



**TANGO Device Server**

# test
# User's Guide

# Emittance Class

**Revision: Emittance-Release_3_0 - Author: poncet**
**Implemented in C++ - CVS repository: ESRF**

## Introduction:

## Class Inheritance:

- Tango::Device_4Impl
  - Emittance

## Properties:

## Device Properties

| Property name | Property type | Description |
|---|---|---|
| **Ccd_device** | Tango::DEV_STRING | Nane of the ccd device |
| **Bpm_device** | Tango::DEV_STRING | Nane of the bpm device |
| **Ct_device** | Tango::DEV_STRING | Name of the current transformer device used to detect an available beam. |
| **Pixel_size** | Tango::DEV_DOUBLE | Pixel size in the image in um |
| **Beta_vertical** | Tango::DEV_DOUBLE | The vertical Beta value at source-point |
| **Beta_horizontal** | Tango::DEV_DOUBLE | The horizontal Beta value at source-point |
| **Optical_error** | Tango::DEV_DOUBLE | Optical errors in um |
| **Photon_divergence** | Tango::DEV_DOUBLE | Photon divergence [urad fwhm] |
| **Source_distance** | Tango::DEV_DOUBLE | Distance [m] source point to scintillator screen |
| **Magnification** | Tango::DEV_DOUBLE | Magnification factor for the emittance calculation |
| **Full_image_height** | Tango::DEV_LONG | Full hight of the image to be analysed. The middle of the image size is used as reference to calculate the peak position in Y. |
| **Full_image_width** | Tango::DEV_LONG | Full width of the image to be analysed. The middle of the image size is used as reference to calculate the peak position in X. |
| **Min_gain** | Tango::DEV_DOUBLE | Minimum gain for the gain interval used by the automatic calibration |
| **Max_gain** | Tango::DEV_DOUBLE | Maximum gain for the gain interval used by the automatic calibration |
| **Min_exposure** | Tango::DEV_DOUBLE | Minimum exposure time for the exposure time interval used by the automatic calibration |
| **Max_exposure** | Tango::DEV_DOUBLE | Maximum exposure time for the exposure time interval used by the automatic calibration |
| **Pinhole_camera** | Tango::DEV_BOOLEAN | Indicates that the camera is used as a pinhole camera. A different formula is used to calculate the beam emittance. In this case the necessary parameters for the calculation are searched as free properties under the name given as pinhole_config_prop. |
| **Pinhole_config_prop** | Tango::DEV_STRING | The name of the free property where to find the parameters for the pinhole emittance calculation. |
| **Cof1** | Tango::DEV_DOUBLE | Coefficient 1 for pinhole emittance calculation in the vertical plane. |
| **Cof2** | Tango::DEV_DOUBLE | Coefficient 2 for pinhole emittance calculation in the vertical plane. |
| **Cof3** | Tango::DEV_DOUBLE | Coefficient 3 for pinhole emittance calculation in the vertical plane. |
| **Cof4** | Tango::DEV_DOUBLE | Coefficient 4 for pinhole emittance calculation in the vertical plane. |
| **Ccd_frame_rate** | Tango::DEV_DOUBLE | The camera frame rate to be applied to the ccd device when switching on the emittance calculation. |

Device Properties Default Values:

| Property Name | Default Values |
|---|---|
| Ccd_device | No default value |
| Bpm_device | No default value |
| Ct_device | No default value |
| Pixel_size | 5.61 |
| Beta_vertical | 35 |
| Beta_horizontal | 5.636 |
| Optical_error | 10 |
| Photon_divergence | 43.45 |
| Source_distance | 1.78 |
| Magnification | 1 |
| Full_image_height | 480 |
| Full_image_width | 640 |
| Min_gain | No default value |
| Max_gain | No default value |
| Min_exposure | No default value |
| Max_exposure | No default value |
| Pinhole_camera | false |
| Pinhole_config_prop | No default value |
| Cof1 | 0.0002 |
| Cof2 | 2.0 |
| Cof3 | 0.00003 |
| Cof4 | 3.0 |
| Ccd_frame_rate | 15 |

**There is no Class properties.**

# States:

| States | |
|---|---|
| **Names** | **Descriptions** |
| **OFF** | The acquisition is switched off |
| **ON** | The acquisition is switched on |
| **ALARM** | The maximum image itensity is not in the calibration interval. |
| **STANDBY** | |

