

## Pco Tango Cpp Class

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### **Pco Class Identification :**

Contact : at null - null  
 Class Family :  
 Platform :  
 Bus :  
 Manufacturer :  
 Manufacturer ref. :

### **Pco Class Inheritance :**

- [Tango::DeviceImpl](#)
  - Pco

### **Pco Class Description :**

The Tango PCO ccd class uses the software development kit (SDK) for Windows from PCO to access the ccd devices.

<http://www.pco.de/software/>

The SDK is capable to handle a series of different ccd cameras. The server was tested with a Pco4000 camera but should work also for the other cameras supported by the SDK.

The camera dependent parameters like the maximum image size for example is read directly from the hardware via the camera description structure of the SDK. These parameters are displayed in the status text.

Actually the server works only with one camera. To handle several cameras on the same PC, some extension is necessary.

## Device server for PCO ccd cameras Device Description

### Pco Class

#### Revision: - Author:

The Tango PCO ccd class uses the software development kit (SDK) for Windows from PCO to access the ccd devices. <http://www.pco.de/software/> The SDK is capable to handle a series of different ccd cameras. The server was tested with a Pco4000 camera but should work also for the other cameras supported by the SDK.

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#### Pco Properties :

There is no class properties

There is no device properties

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Pco Class Commands				
Name	Input type	Output type	Level	Description
<a href="#">State</a>	DEV_VOID	DEV_STATE	OPERATOR	This command gets the device state (stored in its <i>device_state</i> data member) and returns it to the caller.
<a href="#">Status</a>	DEV_VOID	CONST_DEV_STRING	OPERATOR	This command gets the device status (stored in its <i>device_status</i> data member) and returns it to the caller.

<a href="#">Reset</a>	DEV_VOID	DEV_VOID	OPERATOR	Reset a FAULT state and set the binning to 1 and the ROI to the full image size.
<a href="#">Stop</a>	DEV_VOID	DEV_VOID	OPERATOR	Stop the current acquisition.
<a href="#">StartStandardAcq</a>	DEV_VOID	DEV_VOID	OPERATOR	Start an acquisition with the prepositioned parameters
<a href="#">Live</a>	DEV_VOID	DEV_VOID	OPERATOR	Start a live acquisition. Image are aquired in an endless loop with the prepositioned parameters. The Stop command ends the live acquisition.

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### **Command State :**

This command gets the device state (stored in its *device\_state* data member) and returns it to the caller.

State Definition		
Input Argument	Tango::DEV_VOID	none.
Output Argument	Tango::DEV_STATE	State Code
DisplayLevel	OPERATOR	..
Inherited	true	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

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### **Command Status :**

This command gets the device status (stored in its *device\_status* data member) and returns it to the caller.

Status Definition		
Input Argument	Tango::DEV_VOID	none.
Output Argument	Tango::CONST_DEV_STRING	Status description
DisplayLevel	OPERATOR	..
Inherited	true	..
Abstract	false	..
Polling Period	Not polled	..
Command allowed for	All states	..

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### **Command Reset :**

Reset a FAULT state and set the binning to 1 and the ROI to the full image size.

Reset Definition		
Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command NOT allowed for	• RUNNING	..

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### **Command Stop :**

Stop the current acquisition.

Stop Definition		
Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
Command NOT allowed for	• FAULT	..

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### **Command StartStandardAcq :**

Start an acquisition with the prepositioned parameters

StartStandardAcq Definition		
Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	

DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		..
Command NOT allowed for	• RUNNING	..

### Command Live :

Start a live acquisition. Image are aquired in an endless loop with the prepositioned parameters. The Stop command ends the live acquisition.

Live Definition		
Input Argument	Tango::DEV_VOID	
Output Argument	Tango::DEV_VOID	
DisplayLevel	OPERATOR	..
Inherited	false	..
Abstract	false	..
Polling Period	Not polled	..
		..
Command NOT allowed for	• RUNNING	..

