
Changelog for gen4 Devices

Release v1.11.0

Heliotis AG

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Overview

| | | |
|-----------|--|-----------|
| 1 | Version 1.11.0 | 1 |
| 2 | Version 1.10.4 | 2 |
| 3 | Version 1.10.3 | 3 |
| 4 | Version 1.10.2 | 4 |
| 5 | Version 1.10.1 | 5 |
| 6 | Version 1.10.0 | 6 |
| 7 | Version 1.9.2 | 8 |
| 8 | Version 1.9.1 | 10 |
| 9 | Version 1.9.0 | 11 |
| 10 | Version 1.8.0 | 12 |
| 11 | Upgrade and Downgrade Information | 13 |

This file contains the continuously updated changlog for the heliotis gen4 product generation.

1 Version 1.11.0

| | |
|----------------|-----------|
| Release Date: | 14.3.2026 |
| diaphus: | 1.11.0 |
| heliService: | 1.11.0 |
| updateTool: | 1.4.4 |
| FPGA Firmware: | 1883448x |
| heliDriver D3: | 1.11 |

1.1 Overview of new Features

- Add new surface extraction algorithm `Scan3dExtractionMethod = CenterOfMassPhaseFusion` and add its configuration features (14#42, 5#251, 19#74)
- Position based *Reference Trigger*. Configured with: `TriggerSelector = Reference`, `TriggerMode = On`, `TriggerSource = EncoderCamera` (5#242, 5#243, 5#244, 5#266, 7#12, 8#2, 14#47, 19#77, 19#81, 27#10, 5!13)
- Add new read-only feature **WorkingDistance** which returns the working distance, if the feature **OpticType** was set (5#261, 19#76)
- Add support for additional Mirau optics (19#79)

1.2 Bug Fixes and Improvements

- Fix cache missed for **LateralResolution** (5#260)
- Set visibility to *Guru* for advanced Stage Features (5#262)
- Small acceleration in measurement sequence (5#259, 14#43)
- Expose Extraction Control features only, when they are available (depending on `Scan3dExtractionMethod`) (19#72)
- Improvement of heliDriver update mechanism and implementation of WLI8 Heater update (15#21, 15#26, 58#5, 15!3)
- Improvement of communication between camera and heliDriver (59#3)
- Fix communication issues to WLI8 Heater module (51#24)
- Grammar and spelling correction in feature descriptions (19#82)
- Allow (soft)limit configuration for Xenax Stages (212#2)
- Reduce Noise in S4M data readout. (50#15)
- *FPGA*: Fix encoder division in external reference signal. (78#44)
- *Examples*: Improve Python Examples. (10#19, 31#10)
- *Documentation*: Update *C4 Manual*. (10#18)
- *Documentation*: Update Description for FPNCorrection. (5#268)

2 Version 1.10.4

| | |
|----------------|----------|
| Release Date: | 5.9.2025 |
| diaphus: | 1.10.2 |
| heliService: | 1.10.4 |
| updateTool: | 1.4.3 |
| FPGA Firmware: | e089e2dx |
| heliDriver D3: | 1.9 |

2.1 Bug Fixes and Improvements

- Improve Ethernet stability. Prevent network slowdown. (15#19)
- Fix UserSet migration. To avoid any UserSet migration issues, do a direct upgrade to version 1.10.4 from previous versions. (Skip version 1.10.3) (5#258)
- Add write lock during acquisition for the `TransferQueueMaxBlockCount` feature. (19#75)
- Fix firmware version read of WLI8Htr module. (5#256)
- Fix `LateralResolution` calculation. (5#252)
- Add *warning* to the heliService log if a frame start or recording start trigger is missed. (5#254)
- Fix maintenance tool startup issues in upgrade scenario. (15#18)

3 Version 1.10.3

| | |
|----------------|-----------|
| Release Date: | 30.5.2025 |
| diaphus: | 1.10.2 |
| heliService: | 1.10.3 |
| updateTool: | 1.4.3 |
| FPGA Firmware: | e089e2dx |
| heliDriver D3: | 1.9 |

Note: Reduced Transfer Data Rate

Starting from release **1.10.3** the transfer data rate is reduced by approx. 15% for data transmission from the camera to the host PC.

In `Scan3dExtractionMethod = AcceleratedCenterOfMass(IQCorrection)` this results in **3-5ms** longer cycle time.

