Python packages upgraded to their latest versions

4.3 Improvements

Change	Description
Improved reference manual	Fulltext search added to the reference manual.
Aperture mechanism retrievement	Aperture mechanism can be retrieved using an ID.
Improved metadata documentation	Metadata units corrected, various other documentation improvements.
Fixed copy buttons in reference manual	Copy button in documentation examples no longer copies the last example on the page.

5 AutoScript TEM 1.9.0

5.1 Mandatory and breaking changes

None identified.

5.2 New features

Feature	Description
Jupyter community extension	Community extensions are now automatically installed with the product, auto-complete extension enabled by default.
Stem image metadata extended with segment information	The name of the segment from which the image originates is stored in the custom section of the image metadata under the key "StemSegment".
Feature licensing	AutoScript's features can be licensed individually. Active licenses can be viewed in AutoScript server's UI.

5.3 Improvements

Change	Description
New function for converting an EMD file to a newer file version	Allows opening old EMD files in AutoScript.
Improved installation	All installation files are now signed.

6 AutoScript TEM 1.8.0

6.1 Mandatory and breaking changes

Breaking changes relative to the preceding version 1.7.0:
- Segmented STEM and Advanced STEM acquisitions now preserve input segment order for output images.
- Adorned Image no longer saves end-of-file metadata when saving to tiff format.

6.2 New features

Feature	Description
OptiStem+	The user can execute the OptiStem+ (A2B2) autocorrection procedure via scripting.
Package manager – update environments	The user can upgrade AutoScript packages in manually created environments.
Advanced STEM acquisition	STEM acquisition now has new advanced parameters. The user can turn off the auto-blanker and choose acquisition regions to speed up acquisition.

6.3 Improvements

Change	Description
Improved EMD compatibility	AutoScript now documents the version of Velox that can open EMD files created by AutoScript.
Package manager – license configuration	The user can configure which licenses are available in Package manager. Non-free packages can now be installed.

6.4 Solved Issue

Issue	Description
Move to Pixel in STEM and Diffraction	Move to Pixel functionality is now available for all modes.

7 AutoScript TEM 1.7.0

7.1 Mandatory and breaking changes

Breaking changes relative to the preceding version 1.6.0:

- Removed PyQt from AutoScript Python distribution.

7.2 New features

Feature	Description
Package Manager redesigned	Modernized UI of the Package Manager, unified UI with Snippets and Autoscript Runner.
Python environment management	Package Manager can now be used to create and remove Python environments.

7.3 Improvements

Change	Description
PySide added to AutoScript Python distribution	AutoScript now includes PySide Python package as the recommended Python binding for the Qt user interface framework. Consequently, PyQt components have been removed from the Python distribution. Existing scripts that depend on PyQt need to be adjusted to use PySide.
Python upgraded	Python version upgraded to 3.8.17+2, all packages updated to the newest version.

8   AutoScript TEM 1.6.0

8.1   Mandatory and breaking changes

Breaking changes relative to the preceding version 1.5.0:

- Removed support for EMPAD.
- Detectors not mentioned in assigned detector enums are no longer supported.
- Aperture structure now consists of 3 arguments (name, type, diameter) instead of just 2 (type, diameter).

8.2   New Features

Feature	Description
Krios G4 support	Added support for all Krios G4 systems.
DF4 support	Added support for all DF4 detector.

8.3   Improvements

Change	Description
Added is_insertable property for detectors.	User can now verify whether the detector can be inserted/retracted. Unified property behavior with cameras.
Added name argument to Aperture structure	It is now possible to distinguish between multiple apertures of one type.
Improved error message for parameters out of range	STEM acquisition returns readable exception when dwell time is too low.

8.4   Solved issues

Issue	Description
Aperture selection is now always conclusive	Aperture selection is based on the new name property of the aperture. Non-circular apertures can now be selected.
Setting gain /offset on STEM detector segments fixed when the detector is disabled	Segment is now auto-enabled when setting gain/offset.
Segment gain/offset values do not match the Velox values	Added relative gain/offset property to all STEM detectors.

9 AutoScript TEM 1.5.0

9.1 Mandatory and breaking changes

Python 3.8 update and possible changes related to Python packages. Packages are updated, and some may be missing and need to be replaced.

