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## INTRODUCTION

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With the release of the new C6 series in 2021 major changes came in comparison to the former C5 series which was released first in 2014. To give you a better understanding what the main differences between both camera series are, you can find an overview of all changes in this application note. First you will find a direct node comparison which is mainly interesting when it comes to the programming part of the new C6. Afterwards you will get a description how the features are set compared to the previous flow.

In the case of any troubles please get in touch with our support team over the following mail address ([support@AutomationTechnology.de](mailto:support@AutomationTechnology.de)) or directly with your distributor.

## NODE COMPARISON

Below you can find a node comparison table where on the right side the new features of the C6 series are displayed and on the left the former version from the C5 series. In the case of a new feature in the C6 you will have an empty entry on the C5 side.

The new C6 is mainly based on the SFNC 2.6 version and thus some categories have changed and are now positioned differently than before.

C5				C6			
Name	Value	Category	Namespace	Name	Value	Category	Namespace
DeviceScanType	LineScan3D	Device Control	Standard	DeviceScanType	LineScan3D	Device Control	Standard
				RegionSelector	Region0 / Scan3dExtraction0	Image Format Control	Standard
				RegionMode	On / Off		
				RegionIDValue	>=0		
Width	0-4096*	Image Format Control	Standard	Width[RegionSelector]	0-4096*		
OffsetX	0-4095*			OffsetX[RegionSelector]	0-4095*		
AoiHeight	0-3072*	AOIs	Custom	Height[RegionSelector]	0-3072*		
AoiOffsetY	0-3071*			OffsetY[RegionSelector]	0-3071*		
ProfilesPerFrame	>0*	ModeAndAlgorithmControl	Custom	Height[RegionSelector]	>0*		
ReverseX	True / False	Image Format Control	Standard	ReverseX	True / False		
ReverseY	True / False			ReverseY	True / False		

				ComponentSelector	Intensity / Range / Reflectance / ScatterConfidence / Scatter		
EnableDC0	True / False	DataOut put	Custom	ComponentEnable[Comp onentSelector]	True / False		
EnableDC1	True / False						
EnableDC2	True / False						
				ComponentIDValue[Com ponentSelector]	1-7		
PixelFormat	Mono8 / Mono10 / Mono16*	Image Format Control	Standard	PixelFormat	Mono8 / Mono10 / Mono10p / Mono12 / Mono12p / Mono16 /Coord3D_C8 / Coord3D_C10p / Coord3D_C12p / Coord3D_C16		
MultiSlopeMode	Manual	Acquisiti on Control	Standard	MultiSlopeMode	Manual / PresetSoft / PresetMedium / PresetAggressive	Acquisition Control	Standard
MultiSlopeKneeP ointCount	0-2			MultiSlopeKneePointCou nt	0-2		
MultiSlopeKneeP ointSelector	1-2			MultiSlopeKneePointSele ctor	1-2		
MultiSlopeExpos ureLimit	0-100			MultiSlopeExposureLimit	0-100		
MultiSlopeSatura tionThreshold	0-100			MultiSlopeSaturationThr eshold	0-100		
ExposureMode	Timed			ExposureMode	Timed		
ExposureTime	>0			ExposureTime	>0		

AcquisitionMode	Continuous / SingleFrame / MultiFrame			AcquisitionMode	Continuous		
SequencerMode	FreeRun / StartStopCam eralInput12 / StartCameral nput1 / GateCameral nput1 / StartStopCam eralInput12Ev ent / AutoStart	Trigger Control	Custom	AcquisitionStopMode	Complete / Immediate / ImmediateWithPadding		Standard
				TriggerSelector	AcquisitionStart / AcquisitionStop		
ProfileTriggerMode	FreeRun / CameraInput1 / CameraInput2 / EncoderResol verInterfaceR S422	Trigger Control	Custom	TriggerSelector	AcquisitionStart / AcquisitionEnd / FrameBurstStart / FrameBurstEnd / FrameStart / FrameEnd / LineStart		
				TriggerMode[TriggerSelector]	Off/On		
				TriggerSoftware[TriggerSelector]	Command		
				TriggerSource[TriggerSelector]	Line0-Line5		
				TriggerActivation[TriggerSelector]	RisingEdge / FallingEdge / AnyEdge		