Pco Class Attributes							
Name	Inherited	Abstract	Attr. type	R/W type	Data type	Level	Description
<a href="#">Image</a>	false	false	Scalar	READ	Tango::DEV_ENCODED	OPERATOR	The 16bit monochrome image of the camera as encoded data.
<a href="#">ExposureTime</a>	false	false	Scalar	READ_WRITE	Tango::DEV_DOUBLE	OPERATOR	The expousre time in seconds for the camera.\nChanging the exposure time is also possible in live mode.
<a href="#">DelayTime</a>	false	false	Scalar	READ_WRITE	Tango::DEV_DOUBLE	OPERATOR	Delay in seconds between the trigger and the start of image acquisition.\nChanging the delay time is also possible in live mode.
							The supported trigger modes for PCO cameras

<a href="#">TriggerMode</a>	false	false	Scalar	READ_WRITE	Tango::DEV_SHORT	OPERATOR	are:\n \n 1 = Software trigger (external signal not used)\n \n 2 = External Trigger : A delay / exposure sequence is started \n at the RISING or FALLING edge (depending on the DIP switch setting) of the trigger input.\n \n 3 = External gate : The exposure time is defined by the pulse\n length at the trigger input.\n
<a href="#">FileSaving</a>	false	false	Scalar	READ_WRITE	Tango::DEV_BOOLEAN	OPERATOR	Save a file for every image taken when true.\nRunning in live mode with file saving set to true,\nwill result in a saved image file for every acquired image!
<a href="#">FileDir</a>	false	false	Scalar	READ_WRITE	Tango::DEV_STRING	OPERATOR	Path to the camera image files.
<a href="#">FilePrefix</a>	false	false	Scalar	READ_WRITE	Tango::DEV_STRING	OPERATOR	The prefix of the image files to be created.\nThe full image file name will be composed as\n \n <b>prefix_number.postfix</b> \n \nwhen acquiring images.
<a href="#">FileStartNum</a>	false	false	Scalar	READ_WRITE	Tango::DEV_LONG	OPERATOR	The file number used when storing an image file.\nAfter saving a file, this number gets increased by one.\nTo override an image file, the file number has to be set again.
<a href="#">FilePostfix</a>	false	false	Scalar	READ_WRITE	Tango::DEV_STRING	OPERATOR	The Pco server allows the following postfix:\n \n.tif = <b>16 bit monochrome tif image file</b> \n \n.bin = <b>Binary data file without header</b> .\n A text file with the same name contains the image characteristics.\n \nThe postfix determines the image format for the saved\nimage files.
<a href="#">Width</a>	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	The maximum image width without an applied ROI.
<a href="#">Height</a>	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	The maximum image height without an applied ROI.
							Counts the images acquired via the device

<a href="#">ImageCounter</a>	false	false	Scalar	READ	Tango::DEV_LONG	OPERATOR	server. The count increases, when a new image is ready
<a href="#">Binning_x</a>	false	false	Scalar	READ_WRITE	Tango::DEV_SHORT	OPERATOR	for reading. Binning to apply in X (width).
<a href="#">Binning_y</a>	false	false	Scalar	READ_WRITE	Tango::DEV_SHORT	OPERATOR	Binning to applied in Y (height)
<a href="#">ROI_x_min</a>	false	false	Scalar	READ_WRITE	Tango::DEV_LONG	OPERATOR	Position of the left ROI edge in the image.
<a href="#">ROI_x_max</a>	false	false	Scalar	READ_WRITE	Tango::DEV_LONG	OPERATOR	Position of the right ROI edge in the image.
<a href="#">ROI_y_min</a>	false	false	Scalar	READ_WRITE	Tango::DEV_LONG	OPERATOR	Position of the upper ROI edge in the image.
<a href="#">ROI_y_max</a>	false	false	Scalar	READ_WRITE	Tango::DEV_LONG	OPERATOR	Position of the lower ROI edge in the image.
<a href="#">Pixelrate</a>	false	false	Scalar	READ_WRITE	Tango::DEV_LONG	OPERATOR	The frequency of the pixel clock in MHz. For a PCO4000 camera this can be 8 MHz or 32 MHz.
<a href="#">ADCs</a>	false	false	Scalar	READ_WRITE	Tango::DEV_SHORT	OPERATOR	The number of ADCs to use for the image acquisition. 2 ADCs for a faster readout and 1 ADC for a better linearity.
<a href="#">CoolingTempSet</a>	false	false	Scalar	READ_WRITE	Tango::DEV_SHORT	OPERATOR	The temperature setpoint of the ccd sensor cooling.
<a href="#">CoolingTemp</a>	false	false	Scalar	READ	Tango::DEV_DOUBLE	OPERATOR	The actual temperature of the ccd sensor.
<a href="#">ImageTimeStamp</a>	false	false	Scalar	READ_WRITE	Tango::DEV_BOOLEAN	OPERATOR	Write a time stamp in the acquired image.

