

Information

Firmware Update Release 3 for Cameras of the CX Series



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1 Introduction

The Firmware Release 3 provides new features for the whole Baumer CX series and new camera models with IEEE1588 functionality.

Baumer continuously broadens its very successful CX camera series with the latest sensors and new functions. These added functions simplify and improve the integration, which again strongly expands the area of application.

The specific IEEE1588 functionality will be featured by the new CX models of the CX and CX.I series which carry the affix “.PTP” (Precision Time Protocol) in the model name.

2 Firmware Switch for existing CX Cameras

2.1 Procedure

With 102 camera models the CX series is an extensive series. For this reason the switch will be done in steps and divided in groups:

- 1st Step Firmware is available for the customers as an update.
 For single models the firmware update will be available earlier. If an early demand occurs please send a request to the Technical Support support.cameras@baumer.com or our Sales Representative. The Technical Support will provide you with the relevant UpdateTool, if it is already available.
 We thank you for your understanding if delays occur for single models despite careful planning.

2nd Step The camera production is switched to the new Firmware Release 3.
 The information with which firmware the camera is equipped can be obtained from either the label (camera and packaging) or the XML-file in the section "Device Version".
NOTE: In principle Baumer tries to keep minimal stock. However during the transition period it is possible that cameras equipped with Release 2 are still in stock and will be delivered.



Label

▷ Device Type	Transmitter
▷ Device User ID	
▷ Device Vendor Name	Baumer
▷ Device Version	R2.0.1
▷ Read Out Time	66631 µs
▷ Timestamp Latch	Command
▷ Timestamp Latch Value	0 ns

Tree view in XML file

2.2 Schedule

	GigE Interface	USB Interface	Release Date (Firmware Update available)	Date of Production Transition
Group 1: (overall 32 cameras)		VCXU-02M/C VCXU-04M/C VCXU-13M/C VCXU-15M/C VCXU-23M/C VCXU-24M/C VCXU-25M/C VCXU-31M/C VCXU-32M/C VCXU-50M/C VCXU-51M/C VCXU-53M/C VCXU-90M/C VCXU-91M/C VCXU-123M/C VCXU-124M/C	available	CW30
Group 2: (overall 8 cameras)	VCXG-02M/C VCXG-13M/C VCXG-25M/C VCXG-53M/C		CW29 (first models can be requested already now)	CW31
Group 3: (overall 44 cameras)	VCXG-04M/C VCXG-13M/C.I/.XT VCXG-15M/C.I/.XT VCXG-23M/C VCXG-24M/C VCXG-25M/C.I/.XT VCXG-32M/C.I/.XT VCXG-51M/C.I/.XT VCXG-53M/C.I/.XT VCXG-91M/C VCXG-124M/C.I/.XT		CW43 (first models can be requested in CW 36 already)	CW46
Group 3: (overall 16 cameras)	VCXG-22M/C.R VCXG-65M/C.R *) VCXG-125M/C.R VCXG-201M/C.R	VCXU-22M/C.R VCXU-65M/C.R VCXU-125M/C.R VCXU-201M/C.R	CW49 (first models can be requested in CW 43 already)	CW52

With the transition of the cameras to Release 3, newly manufactured cameras will be delivered with this firmware version. This also holds for possible repairs or updates for cameras in the factory.

*) This model will be equipped with Release 3 from its series production start in September 2019 already.