For `Scan3dExtractionMethod = centerOfMass(IQCorrection), ImprovedCenterOfMass, High-Precision` and `rawExtSimpMax` the cycle times is extended by **3-5ms** per transmitted frame configured by `ExtSimpMaxHWin`.

For `Scan3dExtractionMethod = rawIQ` and `rawAmp` the cycle time is increased by **~2ms** per transmitted frame.

Note: Time critical applications can enable the newly introduced *software pipelining* to achieve a better cycle time (see **Overview of new Features**).

3.1 Overview of new Features

- Implementation of multiple frame buffers on the device. Allows to acquire new data during the transmission of the previous measurement. Configuration is possible with `TransferSelector` and `TransferQueueMaxBlockCount`. (5#208, 5#209, 5#210, 5#211, 19#73)

3.2 Bug Fixes and Improvements

- Fix the `DeviceReset` sequence: Now the features `FieldbusIntDataValue` and `FieldbusFloatDataValue` are reset as well. (5#234)
- Increase minimum value for `ExtSimpMaxHWin` from 0 to 1 (5#240, 19#69)
- Expose the heliDriver D3 Heater-Module Firmware version also through the feature `HeliDriverModule-FirmwareVersion`. (5#241)
- Fix the `LineMode` and `LineSource` configuration for digital outputs on the LIA Module. (5#239)
- Fix the default configuration for acquired frames in Lock-In Camera mode. (5#237)
- Fix features invalidation information for `FileAccessControl` features. (19#71)
- Fix and clarify feature description. (19#70)
- Improve the initialization sequence of firmware updates and its post steps. (15#15, 15#16)
- Improve S4H readout noise in special (external reference) case. (50#14)
- Update Linux distribution to Rockhopper 2.1.0 and kernel 6.6. (15#13, 15#14)
- Improve sequence when the Ethernet connection is closed during data transfer. (5#249)
- Improvement of device reset sequence. (5#238, 78#34)
- *FPGA*: No time out exceptions for `FilteredLastMax` depending on Amplitude values anymore. (78#33)
- *FPGA*: Fixed Z-Tag values for maxima that are found near frame0. (78#35)
- *FPGA*: Providing streaming header information in static header. (78#37)
- *FPGA*: Improved frequency synthesis for external reference. (78#38)
- *FPGA*: Save handling of resets during writing of data to the shared memory. (78#42)
- *Examples*: Improve camera configuration in all examples for S4M case. (31#4)
- *Examples*: Improve Lock-In Camera examples and fix FPN correction. (31#8)
- *Examples*: Fix Python requirement file and use current version of Harvesters. (31#9)
- *Documentation*: Add documentation for some internal used features (Visibility = Invisible). Allows to document dynamic feature limits. (23#14, 19#68, 19#67)
- *Documentation*: Update *Event And Status Diagram*. (23#13)

4 Version 1.10.2

| | |
|----------------|--|
| Release Date: | 23.9.2024 |
| diaphus: | 1.10.1 |
| heliService: | 1.10.2 |
| updateTool: | 1.4.3 |
| FPGA Firmware: | 24052302 (1MS4), 24052401 (2MS4), 24052401 (1MS4M), 24052402 (2MS4M) |
| heliDriver D3: | 1.9 |

4.1 Bug Fixes and Improvements

- Acceleration of Feature Read/Write. As well as, accelerate the measurement sequence. (5#228)
- Reduce delay in *FrameActive* and *RecodingActive* signal and status. (5#223, 5#227)
- Change Feature *FieldbusIntDataValue* from unsigned to signed integer. (5#232, 5#230)
- Improve motion sequence and remove the risk of missed trigger in long (de)AccelerationRamp. (5#231)
- Improve Homing Sequence for MA3 stages. This fix was part of the patch 1.10.1-1 and 1.10.1-2 (7#11)
- Fix heliDriver update sequence in combination with partial assembly PI board (58#4)

5 Version 1.10.1

| | |
|----------------|--|
| Release Date: | 7.6.2024 |
| diaphus: | 1.10.1 |
| heliService: | 1.10.1 |
| updateTool: | 1.4.3 |
| FPGA Firmware: | 24052302 (1MS4), 24052401 (2MS4), 24052401 (1MS4M), 24052402 (2MS4M) |
| heliDriver D3: | 1.9 |

5.1 Overview of new Features

- Expose LowLevel interface to heliDriver D3 registers. (19#50)
- Addition of further sequencers for R&D modes (15#11)