9.2 New features

Feature	Description
Monochromator focus controls.	The `microscope.optics.monochromator.focus` property provides getter and setter for monochromator focus value.
Monochromator shift controls.	The `microscope.optics.monochromator.shift` property provides getter and setter for monochromator shift value.
Request script stop/pause in PyCharm editor.	New UI buttons in Pycharm editor can be used to create stop/pause requests. The requests are then processed by new API functions.
Request script stop/pause in AutoScript Runner.	New UI buttons in AS Runner can be used to create stop/pause requests. The requests are then processed by new API functions.
API functions to process pause/ resume/stop requests.	Following API functions detect requests made either in PyCharm or Runner. `service.autoscript.client:` ● `check_pause_requested()`: If pause is requested then pause the script execution until resume is requested. Do nothing when pause is not requested. ● `check_stop_requested()`: If stop is requested then stop the script execution. Do nothing otherwise. ● `is_pause_requested`: Returns `True` if pause is requested. ● `is_stop_requested`: Returns `True` if pause is requested.

9.3 Improvements

Change	Description
Migration to Python 3.8	AutoScript Python environment was upgraded to the Python 3.8 version. All packages included were upgraded as well.
PyCharm upgraded to 2022.3	PyCharm upgraded to the latest version at the time.
Some data structures (point, rectangle, etc.) can be replaced by lists or tuples when entering the data.	Improved usability with data structures in AutoScript. Selected data structures are now automatically converted at API boundaries.

9.4 Solved issues

Issue	Description
Client reconnect is now possible.	It is now possible to re-connect client to server. Repeatable calls of the connect function raise an error. Disconnecting the unconnected client raises an error. Repeatable calls of the disconnect function raise an error.

10   AutoScript TEM 1.4.0

10.1   Mandatory and Breaking Changes

None Identified.

10.2   New features

Feature	Description
Support for SmartStage	Both standard CompuStage and SmartStage are controlled by the same API section under `specimen.stage`.
Stage jogging	The `specimen.stage.start_jogging()` function starts moving the stage at a specified speed and vector. The `specimen.stage.stop_jogging()` function stops the movement.
Insertion state of aperture mechanisms	It is now possible to determine whether an aperture mechanism is inserted by accessing the `insertion_state` property of the `ApertureMechanism` object
Stage moving read-out	The property `specimen.stage.is_moving` returns True if the stage is moving (for example: jogging is in progress).
Support for PNG, BMP and GIF image formats	An `AdornedImage` object can be loaded and saved in other formats besides TIFF.
Vision Toolkit	The Vision Toolkit is an extension of AutoScript TEM, which provides various image processing functions. In addition to two powerful algorithms for pattern matching, you can use it to imprint a scale bar on captured images or adjust their histogram
Move to pixel with optics	While in TEM optical mode, the function `specimen.stage.move_to_pixel()` can optionally perform the move with beam shift.
OptiSTEM autofunction	The `auto_functions.run_opti_stem()` function executes the automatic routine for correcting C1 defocus and A1 astigmatism.

10.3   Improvements

Change	Description
Synchronous setting of beam acceleration voltage	The acceleration voltage change is now blocking - the call returns after the voltage change is complete.
Move to pixel safety	Moving to a pixel with a stage now uses safe stage movement.

10.4   Solved issues

Issue	Description
Setting beam diameter and convergence angle could produce errors	Beam diameter and convergence angle are now only available in the corresponding illumination mode.
Image thumbnail could have incorrect size	The thumbnail property of the `AdornedImage` object could return an image with the wrong size if the image was rectangular.
`Mi` and `Mh` magnifications listed incorrectly	`Mi` and `Mh` magnifications are now filtered out in STEM and imaging optical mode

11 AutoScript TEM 1.3.0

11.1 Mandatory and Breaking Changes

None Identified.