				EncoderSourceA[EncoderSelector]	Line2 (DI2_A)	Encoder Control	
				EncoderSourceB[EncoderSelector]	Line3 (DI2_B)		
				EncoderMode[EncoderSelector]	FourPhase / HighResolution		
TriggerDivider	>0	Resolver RS422	Custom	EncoderDivider[EncoderSelector]	>0		
				EncoderOutputMode[EncoderSelector]	Off / PositionUp / PositionDown / DirectionUp / DirectionDown / Motion		
TriggerCoord	>0	Resolver RS422	Custom	EncoderValue[EncoderSelector]	>0		
				LineSelector	Line0 (DI0) / Line1 (DI1) / Line2 (DI_A) / Line3 (DI_B) / Line4 (DI_Z) / Line5 (DO1) / Line6 (DO2)	DigitalIOControl	Standard
				LineMode[LineSelector]	Input / Output		
UserSetSelector	Factory / UserSet1 / UserSet2 / UserSet3	User Set Control	Standard	UserSetSelector	Default / UserSet0 / UserSet1 / UserSet2	User Set Control	Standard
UserSetLoad	Command			UserSetLoad	Command		
UserSetSave				UserSetSave			
UserSetDefaultSelector	Factory / UserSet1 / UserSet2 / UserSet3		Custom	UserSetDefault	Default / UserSet0 / UserSet1 / UserSet2		Custom

				Scan3dExtractionSelector	Scan3dExtraction0 / Scan3dExtraction1	Scan3dControl	Standard
				Scan3dExtractionSource[Scan3dExtractionSelector]	Region0 / Region1		
CameraMode	Image / FIRPeak / COG / TRSH / MAX	ModeAndAlgorithmControl	Custom	Scan3dExtractionMethod[Scan3dExtractionSelector]	FIRPeak / COG / TRSH / MAX		Custom
AOIThreshold	0-1023	AOIs	Custom	Scan3dExtractionThreshold	0-1023		
				MultiPeakMode	Best / First / Last / Manual		
FIRMode	Off / Smoothing / Derivative	FIR Control	Custom	Scan3dFilterMode	Off / Smoothing / Derivative / Manuel		
FIRCoef	SG5-9 / AV5-9 / Custom			Scan3dFilterSize	Small / Normal / Large		
FIRGain	1						
				Scan3dOutputMode[Scan3dExtractionSelector]	UncalibratedC		Standard
				Scan3dCoordinateSelector[Scan3dExtractionSelector]	CoordinateA / CoordinateB / CoordinateC		
NumSubPixel	0-6	ModeAndAlgorithmControl	Custom	Scan3dCoordinateScale[Scan3dExtractionSelector]			
				Scan3dCoordinateOffset[Scan3dExtractionSelector]			

				Scan3dInvalidDataFlag[Scan3dExtractionSelector]	True / False		
				Scan3dInvalidDataValue[Scan3dExtractionSelector]	0.0		
LightControllerType	Generic	Light Control	Custom	LightControllerType	Generic	Light Control	Custom
LightBrightnessControlMode	Analog		Custom	LightBrightnessControlMode	Analog		
LightControllerSource	ExposureActive		Standard	LightControllerSource	ExposureActive		Standard
LightBrightness	0-100		Standard	LightBrightness	0-100		

Features with \* vary between different C6 camera types



## USE CASES

In this chapter we will explain how to set parameter in the camera to get some specific functions like 3D mode or external trigger mode.

How to set 3D mode?	Set the 3D mode over DeviceScanType from AreaScan to LineScan3D.
How do I change the camera algorithms?	In AreaScan mode the camera shows only the 2D image. In LineScan3D mode you change the modes over Scan3dExtractionMethod.
How can I select the 3D output data?	Set the RegionSelector i.e. to Scan3dExtraction0. Enable Scan3dExtraction0 over RegionMode. Select ComponentSelector to choose the output data. Enable the component over ComponentEnable.
How do I change the AoIThreshold?	In the C6 series the threshold for the 3D algorithms is set over Scan3dExtractionThreshold.
How do I change the AOI?	Set the RegionSelector i.e. to Region0. Enable Region0 over RegionMode. Now you can modify the Width, Height, OffsetX, OffsetY, ReverseX, ReverseY, PixelFormat for this region.
How do I set the number of profiles per frame?	Set the RegionSelector i.e. to Scan3dExtraction0. Enable Scan3dExtraction0 over RegionMode. Height will set the number of profiles per frame.
How to set the exposure time?	Set the exposure time over the appropriate node ExposureTime.

How to set external trigger mode for quadrature encoder?	Set EncoderSourceA to In Enc-A and EncoderSourceB to In Enc-B. You can then choose under EncoderMode between Four Phase and High Resolution. First will use every 4 <sup>th</sup> raw trigger with jitter filter whereas the second uses every raw trigger without jitter filter. Last set EncoderResetActivation to a value different than LevelLow.
How can I set the trigger increment?	Change the EncoderDivider. Have in mind that the EncoderMode also influence the trigger increment

### ***Mono8 3D mode***

The C6 series is able to use Mono8 while running in 3D mode. This feature can help to further increase the maximum data throughput over the GigE cable. Reducing the data format from 16 bit to 8 bit, reduce the amount of data by two.