5.2 Bug Fixes and Improvements

- Fix Access Mode of Fieldbus features. (5#229)
- Add correct entries in *FieldbusType* feature. (19#65)
- Return an error when misconfiguring the features *FPNCorrectionNFrames*, *TriggerDivider* or *TriggerMultiplier*. (5#218)
- Fix external reference. (5#224)
- Include hardware configuration in Log Files (5#222)
- Remove internal features from the nodemap. (5#221, 19#63)
- *FPGA*: Adopted Memory readout for S4M versions. Ascan readout time for S4M = Ascan readout time for S4H. (78#30)
- *FPGA*: Fixed firstMax Amplitude behaviour for surfaces that are separated more than 64 frames. (78#29)
- *FPGA*: Fixed lastMax feature (was not working properly, Measurement could lead to timeouts)
- *FPGA*: Optimized readout speed for dualMem version by 30%
- *FPGA*: Added Memory CalibrationSuccess signal to the reset sequence.
- *Documentation*: Add *AccessMode* information to all features. (23#11)
- *Documentation*: Add *Writable in Acquisition Mode* information to all features. (23#8)
- *Documentation*: Fix page breaks across long tables. (23#9)
- *C4Hdl*: Improve object destruction and fix issue when closing and reopening an interface and/or device. (9#23, 9#30)

- *C4Hdl*: Implement error message in C API as `thread_local` variable. (9#35)*
- *C4Hdl*: Add support for Python 3.12, remove support for deprecated Python 3.5. (9#36)

6 Version 1.10.0

| | |
|----------------|--|
| Release Date: | 22.3.2024 |
| diaphus: | 1.10.0 |
| heliService: | 1.10.0 |
| updateTool: | 1.4.3 |
| FPGA Firmware: | 24030601 (1MS4), 24030501 (2MS4), 24030602 (1MS4M), 24030603 (2MS4M) |
| heliDriver D3: | 1.9 |

6.1 Overview of new Features

- Implement `TargetVerticalSpreading`, `ActualVerticalSpreading` and `LockInTargetBlankDurationNPeriod`, `LockInActualBlankDurationNPeriod` to control when the demodulation is active along the frame. (5#169)
- Specify the position of heliInspect H8 internal stage to the range from **+5.0mm** to **~-35.0mm** device instance independently. This requires a stage calibration (`moCalib`). * Note: Downgrade to older version could change the absolut position.* (212#1, 5#192)
- Add feature `SensorName` which exposes the sensor name. (19#57)
- Add support for heliDriver D3 Fieldbus interface. The new available features are in the category `FieldbusControl`. They are: `FieldbusType`, `FieldbusIntDataSelector`, `FieldbusIntDataValue`, `FieldbusIntDataMode`, `FieldbusFloatDataSelector`, `FieldbusFloatDataValue`, `FieldbusFloatDataMode`, `FieldbusBoolSelector`, `FieldbusBoolMode`, `FieldbusBoolSource` and `FieldbusBoolStatus` (19#33, 5#177, 5#179)
- Provide *Device Description* files for PLC and example project using the Fieldbus features. (10#15)
- Upgrade to GenTL 1.6. Expose buffer part information. (14#31, 14#35)
- Support of new heliDriver D3 Module *RTIO LVDS* (5#199)
- Support for External Reference Source on heliSens S4M. This was also part of patch 1.9.2-1 (50#6)
- Support for new B4 Processing Boards B4.2.0 and B4M.2.0 (32#7)
- Support for new Power and Interface Boards V1.4 partial assembly (32#9)
- New debug and logging interface. The feature `LogLevel1` has less entries and is now based on a selector `LogSelector`. *Note: User application already using the old `LogLevel` feature require an update.* (5#191)
- Transfer the new logging information as `*.tar.gz` through GenICam file access. Add `Log` to the `FileSelector`. (5#195)
- *updateTool*: Get access to the device Log file through the File Manager dialog. (11#19)
- *C4Utility*: Add *Technical Notes* and *heliCam C4 User Manual* to the installation directory. (9#13)