11.2 New features

Feature	Description
Offline mode	When AutoScript TEM is installed in offline mode, it does not control the real microscope, but provides its simulation. Usually, scripts are first developed and tested in the simulation before they are executed on the real microscope. New API functions in the `service.offline` group allow setting some of the simulation parameters.
Piezo stage support	It is now possible to control the movement of the piezo stage. Two modes are supported: ● Movement by a distance relative to the current position. ● Movement in a specified vector and at a specified speed.
Energy filter support	New functions in the `optics.energy_filter` group have been added to control parameters of the energy filter, such as energy shift, slit, mode and others.
Empad detector support	The `acquisition.acquire_stem_data()` function triggers image acquisition with a pixelating camera (Empad). The resulting images are stored on a dedicated PC.
Electron counting parameter for Falcon camera	An optional parameter has been added to the `CameraAcquisitionSettings` structure to specify whether an electron counted image should be generated during image acquisition. Applies only to Falcon cameras.

11.3 Improvements

Change	Description
Stage API moved	The API group `microscope.stage` is moved to `microscope.specimen.stage`. Functions in the original group remain functional, but print a deprecation warning to the console when called.
Packages updated	All Python packages in the AutoScript TEM Python distribution have been updated to their latest available versions as of 2022-May-22.
Scikit learn package	The machine learning package *Scikit learn* is now included in the Python distribution.

11.4   Solved issues

Issue	Description
Spot size clipping	On Talos systems, the spot size index is no longer clipped at high acceleration voltages .
Handling of Unicode characters in image metadata	Special characters like 'µ' are now preserved in image metadata during loading and saving of images
Switching objective lens mode	Switching objective lens mode to LM in STEM imaging now works correctly. So is switching to Lorentz objective lens mode in Mi sub mode.
Double lines in AutoScript Runner	AutoScript Runner produced each output line twice when the output log size exceeded a certain value.

12 AutoScript TEM 1.2.0

12.1 Mandatory and Breaking Changes

Breaking changes relative to the preceding version 1.1.0:

- The structures package (`structures.py`) no longer exports unintended internal functions and classes - `List`, `Optional`, `isclose`, `sha1`.
- Image metadata structures were adapted to comply with the Thermo Scientific metadata standard. As a result, several metadata properties changed their name or type.
- Two properties of the `AdornedImage` structure changed their visibility from public to protected:
  - `AdornedImage.raw_data` became `_raw_data`
  - `AdornedImage.raw_encoding` became `_raw_encoding`
- Members of structures that hold results of autofunction runs are now read-only:
  - `RunBeamTiltAutoFocusResults`
  - `RunStemAutoFocusResults`
  - `RunObjectiveAutoStigmatorResults`

12.2 New features

Feature	Description
Acquisition with Falcon camera	Functions for image acquisition newly support the Falcon 3EC and 4i cameras.
Advanced camera acquisition settings	Functions for image acquisition from cameras have received an advanced version that accepts additional parameters such as the read-out area or frame combining.
Lorentz mode support	AutoScript now enables to activate or deactivate the Lorentz objective lens mode for imaging.
Column valve control	New functions for determining the state of column valves, their opening and closing have been added under microscope.vacuum.column_valves group.
Auto coma correction autofunction	A new automatic routine to reduce comatic aberration has been added to microscope.auto_functions.
Screen position	The new microscope.detectors.screen.position property can be used to determine the screen position (inserted/retracted).
Integration with Health Monitoring	AutoScript now logs its usage data to Health monitoring database for the purpose of system troubleshooting.

12.3   Improvements

No (major) items.

12.4   Solved issues

Issue	Description
Python environment corruption fixed	Uninstalling AutoScript 1.0.0 or 1.1.0 could cause corruption of Python configuration files and render the python deployment manager tool (edm.exe) unusable.
Magnification and camera length behavior improved	Magnification available values now correctly return an empty list in diffraction mode. Camera length available values now correctly return an empty list in imaging.
Stage moves safety improved.	Functions for moving the stage now check whether the beta axis is present and whether the target coordinate is within stage limits before each move.
Image metadata inconsistency solved	Changes made to image metadata structures (AdornedImage.metadata) are now respected when saving the image to disk file as TIFF. The metadata structures are also properly initialized when a TIFF image is loaded from disk.

13 AutoScript TEM 1.1.0

13.1 Mandatory and Breaking Changes

Breaking changes relative to the preceding version 1.0.0:

● Accelerator state enumeration is removed.
● Changing optical mode no longer restores magnification when going back to the original mode (e.g. from TEM to STEM, then back to TEM).