2.3 New Functions and Improvements

Block	Feature	Description
Auto functions	ExposureAuto	Controls the brightness automatically via exposure value
	GainAuto	Controls the brightness automatically via gain value
	BrightnessAutoPriority	Customer can select, which brightness function has the higher priority, if ExposureAuto and GainAuto are activated
	BrightnessAuto ROI	Customer can select an ROI in the used image, where the brightness calculation is active
	BalanceWhiteAuto	controls the white balance of the image function improved and expanded: - Once or Continuous can be stored in the „User Set“ - Improved control in extreme conditions - Control over multiple images if the white balance has not yet been reached
	ColorTransformationAuto	Controls the used color correction (transformation) matrix automatically depends on the used light source
	BalanceWhiteAuto ROI	Customer can select an ROI in the used image, where the white balance calculation is active
Process synchronization	Chunk SequencerSetActive	Returns the active sequencer set inside the chunk data.
	Chunk Counter value	Returns the current value of the selected counter inside the chunk data.
	SequencerTriggerSource Counter1/2End	Starts the sequencer with the reception of the counter end
	SequencerTriggerActivation expanded with „LevelHigh“ and „LevelLow“ values	Specifies that the trigger is considered valid as long as the level of the source signal is high or low.
	Support of Encoders via CounterEnd Triggersource	With the new Trigger Source „Counter1/2End“ and the counter function it is possible to divide encoder signals and to trigger the camera at a defined encoder position.
Simplification	Memory Max Blocks	Customer can read the maximum used image buffer inside the camera
	Output Color Space	Customer can read the used color space, where are calculated the color correction matrix inside the camera
	Sensor Name	Customer can read the used sensor name
	Sensor Pixel Size	Customer can read the used pixel size
	Sensor Shutter Mode	Customer can read the used shutter mode
Improvement	Additional Color Matrix for 5000 K and 9500 K Lightsource	3000 K, 5000 K, 6500 K or 9500 K light source are now selectable for highest color fidelity
	Custom Data	Customer can store his own value, like calibration data of lenses (up to 128 Byte)
	Energy Efficient Ethernet Enable (EEE-Mode) <i>only GigE Models</i>	All CX cameras supports Green Ethernet (EEE) per default. Many GigE PCI boards or GigE switches supports also the EEE mode, but not all components works perfectly. With Release 3 it is possible to „Disable“ the EEE Mode, if problems arise with components.
	Min. Height monochrome = 1 line and color = 2 lines	With Release 3 it is possible to use 1 line with ROI for monochrome global shutter cameras
	SFNC 2.4	Supports the latest Standard Feature Naming Convention
	Sequencer input lines with debouncer functionality	Debouncer function of input lines can now used within the sequencer function
	Image content errors with ROIs smaller than 512 pixels	Improvement of the ROI function
	Sony IMX264 sensor pixel clock changed (all VCXU-51 or VCXG-51 Models)	Slight adjustment of the pixel clock on advice from Sony to this sensor → Framerate in Full Frame is the same, only in small ROI it can be slower e.g. VGA resolution now with 139 fps (142 fps with R 2.x)
Note	Stored User Sets from Release 2.x incompatible with Release 3	Stored User Sets from Release 2 cannot be used for the new Firmware Release 3. If „User sets“ are used then it is necessary to store the Feature Set new with the Release 3.

2.4 Firmware Update Information/FAQs

Baumer aimed to keep all existing functions of Release 2 and add new functions in order to reach the highest possible compatibility for existing software environments. If, despite highest care, incompatibilities should occur, the device can be downgraded with the older Firmware Release 2 via UpdateTool.

In the transition period our customers will most likely contact you regarding the following questions.

1. Is it possible to update a camera originally delivered with firmware Release 2 to 3 in the field? What do I have to pay attention to?

An update from Release 2 to Release 3 is possible without restrictions. The UpdateTool can be requested from the Technical Support support.cameras@baumer.com.

NOTE: A firmware update from Release 1 to Release 3 of cameras in the field is **NOT** recommended, but possible (please see PM Info Switch to Release 2).

2. Is it possible to downgrade a camera originally delivered with firmware Release 3 to 2 in the field? What do I have to pay attention to?

Yes, this downgrade is possible as well. The fitting UpdateTool can be requested from the Technical Support support.cameras@baumer.com.

3 New CX Camera Models with IEEE1588 (PTP) Function

3.1 Function

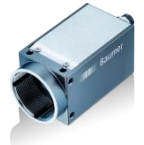
IEEE1588 Precision Time Protocol (PTP) manages the time synchronization of several devices joined in an Ethernet network. The precise time synchronization of all components in the network to a Master Clock enables an easy and precise matching of image and/or process data and also simplifies the whole system setup. Especially in multi camera setup this simplification is of advantage. Cameras with the latest sensor technology usually allow extremely high clock rates in the machine process. This in turn requires a significantly faster time synchronization of all machine components and a consistent standardized synchronization procedure.

Block	Feature	Description
Time synchronization	IEEE1588 Master and Slave Function	The camera can be used as a PTP master or as a PTP slave.
	IEEE1588 Scheduled Action CMD	The camera can triggered via an action command where is possible to send the planed time for a trigger event inside the camera.
	IEEE1588 synchronized AcquisitonFramerate	A multi camera system can be synchronized e.g. 10 Hz with the feature "Adjustable Acquisition Frame Rate" without additional process interface cabling, for example a trigger cable. All cameras take the picture at the same time.
Process synchronization	ActionCMD Request ID	Additional Request ID and Source IP inside the Action CMD will copy to the Image Chunk "Trigger ID" for image data mapping with process data, e.g. a trigger number.
	Trigger ID inside Chunk	Returns the Trigger ID and the Trigger SourceIP inside the chunk data. The Trigger ID counts the incoming triggers of the signal selected at TriggerSource. When the signal "Action1" (Action CMD) is selected, the Request ID and the Source IP of the triggering device are output.

Note: The cameras with IEEE1588 functionality (.PTP) are not equipped with Auto Features. This combination is not possible for technical reasons (hardware). In Chapter 4 "[Function Comparison of the CX Series and CX.PTP Series](#)" the respectively available features are displayed.