6.2 Bug Fixes and Improvements

- Inputs FI2, FI3 and RTIO6, RTIO7 are not available for `FrameStartTrigger`. They are now removed from the enumeration list. (19#41)
- Fix functionality for `RecordingStartTrigger` coming from RTIO4 or DIO*. (5#198)
- Handle `RecordingStartTrigger` on RTIO6 correctly. (5#215)
- Rename `SignalGenerationMode` to `SignalGenerationModulationMode`. *Note: The old feature stays hidden for backward compatibility but is deprecated and will be removed in further major release.* (19#58)
- Define maximum values of `AcquisitionBurstFrameCount` based on the Sensor Type. (19#61)
- Define maximum values of `ScanSpeed` based on the Stage Type. (19#59, 193#1)
- Return the correct value in the feature `SensorHeight`. (5#217)
- Fix and define the value range for `LockInTargetReferenceFrequency` based on the sensor type. (19#55, 19#62, 5#196, 5#197, 5#205)
- Increase minimum value of `ScanRange` to 0.01 (19#54)
- Increase minimum value of `SignalGeneratorOffset` to 1.0 (5#206)
- Increase maximum length for error messages of feature access. They are usually returned through exceptions (19#35)
- Increase maximum number of available `ChunkZTagValue` to 1998 (19#43)
- Fix the maximum value for `ChunkZTagSelector` to `ChunkZTagCount - 1` (5#173)
- Change type of `OpticControllerSerialNumber` to a string, according to the GenICam definition. (5#207)
- Small changes in features meta data (Namespace, Visibility) to fulfill the GenICam definitions. Impacted features are `OpticControl`, `OpticControllerSelector`, `OpticControllerSerialNumber`, `OpticControllerFirmwareVersion`, `NumericalAperture`, `Magnification`. (19#56)
- Change nominal wavelength of Red LED Type 2 from 640nm to 650nm. (32#10)
- Change default `ScanPosition` to the stage's center position. (5#200)
- Return more error information in heliDriver D3 specific errors. (5#201)
- Fix artifacts in rawIQ and rawAmp mode of the dual-memory firmware. This fix was part of the patch 1.9.2-2 (78#15)
- Fix output configuration of RTIO2 (78#8, 78#28)
- Fix and return correct `LineStatus` information for RTIO2, RTIO3, RTIO6 and RTIO7 (78#14)
- Fix LineInverter configuration for RTIO6 and RTIO7. (78#23)
- Remove first and second frame masking in rawIQ mode. (78#18)
- Fix a small z offset bias. This fix was part of patch 1.9.2-2 (78#24)
- When lock-in reference is external and `LockInReferenceFrequencyScaler` isn't *MultiplyBy4*: Demodulate only as long external reference signal transitions are detected (previously kept synthesizing reference even when signal was not provided) (78#26)
- Fix Row Shift on heliSens S4M. This fix was part of patch 1.9.2-1 (50#5)
- Fix small reference frequency deviation when using internal reference frequency. (50#12)
- Improve demodulation frequency accuracy when reference source is internal. Inaccuracy is now limited to approximately 1% in the worst case (highest frequency). It was up to a few % in the worst case previously. (50#4)
- Improve internal sensor configuration and fix few rounding issues. (5#216)

- Provide full external reference frequency tracking fidelity with `LockInCoupling = AC`. Previously tracking errors (frame-to-frame phase jumps) occurred in AC mode when using maximum `LockInSensitivity` and low `ExpectedFrequencyDeviation`. (50#13)
- Fix motion implementation for gen4 devices without motion control and update stage status information. (5#219, 8#1)
- Fix error in second stage initialization of Xenax stage with Xvi 75V8 controller. (27#8)
- Fix type on Xenax specific feature and rename `XenaxReplay` to `XenaxReply`. *Note: The old feature stays hidden for backward compatibility but is Deprecated and will be removed in further major release.* (27#7)
- Use the LED Type installed on the device for postprocessing in `clupea` library. (14#36, 14#39)
- Add support for LED Type 3 in `clupea` (1#2)
- *updateTool*: Remove unused `UserSet` verification. It is handled on the device since version 1.8.0. (11#6)
- *Examples*: Update and expand Python examples for heliCam C4. (31#3)
- *Examples*: Update simple Python examples for heliInspect H8. (31#7)
- *Examples*: Add readme how to setup Python environment. (31#6)
- *Examples*: Update HALCON example and define producer name to accelerate the `open_framegrabber` command. (29#1)
- *Examples*: Add MATLAB example based on the C4Hdl library for heliCam C4. (9#31)
- *Examples*: Add Matrox Design Assistant examples for heliInspect H8 and H9.