13.2 New features

Feature	Description
Optics control extended with stigmators	Microscope.optics group got new properties to control condenser, diffraction, gun and objective stigmators.
Camera settings	DetectorCamera object newly exposes several properties of the camera, such as exposure time limits, insertion state, pixel size and others.
Objective auto stigmator	A new function that performs defocus and objective astigmatism correction.
STEM auto focus	A new function to automatically focus in STEM optical mode.
Beam tilt auto focus	A new function to automatically focus with the beam tilt method.
Basic support form EMD file format	AutoScript can read all images stored in an *.emd file from the Velox application
Simulator API enhancements	Objective lens mode property and the ability to turn on the accelerator was added to the microscope.simulator group.
PNG, BMP and JPG image formats can be loaded	AdornedImage.load() now supports PNG, BMP and JPG image formats.
Search box in reference manual	When typing text in the search box the navigation menu is filtered to show only entries containing that text.
Mathematical operators added to Point, StagePosition	It is now possible to perform mathematical operations with Point and StagePosition structures.
Jupyter notebook support	A sample Jupyter notebook with AutoScript TEM demonstration code can be opened from Start Menu.

13.3 Improvements

No (major) items.

13.4   Solved issues

Issue	Description
Ceta camera naming fixed	Function microscope.detectors.camera_detectors now returns a fixed string identifier "BM-Ceta" instead of a type-specific name "Ceta-16M", "Ceta-D" etc, which was sometimes incorrect.
Panther STEM acquisition depth no longer limited to 8-bit	Acquisition from Panther STEM BF-S/DF-S detector segments in not limited to 8-bit image depth anymore.
Illumination modes C2_OFF and C3_OFF can be set	On Titan and Spectra systems setting the illumination mode to C2_OFF or C3_OFF no longer causes an error.
Errors in Image Viewer plugin inside PyCharm editor	ImageViewer plugin in PyCharm gave error when images originated from a list or tuple.
Script header shown in AutoScript Runner was incomplete	When more than one comment style was used in a script header, the script description displayed in Runner was limited only to the first comment found

14   AutoScript TEM 1.0.0

14.1   Mandatory and Breaking Changes

This is the first release of the AutoScript TEM software. There are no mandatory or breaking changes relative to a preceding version.

14.2   New features

The first release of AutoScript TEM contains the following features:

Feature	Description
AutoScript Server	A service on the Microscope PC that accepts scripting commands and forwards them to the TEM Server. The AutoScript Server service features a simple User Interface to configure network settings and to manage the product license.
PyCharm IDE	A 3rd party Integrated Development Environment (IDE) from vendor JetBrains. The included version is Community Edition version 2019.2. For more information, see: https://www.jetbrains.com/pycharm/
Python Distribution	Enthought Python 3.6.12 runtime, including: A selection of 92 Python packages. See Python Package Versions on page 7. The Enthought EDM command line tool (edm.exe), which allows users to download additional Python packages from the Enthought Deployment Server. For more information, see: https://docs.enthought.com/edm/
TEM API Python package	A Python package that provides a collection of objects and functions, organized in a logical tree structure. The objects and functions read or change the state of the system or a subsystem, or perform an action. For a list of the available objects and functions, see: Supported AutoScript TEM Objects and Functions on page 29 on page 12.
Reference manual	The Reference Manual describes the TEM API functions and data structures. Part of the Reference Manual is the user guide, that contains a collection of code snippets to demonstrate the use of the API on specific microscope subsystems.
AutoScript Snippets	A tool with full-text search capability to manages a database of example code snippets.
AutoScript Runner	A tool with a simple user interface to run scripts outside the IDE. The AutoScript Runner can also display and archive script outputs.

Feature	Description
AutoScript Package Manager	A utility with a simple user interface to manage installed Python packages. The AutoScript Package Manager is built on top of the Enthought Deployment Manager (EDM), which uses a command line interface
AutoScript DAR	A tool to collect diagnostic data related to AutoScript TEM. The collected data helps Thermo Fisher Scientific Service Engineers to troubleshoot.

14.3   Improvements

This is the first release of the AutoScript TEM software. There are no improvements relative to a preceding version.