**There is no dynamic attribute defined.**

### **Attribute Image :**

The 16bit monochrome image of the camera as encoded data.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ
Data Type	Tango::DEV_ENCODED
Display Level	OPERATOR

Attribute Properties	
label	Ccd Image
unit	
standard unit	
display unit	
format	RawImage

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set

Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	Not set
Read allowed for	All states

max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

**Attribute ExposureTime :**

The exposure time in seconds for the camera. Changing the exposure time is also possible in live mode.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_DOUBLE
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	• FAULT
Write allowed for	All states

Attribute Properties	
label	Exposure Time
unit	s
standard unit	
display unit	
format	%6.4f
max_value	
min_value	0.0001
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set



**Attribute DelayTime :**

Delay in seconds between the trigger and the start of image acquisition.\nChanging the delay time is also possible in live mode.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_DOUBLE
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>• FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	Delay Time
unit	s
standard unit	
display unit	
format	%6.4f
max_value	
min_value	0
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

**Attribute TriggerMode :**

The supported trigger modes for PCO cameras are:\n

\n 1 = Software trigger (external signal not used)\n

\n 2 = External Trigger : A delay / exposure sequence is started \n at the RISING or FALLING edge (depending on the DIP switch setting) of the trigger input.\n

\n 3 = External gate : The exposure time is defined by the pulse\n length at the trigger input.\n

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_SHORT
Display Level	OPERATOR
Inherited	false

Attribute Properties	
label	Trigger Mode
unit	
standard unit	
display unit	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set

Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

format	%1d
max_value	3
min_value	1
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

**Attribute FileSaving :**

Save a file for every image taken when true.\nRunning in live mode with file saving set to true,\nwill result in a saved image file for every acquired image!

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_BOOLEAN
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>• FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	File Saving
unit	
standard unit	
display unit	
format	
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute FileDir :**

Path to the camera image files.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_STRING
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"><li>• RUNNING</li><li>• FAULT</li></ul>
Write allowed for	All states

Attribute Properties	
label	Image File Path
unit	
standard unit	
display unit	
format	
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

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### **Attribute FilePrefix :**

The prefix of the image files to be created.\n\nThe full image file name will be composed as\n\n\\nprefix\_number.postfix\n\n\nwhen acquiring images.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_STRING
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true

Attribute Properties	
label	Image File Prefix
unit	
standard unit	
display unit	
format	
max_value	
min_value	
max_alarm	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set

Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute FileStartNum :**

The file number used when storing an image file. After saving a file, this number gets increased by one. To override an image file, the file number has to be set again.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_LONG
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	Image File Number
unit	
standard unit	
display unit	
format	%5d
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute FilePostfix :**

The Pco server allows the following postfix:  
 \n.tif = 16 bit monochrome tif image file \n

\n**.bin = Binary data file without header.**\n A text file with the same name contains the image characteristics.\n  
 \nThe postfix determines the image format for the saved\nimage files.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_STRING
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	Image File Postfix
unit	
standard unit	
display unit	
format	
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute Width :**

The maximum image width without an applied ROI.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ
Data Type	Tango::DEV_LONG
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	Not set
Read allowed for	All states

Attribute Properties	
label	Image Width
unit	pixel
standard unit	
display unit	
format	%4d
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set

min_warning	
delta_time	
delta_val	

Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

**Attribute Height :**

The maximum image height without an applied ROI.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ
Data Type	Tango::DEV_LONG
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	Not set
Read allowed for	All states

Attribute Properties	
label	Image Height
unit	pixel
standard unit	
display unit	
format	%4d
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

**Attribute ImageCounter :**

Counts the images acquired via the device server.\n\nThe count increases, when a new image is ready for\n\nreading.

<b>Attribute</b>
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<b>Attribute</b>
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<b>Attribute Event Criteria</b>
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Definition	
Attribute Type	Scalar
R/W Type	READ
Data Type	Tango::DEV_LONG
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	Not set
Read allowed for	All states

Properties	
label	Image Counter
unit	
standard unit	
display unit	
format	%6d
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute Binning\_x :**

Binning to apply in X (width).