6.3 Known Behavioral Changes

- *Reflectance* values are reduced by approx. 6% when using `Scan3dExtractionMethod = ImprovedCenterOfMass` or `HighPrecision`.
- Camera configuration time is a little longer compared to release 1.9.2.
- `WavelengthCorrection` must be recalculated when configuring a static value to `WavelengthCorrection` and a *Red LED Type 2* is installed.
- `LogLevel1` interface has changed. See *Overview of new Features* above.

7 Version 1.9.2

| | |
|----------------|--|
| Release Date: | 19.6.2023 |
| diaphus: | 1.9.2 |
| heliService: | 1.9.2 |
| updateTool: | 1.4.2 |
| FPGA Firmware: | 23060801 (1MS4), 23060802 (2MS4), 23060803 (1MS4M), 23060804 (2MS4M) |
| heliDriver D3: | 1.8 |

7.1 Overview of new Features

- Expose the heliDriver D3 module firmware version through the new feature `HeliDriverModuleFirmwareVersion[HeliDriverModuleSelector]` (19#37)
- Expose the feature `SignalGeneratorPhaseShift` to configure a phase shift in the SignalGenerator if it in *Pulsed Mode* (19#28)
- Add instance specific motor interpolator configuration (32#3)
- Add full support (incl. update mechanism) for new stage types MA3 and MA4 (7#9, 15#10)

7.2 Bug Fixes and Improvements

- Clear `Scan3dCoordinateScale` cache when `OpticType` feature is written (19#52)
- Expose `DeviceModelName` correctly (5#183)
- Expose `DeviceFamilyName` according to new heliotis naming convention (5#184)
- Fix swapped `FI2` and `FI3` configuration for LIA module (19#39)
- Fix `LineMode` feature for DIOs on LIA module (5#185)
- Fix input events for `DIO 10-17` on LIA module (5#186)
- Fix implementation of `SignalGeneratorTriggerSource` and `SignalGeneratorTriggerDelay` features (5#172)
- Limits of `SignalGeneratorAmplitude` feature in the range of 1.0% - 100.0% (5#189, 19#53)
- Limits of `LockInTargetReferenceFrequency` feature in the range of 304Hz - 136kHz (19#45)
- Limits of `LightBrightness` feature in the range of 1.0% - 100.0% (19#36, 14#30)
- Set allowed minimum value of `ScanSpeed` feature to 0.1mm/s. (19#44)
- Make the `LightCurrentRating` feature writeable for TriLED outputs (19#49)
- Change `LockInReferenceTimeShift` and `TriggerDelay` implementation and make it functional (19#51, 78#7)
- Improve Xenax stage communication stability (27#6)
- Fix Xenax stage status information (27#4)
- Fix smart stage initialization for Xenax controllers (27#5)
- Automated correction of misconfigured D3 firmware (15#9)
- Update to heliDriver D3 1.8 firmware (5#187)*
- Fix DIO inverter configuration (51#10)
- Fix error when no LED is connected (51#13)
- **D3:** Fix functionality of `SignalGeneratorTriggerDelay`
- Fix increased surface noise when `Scan3dExtractionMethod = AcceleratedCenterOfMass` or `AcceleratedCenterOfMassIQCorrection` (78#17)
- Fix reset during recording active (78#12)
- Block `DeviceReset` command in acquisition mode (5#194)
- **Documentation:** Add unit information in the feature description (19#38)
- **Documentation:** Add deprecated warning in feature description (23#6)
- **Documentation:** Correction of smaller typos in the feature description and changelog (19#47, 19#48, 10#10, 23#7)

- *Python Example*: Using current Harvesters version 1.4.0 (31#2)
- *CVB Example*: Add examples for Common Vision Blox (37#1)
- *updateTool*: Remove unused reboot button in update window (11#17, 11#14)
- *updateTool*: Add links to the documentation and updates in the help menu (11#12, 11#13)

8 Version 1.9.1

| | |
|----------------|--|
| Release Date: | 27.1.2023 |
| diaphus: | 1.9.1 |
| heliService: | 1.9.1 |
| updateTool: | 1.4.1 |
| FPGA Firmware: | 22122202 (1MS4), 23010401 (2MS4), 22122203 (1MS4M), 23010402 (2MS4M) |
| heliDriver D3: | 1.6 |