14.4   Solved issues

This is the first release of the AutoScript TEM software. There are no Solved Issues relative to a preceding version.

15 Supported AutoScript TEM Objects and Functions

The following functions and objects are available in AutoScript TEM:

15.1 Static API

microscope.acquisition.acquire_camera_image()	1.0.0 and later
microscope.acquisition.acquire_camera_image_advanced()	1.2.0 and later
microscope.acquisition.acquire_camera_series()	1.0.0 and later
microscope.acquisition.acquire_camera_series_advanced()	1.2.0 and later
microscope.acquisition.acquire_stem_data	1.3.0 and later
microscope.acquisition.acquire_stem_image()	1.0.0 and later
microscope.acquisition.acquire_stem_images()	1.0.0 and later
microscope.acquisition.acquire_stem_segment_images()	1.0.0 and later
microscope.acquisition.acquire_stem_segment_images_advanced()	1.8.0 and later
microscope.auto_functions.run_auto_coma_correction()	1.2.0 and later
microscope.auto_functions.run_beam_tilt_auto_focus()	1.1.0 and later
microscope.auto_functions.run_objective_auto_stigmator()	1.1.0 and later
microscope.auto_functions.run_opti_stem()	1.4.0 and later
microscope.auto_functions.run_stem_auto_focus()	1.1.0 and later
microscope.detectors.camera_detectors	1.0.0 and later
microscope.detectors.get_camera_detector()	1.0.0 and later
microscope.detectors.get_scanning_detector()	1.0.0 and later
microscope.detectors.scanning_detectors	1.0.0 and later
microscope.detectors.screen.insert()	1.0.0 and later
microscope.detectors.screen.measure_current()	1.0.0 and later
microscope.detectors.screen.position	1.2.0 and later
microscope.detectors.screen.retract()	1.0.0 and later
microscope.optics.acceleration_voltage.limits	1.0.0 and later
microscope.optics.acceleration_voltage.value	1.0.0 and later
microscope.optics.aperture_mechanisms.bi_prisms.get_available_bi_prisms()	1.12.0 and later
microscope.optics.aperture_mechanisms.bi_prisms.get_bi_prism()	1.12.0 and later

microscope.optics.aperture_mechanisms.C1	1.0.0 and later
microscope.optics.aperture_mechanisms.C2	1.0.0 and later
microscope.optics.aperture_mechanisms.C3	1.0.0 and later
microscope.optics.aperture_mechanisms.GetAvailable()	1.10.0 and later
microscope.optics.aperture_mechanisms.GetMechanism()	1.10.0 and later
microscope.optics.aperture_mechanisms.objective	1.0.0 and later
microscope.optics.aperture_mechanisms.SA	1.0.0 and later
microscope.optics.beam_diameter	1.0.0 and later
microscope.optics.beam_stopper.insert()	1.12.0 and later
microscope.optics.beam_stopper.insertion_state	1.12.0 and later
microscope.optics.beam_stopper.halfInsert()	1.12.0 and later
microscope.optics.beam_stopper.retract()	1.12.0 and later
microscope.optics.blank()	1.0.0 and later
microscope.optics.convergence_angle	1.0.0 and later
microscope.optics.deflectors.beam_shift	1.0.0 and later
microscope.optics.deflectors.beam_tilt	1.0.0 and later
microscope.optics.deflectors.GetAvailableDeflectors()	1.10.0 and later
microscope.optics.deflectors.GetDeflectorValue()	1.10.0 and later
microscope.optics.deflectors.gun_shift	1.0.0 and later
microscope.optics.deflectors.gun_tilt	1.0.0 and later
microscope.optics.deflectors.image_shift	1.0.0 and later
microscope.optics.deflectors.image_tilt	1.0.0 and later
microscope.optics.deflectors.SetDeflectorValue()	1.10.0 and later
microscope.optics.defocus	1.0.0 and later
microscope.optics.energy_filter.apertures.available_values	1.3.0 and later
microscope.optics.energy_filter.apertures.value	1.3.0 and later
microscope.optics.energy_filter.energy_shift.limits	1.3.0 and later
microscope.optics.energy_filter.energy_shift.value	1.3.0 and later
microscope.optics.energy_filter.high_tension_offset.limits	1.3.0 and later
microscope.optics.energy_filter.high_tension_offset.value	1.3.0 and later
microscope.optics.energy_filter.mode.available_values	1.3.0 and later