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_SHORT
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>RUNNING</li> <li>FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	Binning X
unit	
standard unit	
display unit	
format	%1d
max_value	2
min_value	1
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

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**Attribute Binning\_y :**

Binning to applied in Y (height)

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_SHORT
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"><li>• RUNNING</li><li>• FAULT</li></ul>
Write allowed for	All states

Attribute Properties	
label	Binning Y
unit	
standard unit	
display unit	
format	%1d
max_value	4
min_value	1
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

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**Attribute ROI\_x\_min :**

Position of the left ROI edge in the image.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_LONG
Display Level	OPERATOR
Inherited	false
Abstract	false

Attribute Properties	
label	ROI_X min
unit	pixel
standard unit	
display unit	
format	%4d

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
	Not



Polling Period	Not polled
Memorized	true
Write hardware at init.	Not set
Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Archive Periodic	set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute ROI\_x\_max :**

Position of the right ROI edge in the image.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_LONG
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	Not set
Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	ROI_X max
unit	pixel
standard unit	
display unit	
format	%4d
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute ROI\_y\_min :**

Position of the upper ROI edge in the image.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_LONG
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	Not set
Read NOT allowed for	<ul style="list-style-type: none"> <li>RUNNING</li> <li>FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	ROI_Y min
unit	pixel
standard unit	
display unit	
format	%4d
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute ROI\_y\_max :**

Position of the lower ROI edge in the image.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_LONG
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	Not set
Read NOT allowed for	<ul style="list-style-type: none"> <li>RUNNING</li> <li>FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	ROI_Y max
unit	pixel
standard unit	
display unit	
format	%4d
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false

Push DataReady event by user code	Not set
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### **Attribute Pixelrate :**

The frequency of the pixel clock in MHz.\nFor a PCO4000 camera this can be 8 MHz or\n32 MHz.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_LONG
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	Pixelrate
unit	MHz
standard unit	
display unit	
format	%2d
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute ADCs :**

The number of ADCs to use for the image acquisition.\n2 ADCs for a faster readout and 1 ADC for a better\nlinearity.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_SHORT
Display Level	OPERATOR
Inherited	false

Attribute Properties	
label	ADCs
unit	
standard unit	
display unit	
format	%1d

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set

Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

max_value	2
min_value	1
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

**Attribute CoolingTempSet :**

The temperature setpoint of the ccd sensor cooling.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_SHORT
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true
Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

Attribute Properties	
label	Ccd Sensor Temp. Setpoint
unit	C
standard unit	
display unit	
format	%2d
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

**Attribute CoolingTemp :**

The actual temperature of the ccd sensor.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ
Data Type	Tango::DEV_DOUBLE
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	Not set
Read allowed for	All states

Attribute Properties	
label	Ccd Sensor Temperature
unit	C
standard unit	
display unit	
format	%4.1f
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	
min_warning	
delta_time	
delta_val	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set
Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

### **Attribute ImageTimeStamp :**

Write a time stamp in the acquired image.

Attribute Definition	
Attribute Type	Scalar
R/W Type	READ_WRITE
Data Type	Tango::DEV_BOOLEAN
Display Level	OPERATOR
Inherited	false
Abstract	false
Polling Period	Not polled
Memorized	true
Write hardware at init.	true

Attribute Properties	
label	Image Time Stamp
unit	
standard unit	
display unit	
format	
max_value	
min_value	
max_alarm	
min_alarm	
max_warning	

Attribute Event Criteria	
Periodic	Not set
Relative Change	Not set
Absolute Change	Not set
Archive Periodic	Not set
Archive Relative Change	Not set
Archive Absolute Change	Not set

Read NOT allowed for	<ul style="list-style-type: none"> <li>• RUNNING</li> <li>• FAULT</li> </ul>
Write allowed for	All states

min_warning_delta_time	
delta_val	

Push Change event by user code	false
Push Archive event by user code	false
Push DataReady event by user code	Not set

Pco Class States	
Name	Description
ON	The camera is ready to take images.
RUNNING	An acquisition is running.
FAULT	An error occurred on the camera during an acquisition. Confirm with a Reset command or execute the next command. The Reset command will also the binning and the ROI to the full image size.