Note: C4Hdl library

With release **1.9.1** the Python Bindings are available for all active Python versions according to the Python Release Cycle (<https://devguide.python.org/versions/>). The binaries are include in C4Utility installation directory `./C4Utility/c4hdl/win64-x64/python/bin`

The lowest supported .NET Frameworks for the CLR bindings are based on the Microsoft .NET Framework Lifecycle Policy (<https://learn.microsoft.com/en-us/lifecycle/products/microsoft-net-framework>)

8.1 Overview of new Features

- Add support for heliDriver D3 LIA module as well as its SignalGenerator. SignalGenerator Features are: `SignalGeneratorFrequency`, `SignalGeneratorAmplitude`, `SignalGeneratorOffset`, `SignalGeneratorMode` (5#114, 5#156, 5#167)
- Implement external Reference signal for LockInCam applications. (5#160)
- The Reference signal could be mapped to digital output `RTIO2` and `RTIO3` (see enumeration list in `LineSource` feature description). (5#161)
- A new feature `OpticType` is available. A write access to this feature loads a predefined and best guess for the configuration of the features: `Magnification`, `NumericalAperture`, `WavelengthCorrection`, `TargetVerticalSpacing`. Additional information are available in the feature description. (19#32, 5#131)

8.2 Bug Fixes and Improvements

- Reduce the minimum supported `ScanRange` (or number of Recording Frames down to 4 in volume mode). (5#162, 5#163)
- Increase maximal supported `ScanRange` (or number of Recording Frames up to 1348 in surface mode). (5#162)
- Improve Illumination current calibration sequence. (5#158)
- Tolerated Frequency deviation of external Reference Signal is now tolerated within the bounds set with `LockInExpectedFrequencyDeviation`. (5#170)
- External Reference signal scaling is corrected so that the configuration of `LockInReferenceFrequencyScaler = Off` match with the applied demodulation reference signal. (5#159, 5#168)

- The prerelease feature name `AcquisitionBurstFrameCountPreview` is renamed to `AcquisitionBurstFrameCount` and the feature behavior is fixed. (5#149, 5#157)
- Improve the `StageInit` command (reliability when executing while H8 internal stage is at lower positions). (5#154)
- Define limits (minimum and maximum values) for position and range features. The limits are based on the Hardware and UserLimits. (5#144, 5#166, 19#30)
- `LockInReferenceFrequencyScaler` value `DevideBy2` is fixed. (5#151)
- Control of Digital IO `Line0 - Line3` was broken in release 1.9.0. This is fixed. (5#147)
- `SignalGenerator` feature family is now usable (access mode was NI). (5#146)
- Handle unplugging or disabling of network interface correctly (14#32, 9#25)
- `C4Hdl`: Implement and Support GenICam AccessMode *Not Implemented (NI)* (9#24)
- `C4Hdl`: Use .NET Framework 4.6.2
- `FPGA`: Full featured support for S4M sensor.

9 Version 1.9.0

| | |
|----------------|--|
| Release Date: | 16.9.2022 |
| diaphus: | 1.9.0 |
| heliService: | 1.9.0 |
| updateTool: | 1.4.1 |
| FPGA Firmware: | 22082307 (1MS4), 22082401 (2MS4), 22082306 (1MS4M), 22082402 (2MS4M) |
| heliDriver D3: | 1.1 |

9.1 Overview of new Features

- Add new `DeviceOperationMode` to select how the camera is used (e.g. as 3D measurement system or as 2D LockInCam). Based on the `DeviceOperationMode` different configuration features are available.
- Remove the `ConfigurationStyle` feature and split its content to `DeviceOperationMode` and `LowLevelMode` features. (19#21)
- Implement LockInCam features (available in `DeviceOperationMode=LockInCam`). The new features available in the `LockInControl` category: `LockInTargetReferenceFrequency`, `LockInActualReferenceFrequency`, `LockInExpectedFrequencyDeviation`, `LockInTargetTimeConstantNPeriods`, `LockInActualTimeConstantNPeriods`, `LockInReferenceSourceType`, `LockInReferenceSourceSignal`, `LockInReferenceTimeShift`, `LockInReferenceFrequencyScaler`, `LockInCoupling`, `LockInSensitivity` as well as `AcquisitionBurstFrameCountPreview` and `TriggerSelector=Reference`. The whole mode is in beta mode and features changes of the configuration style will be possible. (5#105)
- Add support for the configuration of `RTIO2`, `RTIO3`, `RTIO6`, `RTIO7`, `FI2`, `FI3` and `SwCtrlVdd5`. They are available dependent on the hardware configuration. (5#106)
- Add features `Scan3dCoordinateScale`, `Scan3dCoordinateOffset` and `Scan3dOutputMode` to scale and move the 3D surface in x,y and z (`Scan3dCoordinateSelector`). (5#97, 5#129)
- Define a hardware configuration for horizontal or vertical mounting and configure the stage control parameters according to the configuration (5#132)
- Add support for additional H8 stage types `-MA3-` and `-MA4-`. (32#2)