microscope.optics.energy_filter.mode.value	1.3.0 and later
microscope.optics.energy_filter.slit.insert	1.3.0 and later
microscope.optics.energy_filter.slit.is_inserted	1.3.0 and later
microscope.optics.energy_filter.slit.retract	1.3.0 and later
microscope.optics.energy_filter.slit.width.limits	1.3.0 and later
microscope.optics.energy_filter.slit.width.value	1.3.0 and later
microscope.optics.focus	1.0.0 and later
microscope.optics.focusing.stem.intensity.defocus	1.11.0 and later
microscope.optics.focusing.stem.intensity.focus	1.11.0 and later
microscope.optics.focusing.stem.intensity.reset_defocus()	1.11.0 and later
microscope.optics.focusing.stem.objective.defocus	1.11.0 and later
microscope.optics.focusing.stem.objective.focus	1.11.0 and later
microscope.optics.focusing.stem.objective.reset_defocus()	1.11.0 and later
microscope.optics.focusing.tem.defocus	1.11.0 and later
microscope.optics.focusing.tem.focus	1.11.0 and later
microscope.optics.focusing.tem.reset_defocus()	1.11.0 and later
microscope.optics.illumination_mode	1.0.0 and later
microscope.optics.intensity	1.0.0 and later
microscope.optics.is_accelerator_on	1.0.0 and later
microscope.optics.is_beam_blanked	1.0.0 and later
microscope.optics.is_eftem_on	1.0.0 and later
microscope.optics.is_xl_mode_on	1.10.0 and later
microscope.optics.lenses.alignments.x	1.10.0 and later
microscope.optics.lenses.get_available()	1.9.0 and later
microscope.optics.lenses.get_lens()	1.9.0 and later
microscope.optics.magnification.available_values	1.0.0 and later
microscope.optics.magnification.increase()	1.0.0 and later
microscope.optics.magnification.value	1.0.0 and later
microscope.optics.monochromator.focus	1.5.0 and later
microscope.optics.monochromator.shift	1.5.0 and later
microscope.optics.objective_lens_mode	1.0.0 and later

microscope.optics.optical_mode	1.0.0 and later
microscope.optics.paused_scan_beam_position	1.0.0 and later
microscope.optics.probe_mode	1.0.0 and later
microscope.optics.projector_mode	1.0.0 and later
microscope.optics.reset_defocus()	1.0.0 and later
microscope.optics.scan_field_of_view	1.0.0 and later
microscope.optics.scan_rotation	1.0.0 and later
microscope.optics.set_projector()	1.0.0 and later
microscope.optics.spot_size_index	1.0.0 and later
microscope.optics.stigmators.condenser_stigmator	1.1.0 and later
microscope.optics.stigmators.diffraction_stigmator	1.1.0 and later
microscope.optics.stigmators.gun_stigmator	1.1.0 and later
microscope.optics.stigmators.objective_stigmator	1.1.0 and later
microscope.optics.unblank()	1.0.0 and later
microscope.service.autoscript.client.check_pause_requested()	1.5.0 and later
microscope.service.autoscript.client.check_stop_requested()	1.5.0 and later
microscope.service.autoscript.client.is_pause_requested()	1.5.0 and later
microscope.service.autoscript.client.is_stop_requested()	1.5.0 and later
microscope.service.autoscript.client.version	1.0.0 and later
microscope.service.autoscript.server.is_offline	1.3.0 and later
microscope.service.autoscript.server.version	1.0.0 and later
microscope.service.offline.reset_image	1.3.0 and later
microscope.service.offline.set_image	1.3.0 and later
microscope.service.system.name	1.0.0 and later
microscope.service.system.serial_number	1.0.0 and later
microscope.service.system.version	1.0.0 and later
microscope.specimen.piezo_stage.disable	1.3.0 and later
microscope.specimen.piezo_stage.enable	1.3.0 and later
microscope.specimen.piezo_stage.get_axis_limits()	1.3.0 and later
microscope.specimen.piezo_stage.is_enabled	1.3.0 and later
microscope.specimen.piezo_stage.is_moving	1.3.0 and later