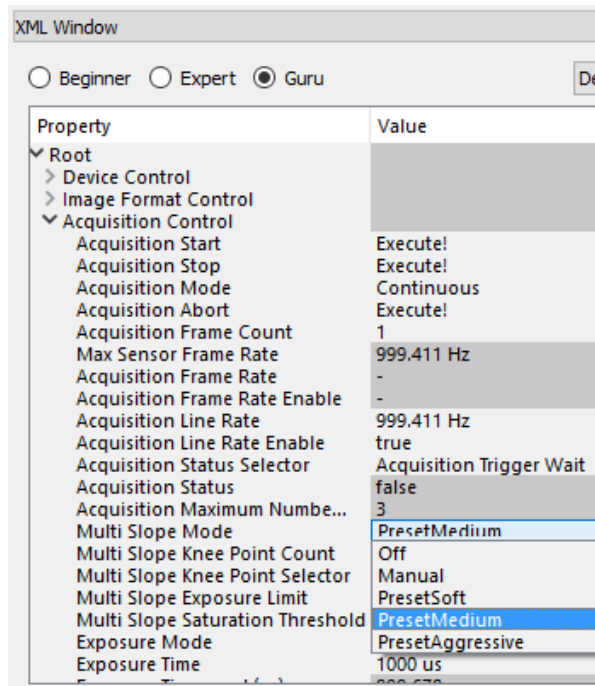
The Mono8 3D mode has some limitations that need to be followed in order to achieve proper results. The following table describes the relation between numbers of rows to subpixel accuracy.

Subpixel Row	0	1	2	3	4	5	6
3	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✗
15	✓	✓	✓	✓	✓	✗	✗
31	✓	✓	✓	✓	✗	✗	✗
63	✓	✓	✓	✗	✗	✗	✗
127	✓	✓	✗	✗	✗	✗	✗
255	✓	✗	✗	✗	✗	✗	✗

Using numbers of rows with a higher subpixel accuracy then stated in the table above can result in a bit overflow. That happen easy, when the pixel values go over the 255 ( $2^8 - 1$ ) range.

## ***Multi Slope Mode***

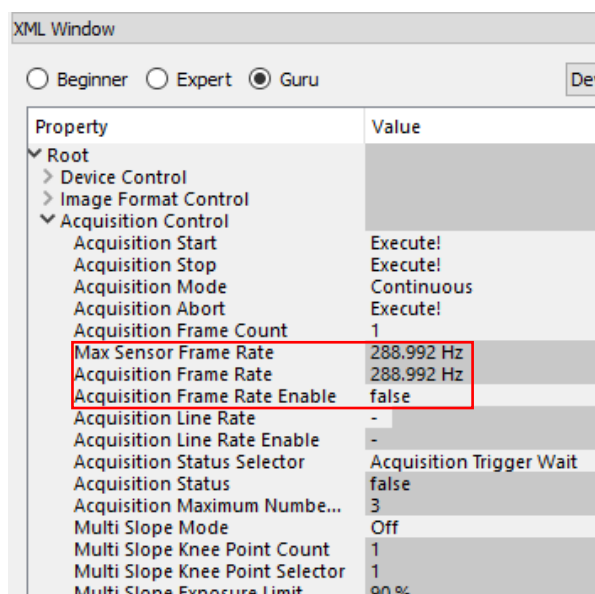
The *Multi Slope Mode* has now three pre-defined settings to make it much easier to find the right set up. Nevertheless it is possible to manually adjust the Multi Slope feature or to disable it.



## ***Sensor Frame Rate / Line Rate***

The *Max Sensor Frame Rate* shows the maximum speed the camera can run either in 2D or 3D mode.

The *Acquisition Frame Rate* shows the current speed the camera run in 2D image mode. Set the *Acquisition Frame Rate Enable* to *false* to get the maximum possible speed.



The *Acquisition Line Rate* shows the current speed the camera run in 3D mode. Set the *Acquisition Line Rate Enable* to *false* to get always the maximum possible speed.

XML Window	
<input type="radio"/> Beginner <input type="radio"/> Expert <input checked="" type="radio"/> Guru <span>D</span>	
Property	Value
✓ Root	
> Device Control	
> Image Format Control	
✓ Acquisition Control	
Acquisition Start	Execute!
Acquisition Stop	Execute!
Acquisition Mode	Continuous
Acquisition Abort	Execute!
Acquisition Frame Count	1
Max Sensor Frame Rate	1070.17 Hz
Acquisition Frame Rate	-
Acquisition Frame Rate Enable	-
Acquisition Line Rate	1070.17 Hz
Acquisition Line Rate Enable	false
Acquisition Status Selector	Acquisition Trigger Wait
Acquisition Status	false
Acquisition Maximum Numbe...	3
Multi Slope Mode	Off
Multi Slope Knee Point Count	1
Multi Slope Knee Point Selector	1
Multi Slope Exposure Limit	00 %

## DOCUMENT REVISION

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Rev. No.	Date	Modification
1.0	19.01.2021	First release