3.2 Models

3.2.1 VCXG Cameras



Model	MP	Sensor	Resolution [px]	Pixel size [µm]	Full frames [max. fps / 8 bit]
VCXG-32M/C.PTP	3.0	IMX265	2048 × 1536	3.45 × 3.45	55* 39
VCXG-51M/C.PTP	5.0	IMX264	2448 × 2048	3.45 × 3.45	35* 23
VCXG-124M/C.PTP	12.0	IMX304	4096 × 3000	3.45 × 3.45	15* 10

* Burst Mode

3.2.2 VCXG.I Cameras



Model	MP	Sensor	Resolution [px]	Pixel size [µm]	Full frames [max. fps / 8 bit]
VCXG-32M/C.I.PTP	3.0	IMX265	2048 × 1536	3.45 × 3.45	55* 39
VCXG-51M/C.I.PTP	5.0	IMX264	2448 × 2048	3.45 × 3.45	35* 23
VCXG-124M/C.I.PTP	12.0	IMX304	4096 × 3000	3.45 × 3.45	15* 10

* Burst Mode

On Request: XT Models → currently not planned with PTP function

3.3 Schedule


First models will be available in September 2019. The serial production of all models starts in the end of December 2019.

3.4 Update of existing CX Models to CX.PTP Models

It is **NOT** possible to update existing camera models of the CX series with the PTP firmware. For evaluation and project integration new PTP camera models have to be ordered from Baumer.

4 Function Comparison of the CX Series and CX.PTP Series

Functionality (basic features)	CX		CX.PTP	CX.I Standard / XT	CX.I.PTP Standard
	Global Shutter	Rolling Shutter	Global Shutter	Global Shutter	Global Shutter
Basic functions					
Exposure		✓			✓
Gain / Color-Gain		✓			✓
Trigger / Exposure Active [Flash]		✓			✓
Binning 2x2		✓			✓
PartialScan		✓			✓
Offset		✓			✓

Functionality (advanced features)	CX		CX.PTP	CX.I Standard / XT	CX.I.PTP Standard
	Global Shutter	Rolling Shutter	Global Shutter	Global Shutter	Global Shutter
Auto functions					
ExposureAuto (new ≥ R3.0) (Once/Continuous)	✓	✓	✗	✓	✗
GainAuto (new ≥ R3.0) (Once/Continuous)	✓	✓	✗	✓	✗
WhiteBalanceAuto (Once/Continuous)	✓	✓	✓	✓	✓
ColorTransformationAuto (new ≥ R3.0) (Once/Continuous)	✓	✓	✗	✓	✗
Image Pre-processing					
Image Flipping (x/y)	✓	 ✓ ✗	✓	✓	✓
Color processing (RGB, BGR, Mono)	✓	✓	✓	✓	✓
Color Enhancement (with optimized ColorTransformationMatrix)	✓	✓	✓	✓	✓
LUT / Gamma	✓	✓	✓	✓	✓
Acquisition/Interface					
Burst Mode	✓	✓	✓	✓	✓
Adjustable Framerate	✓	✓	✓	✓	✓
Short Exposure Time Enable *)	✓	✗	✓	✓	✓
Device Link Throughput Limit	✓	✓	✓	✓	✓

Functionality (advanced features)	CX		CX.PTP	CX.I Standard / XT	CX.I.PTP Standard
	Global Shutter	Rolling Shutter	Global Shutter	Global Shutter	Global Shutter
Process Synchronization					
Events	✓	✓	✓	✓	✓
Timer	✓	✓	✓	✓	✓
Triggerdelay	✓	✓	✓	✓	✓
Debouncer	✓	✓	✓	✓	✓
Counter	✓	✓	✓	✓	✓
Sequencer	✓	✗	✓	✓	✓
Trigger via ActionCMD [GigE]	✓	✓	✓	✓	✓
ActionCMD Request ID (new ≥ R3.0)	✗	✗	✓	✗	✓
Trigger ID inside Chunk (new ≥ R3.0)	✗	✗	✓	✗	✓
Additional Output Modes [e.g.: TriggerReady]	✓	✓	✓	✓	✓
PWM [PWMDuration/ PWMDutyCycle]	✗	✗	✗	✓	✓
Selectable Output format [e.g.: Tri State, PushPull]	✗	✗	✗	✓	✓
Chunkdata inside transferred Image	✓	✓	✓	✓	✓
Support of Encoders via CounterEnd Triggersource (new ≥ R3.0)	✓	✓	✓	✓	✓
Time synchronization IEEE1588 (=PTP)					
IEEE1588 / Master and Slave Function (new ≥ R3.0)	✗	✗	✓	✗	✓
IEEE1588 / Sceduled Action CMD (new ≥ R3.0)	✗	✗	✓	✗	✓
IEEE1588 / synchronised AcquisitionFramerate (new ≥ R3.0)	✗	✗	✓	✗	✓
Additional					
UserSet (EX= 1x/ CX=3x)	✓	✓	✓	✓	✓
„InHouse“ temperatur sensor	✓	✓	✓	✓	✓
readable additional Information (new ≥ R3.0) (Number of Buffer, Sensorinformation)	✓	✓	✓	✓	✓
save Customer Data (new ≥ R3.0)	✓	✓	✓	✓	✓