microscope.specimen.piezo_stage.jogging_velocity	1.3.0 and later
microscope.specimen.piezo_stage.position	1.3.0 and later
microscope.specimen.piezo_stage.relative_move()	1.3.0 and later
microscope.specimen.piezo_stage.reset_position()	1.3.0 and later
microscope.specimen.piezo_stage.start_jogging()	1.3.0 and later
microscope.specimen.piezo_stage.stop()	1.3.0 and later
microscope.specimen.stage.absolute_move()	1.3.0 and later
microscope.specimen.stage.absolute_move_safe()	1.3.0 and later
microscope.specimen.stage.get_axis_limits()	1.3.0 and later
microscope.specimen.stage.get_holder_type()	1.3.0 and later
microscope.specimen.stage.is_enabled	1.3.0 and later
microscope.specimen.stage.is_moving	1.4.0 and later
microscope.specimen.stage.move_to_pixel()	1.3.0 and later
microscope.specimen.stage.position	1.3.0 and later
microscope.specimen.stage.relative_move()	1.3.0 and later
microscope.specimen.stage.relative_move_safe()	1.3.0 and later
microscope.specimen.stage.start_jogging()	1.4.0 and later
microscope.specimen.stage.stop_jogging()	1.4.0 and later
microscope.stage.absolute_move()	1.0.0 – 1.3.0
microscope.stage.absolute_move_safe()	1.0.0 – 1.3.0
microscope.stage.get_axis_limits()	1.0.0 – 1.3.0
microscope.stage.get_holder_type()	1.0.0 – 1.3.0
microscope.stage.is_enabled	1.0.0 – 1.3.0
microscope.stage.position	1.0.0 – 1.3.0
microscope.stage.relative_move()	1.0.0 – 1.3.0
microscope.stage.relative_move_safe()	1.0.0 – 1.3.0
microscope.vacuum.column_valves.close()	1.2.0 and later
microscope.vacuum.column_valves.open()	1.2.0 and later
microscope.vacuum.column_valves.state	1.2.0 and later
microscope.vacuum.state	1.0.0 and later

15.2 Dynamic Objects

ApertureMechanism.aperture	1.0.0 and later
ApertureMechanism.apertures	1.0.0 and later
ApertureMechanism.disable()	1.0.0 and later
ApertureMechanism.enable()	1.0.0 and later
ApertureMechanism.insert()	1.0.0 and later
ApertureMechanism.insertion_state	1.4.0 and later
ApertureMechanism.is_enabled	1.0.0 and later
ApertureMechanism.is_retractable	1.0.0 and later
ApertureMechanism.position	1.0.0 and later
ApertureMechanism.reset_positions()	1.0.0 and later
ApertureMechanism.retract()	1.0.0 and later
BiPrism.name	1.12.0 and later
BiPrism.voltage	1.12.0 and later
BiPrism.rotation	1.12.0 and later
BiPrism.recover()	1.12.0 and later
BiPrism.enable()	1.12.0 and later
BiPrism.disable()	1.12.0 and later
BiPrism.is_enabled	1.12.0 and later
BiPrismRotation.is_available	1.12.0 and later
BiPrismRotation.rotate(angle)	1.12.0 and later
BiPrismRotation.Value	1.12.0 and later
BiPrismRotation.limits	1.12.0 and later
BiPrismVoltage.value	1.12.0 and later
BiPrismVoltage.limits	1.12.0 and later
CameraDetector.display_name	1.1.0 and later
CameraDetector.exposure_time_limits	1.1.0 and later
CameraDetector.insert()	1.1.0 and later
CameraDetector.insertion_state	1.1.0 and later
CameraDetector.is_dose_sensitive	1.1.0 and later