9.2 Bug Fixes and Improvements

- Support for S4M sensor with optimized reference voltages, sequencer. (5#112, 5#115, 5#139)
- Correct offset of 1 in `PeakDetectionFilterWidth` feature (5#124)
- Recalculate `ActualVerticalSpacing` when changing `BackgroundSuppression` feature. (5#116)
- Fix the selection of `StageStatus=Initialized` and return the correct status in `StageStatus` (5#117)
- Fix move issue with heavy loaded Xenax stages (5#121)
- Fix the chunk information `ChunkScan3dDistanceUnit` and match it with `Scan3dDistanceUnit` configuration. (5#96)
- Remove cache for `HeliDriverStatus` feature. (19#26)
- *updateTool*: correct handling of updates (*.ipkg) when the file name contains special characters.
- *updateTool*: small operation improvement in hardware configuration window (11#10)
- fix re-initialization sequence in H8 motion. (7#7)

10 Version 1.8.0

| | |
|----------------|----------------------------------|
| Release Date: | 15.4.2022 |
| diaphus: | 1.8.0 |
| heliService: | 1.8.0 |
| updateTool: | 1.4.0 |
| FPGA Firmware: | 22030201 (1MS4), 22030103 (2MS4) |
| heliDriver D3: | 1.0 |

Note: Important Note

Starting with the release **1.8.0**, a new fail safe memory layout is introduced. Future updates are released as whole image package (*.ipkg) and, alternatively, as a whole SD card image (*.img).

A detailed upgrade instruction is shown in chapter [Upgrade and Downgrade Information](#) and the sequence to upgrade to **1.8.0** is part of its sub-chapter [Upgrade from Version <1.8.0 to Version >=1.8.0](#)

A downgrade to previous versions is only possible by rewriting the SD card with image [b4brdlmg_20190719V03.img](#). (see chapter [Upgrade and Downgrade Information](#))

10.1 Overview of new Features

- FPGA Firmware selection (*single-memory* or *dual-memory*) based on camera hardware configuration (via updateTool)
- Add image based camera firmware update via *.ipkg file.
- Add additional information to the Chunk data: **ChunkTimestamp** and **ChunkFrameID** (5#94)
- Add Low-Level feature to enable Test and Fill Pixels (19#20)
- UserSets version (up/down-grades) are handled directly on the camera when the files are exchanged. No manual verification step is required. (5#102, 32#0)
- Add Adaptive Vision examples (10#5)
- *C4Hdl*: Add MATLAB example script

- *updateTool*: Linux support
- *updateTool*: Add dialog for Hardware Configuration
- *updateTool*: Add support for new camera firmware update (ipkg)
- *internal*: Support for S4MEmu (5#38)

10.2 Bug Fixes and Improvements

- Fix default configuration of Scan3dExtractionMethod. (14#28)
- Update feature description and meta information. (19#16, 19#17, 19#19, 19#22)
- Increase maximum motion speed for Xenax with 1um encoder. (19#18)
- Adjust default values of **OpticControl** features. Disable optic heater by default. (5#83)
- Features **NumericalAperture** and **Magnification** now depend on **OpticControllerSelector**. (5#91)
- Fix trigger configuration of **RecordingStart = Off** and **Software**. (5#85)
- Buffering new TargetPosition when it is written during a measurement sequence and apply it as soon as possible. (5#103)
- Removing cache from **Timestamp** feature. (5#100) Mark Sequencer relevant features as invalid when a new sequencerSet is loaded. (5#86)
- Fix x-y scaling in plots of Python examples.
- Improve Sensor configuration sequence. (5#90)
- Give write access independent of the Configuration Style for **ExtractionControl** features as well as for **AccelerationRamp**. (19#21)
- *C4Hdl*: Add additional error information when an internal exception is thrown. (#18)
- *C4Hdl*: Fix typo in C4FeatureInfo method name and rename getAccessMode to `getAccessMode`. (#19)
- *C4Hdl*: Rework of `getEnumEntryList()` method and return only available enumeration entries. (#20)
- *diaphus*: Accelerate computer based post-processing algorithm. (#23)
- *updateTool*: Handle fast clicks on “Update Device List” button. (#4)
- *updateTool*: Validate gateway configuration and create a warning pop-up when the network is misconfigured. (#5)
- *C4Utility*: Installer selects all examples by default. (10#7)
- *C4Utility*: Register a QuietUninstallString in the Windows registry. (10#6)