CameraDetector.is_insertable	1.1.0 and later
CameraDetector.is_operational	1.1.0 and later
CameraDetector.name	1.1.0 and later
CameraDetector.pixel_size	1.1.0 and later
CameraDetector.retract()	1.1.0 and later
DetectorSegment.detector_name	1.0.0 and later
DetectorSegment.gain	1.0.0 and later
DetectorSegment.is_enabled	1.0.0 and later
DetectorSegment.name	1.0.0 and later
DetectorSegment.offset	1.0.0 and later
Lens.limits_raw	1.9.0 and later
Lens.name	1.9.0 and later
Lens.value	1.9.0 and later
Lens.value_raw	1.9.0 and later
PresetRaw.limits	1.10.0 and later
PresetRaw.value	1.10.0 and later
ScanningDetector.collection_angle_limits	1.0.0 and later
ScanningDetector.display_name	1.1.0 and later
ScanningDetector.gain	1.0.0 and later
ScanningDetector.gain_limits	1.6.0 and later
ScanningDetector.get_enabled_segments()	1.0.0 and later
ScanningDetector.get_segment()	1.0.0 and later
ScanningDetector.get_segments()	1.0.0 and later
ScanningDetector.insert()	1.1.0 and later
ScanningDetector.insertion_state	1.1.0 and later
ScanningDetector.is_insertable	1.6.0 and later
ScanningDetector.name	1.0.0 and later
ScanningDetector.offset	1.0.0 and later
ScanningDetector.offset_limits	1.6.0 and later
ScanningDetector.relative_gain	1.6.0 and later
ScanningDetector.relative_offset	1.6.0 and later

ScanningDetector.reset_segments()	1.0.0 and later
ScanningDetector.retract()	1.1.0 and later
ScanningDetector.set_enabled_segments()	1.0.0 and later
ScanningDetector.set_segment_gain()	1.0.0 and later
ScanningDetector.set_segment_offset()	1.0.0 and later
XLensAlignment.preset_raw	1.10.0 and later

16   Other product information

AutoScript 1 is available in 3 different product variants for the Python scripting usecase. Additionally, there is one feature variant that can be combined with the product variant. The variants determine which microscope parameters are accessible for scripting. All variants are installed with the same installation media, the distinction is made by applying a specific license key after installation. The variants are:

Product Variant name	Commercial ID
AutoScript TEM 1 – Academic	1408417
AutoScript TEM 1 – Commercial	1408419
AutoScript TEM 1 – Offline	1290580

Feature Variant name	Commercial ID

It is possible to evaluate the product during the 90-day evaluation period without a licence key. For the duration of this trial period the "AutoScript TEM 1 - Commercial " variant is activated.

Only one product variant can be activated on a single computer with combination of any number of feature product variants.

17   Known Issues

The most recent release of AutoScript TEM has the following Known Issues.

ID	Issue Description and Workaround
ASTEM-1543	Move to pixel does not work properly with non-zero STEM rotation.
	Do not use STEM scan rotation.

ID	Issue Description and Workaround
ASTEM-1663	Selecting bi-prism aperture doesn't wait for enabling.
	Wait until biprism is enabled.

ID	Issue Description and Workaround
ASTEM-1618	Bi-prism - Setting rotation with the value as the current angle raises an exception.
	No workaround.

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Revision Table

Revision	Date	ECO number	Description of Changes
1.0.0	02-FEB-2021	SDR28886	Initial Release
1.1.0	25-JUN-2021	SDR30731	Update for AutoScript TEM 1.1.0
1.1.0	01-JUL-2021	SDR30813	Update for AutoScript TEM 1.1.0.
1.2.0	10-JAN-2022	SDR33643	Update for AutoScript TEM 1.2.0
1.3.0	05-JUL-2022	SDR37547	Update for AutoScript TEM 1.3.0
1.4.0	10-JAN-2023	SDR40517	Update for AutoScript TEM 1.4.0
1.4.0.A	16-JAN-2023	feedback	Solved Known Issue removed
1.5.0	14-APR-2023	feedback	Update for AutoScript TEM 1.5.0
1.6.0	04-JUL-2023		Update for AutoScript TEM 1.6.0 Solved known issues removed
1.7.0	OCT-2023		Update for v1.7.0
1.8.0	JAN-2024		Update for v1.8.0
1.9.0	APR-2024		Update for 1.9.0
1.10.0	JUL-2024		Update for 1.10.0
1.11.0	OCT-2204		Update for 1.11.0
1.12.0	JAN-2025		Update for 1.12.0