11 Upgrade and Downgrade Information

This section assist you for up- or downgrading the camera firmware.

Note: It is recommended to use always the latest firmware version for best product stability and performance.

11.1 Upgrade from Version $\geq 1.8.0$ to Version $> 1.8.0$

- Install the target C4Utility on your host machine. (C4Utility-1.X.Y-win64.exe or C4Utility-1.X.Y-Linux.sh)
- Start the *updateTool* and scan for devices. ("Update Device List" button)
- Select your device from the list and push the "Update Device" button.
- Select the image package `update_1.X.Y.ipkg` in the pop up browser window.
- Optionally check the log output in the dialog.
- The device reboots after the update, is ready to use and you may close the dialog.

11.2 Upgrade from Version $< 1.8.0$ to Version $\geq 1.8.0$

- Install the target C4Utility on your host machine. (C4Utility-1.X.Y-win64.exe or C4Utility-1.X.Y-Linux.sh)
- Start the *updateTool* and scan for devices. ("Update Device List" button)
- Select your device from the list and push the "Update Device" button.
- Select the update package `update_1.8.0.upkg` in the new window.
- Optionally check the log output in the dialog and *Close* it if it asked for in the output message. (Don't use the *Reboot* button)
- The next step of the upgrade is installed in a silent mode and take around 15 minutes. **Don't power off the device during this upgrade sequence for the next 15 minutes!** At the end of the update installation, the illumination flashes two times and the device can be detected in the updateTool. (Version 1.8.0 is installed)
- After this procedure it's possible to upgrade to newer software according the description in [Upgrade from Version \$\geq 1.8.0\$ to Version \$> 1.8.0\$](#)

11.3 Downgrade from Version $> 1.8.0$ to Version $\geq 1.8.0$

- The downgrade sequence is identical to the upgrade sequence described in [Upgrade from Version \$\geq 1.8.0\$ to Version \$> 1.8.0\$](#) .

11.4 Downgrade from Version $\geq 1.8.0$ to Version $< 1.8.0$

- Downgrading to version below 1.8.0 requires a SD card rewrite. Download the image `b4brdImg_20190719V03.img` from our webpage.
- Power Down the device, extract the SD card from the device and insert it into your PC's card reader. Flush the image on it. (e.g. by using the Tool *balenaEtcher* on Windows or *dd* on Linux)
- Insert the SD card into the device and start it.
- Install the target C4Utility on your host machine.
- Start the *updateTool* and scan for devices. ("Update Device List" button)
- Select your device from the list and push the "Update Device" button.
- Select the target update package `*.upkg`.
- Optionally check the log output in the dialog and *Reboot* the device if it asked for in the output message.

Hint: see also the section [Additional Hints](#).

11.5 Downgrade from Version <1.8.0 to Version <1.8.0

- Start the *updateTool* and scan for devices. (“*Update Device List*” button)
- Select your device from the list and push the “*Update Device*” button.
- Select the update package `update_1.X.Y.upkg` in the new window.
- Optionally check the log output in the dialog and reboot the device.
- Install the target C4Utility on your host machine. (`C4Utility-1.X.Y-win64.exe` or `C4Utility-1.X.Y-Linux.sh`)

Hint: see also the section *Additional Hints*.

11.6 Additional Hints

Version 1.5.0 and 1.5.1: It is not recommended to use this versions! For applications requiring a version 1.5.x it is recommended to use 1.5.2.

Downgrade to Versions <= 1.4.1: For a downgrade to versions <= 1.4.1 install `update_1.4.1-2.upkg`, reboot the camera and install the target version.

Upgrade from Versions < 1.3.3 to Version >= 1.3.3: Manual uninstallation of C4Utility is required