# Attributes:

## Scalar Attributes

| Attribute name | Data Type | R/W Type | Expert |
|---|---|---|---|
| **Emittance**: Caluclated emittance | DEV_DOUBLE | READ | No |
| **PeakFwhm**: Calculated FWHM | DEV_DOUBLE | READ | No |
| **PeakPosition**: Calculated position | DEV_DOUBLE | READ | No |
| **ImageMaxIntensity**: Maximal intensity in the source image. | DEV_LONG | READ | No |
| **CalibMinIntensity**: Minimal intensity for the calibration interval. | DEV_LONG | READ_WRITE | No |
| **CalibMaxIntensity**: Maximal intensity for the calibration interval. | DEV_LONG | READ_WRITE | No |
| **Average**: The coefficient used for the linear averaging of the images. 1 = no averaging, 100 = averaging with a coefficient of 0.01. | DEV_LONG | READ_WRITE | No |
| **AOIExtension**: Extends the automatic AOI to x times the calculated FWHM around the founds maximum | DEV_DOUBLE | READ_WRITE | No |
| **BackgroundSubstraction**: Substracts the background level found at the AOI borders from the image | DEV_BOOLEAN | READ_WRITE | No |
| **ROI_X_min**: coordinates of the region of interest | DEV_LONG | READ_WRITE | No |
| **ROI_X_max**: coordinates of the region of interest | DEV_LONG | READ_WRITE | No |
| **ROI_Y_min**: coordinates of the region of interest | DEV_LONG | READ_WRITE | No |
| **ROI_Y_max**: coordinates of the region of interest | DEV_LONG | READ_WRITE | No |
| **Exposure**: Camera exposure time | DEV_DOUBLE | READ_WRITE | No |
| **Gain**: Camera gain | DEV_DOUBLE | READ_WRITE | No |
| **XEmittance**: Caluclated emittance | DEV_DOUBLE | READ | No |
| **XPeakFwhm**: Calculated FWHM | DEV_DOUBLE | READ | No |
| **XPeakPosition**: Calculated position | DEV_DOUBLE | READ | No |
| **Enable_FwhmTuning**: When set to true the FWHM is recalculted with a profile of only a part of the image around the beam center. The extension of this area is defined by FwhmTuningExtension attribute. | DEV_BOOLEAN | READ_WRITE | No |
| **FwhmTuningExtension**: Extends the profiling area for the FWHM recalculation to x times the calculated FWHM on the full image around the found maximum. | DEV_DOUBLE | READ_WRITE | No |

## Image Attributes

| Attribute name | Data Type | X Data Length | Y Data Length | Expert |
|---|---|---|---|---|
| **Image** | DEV_DOUBLE | 4096 | 4096 | No |

# Commands:

More Details on commands....

| Device Commands for Operator Level | | |
|---|---|---|
| **Command name** | **Argument In** | **Argument Out** |
| **Init** | DEV_VOID | DEV_VOID |
| **State** | DEV_VOID | DEV_STATE |
| **Status** | DEV_VOID | CONST_DEV_STRING |
| **StartCalibration** | DEV_VOID | DEV_VOID |
| **StopCalibration** | DEV_VOID | DEV_VOID |
| **On** | DEV_VOID | DEV_VOID |
| **Off** | DEV_VOID | DEV_VOID |
| **Reset** | DEV_VOID | DEV_VOID |
| **SetRoi** | DEV_VOID | DEV_VOID |
| **SetFullImage** | DEV_VOID | DEV_VOID |

# 1 - Init

- **Description:** This commands re-initialise a device keeping the same network connection.
  After an Init command executed on a device, it is not necessary for client to re-connect to the device.
  This command first calls the device *delete_device()* method and then execute its *init_device()* method.
  For C++ device server, all the memory allocated in the *nit_device()* method must be freed in the *delete_device()* method.
  The language device desctructor automatically calls the *delete_device()* method.

- **Argin:**
  **DEV_VOID** : none.

- **Argout:**
  **DEV_VOID** : none.

- **Command allowed for:**
  - Tango::OFF
  - Tango::ON
  - Tango::ALARM
  - Tango::STANDBY

## 2 - State

- **Description:** This command gets the device state (stored in its *device_state* data member) and returns it to the caller.

- **Argin:**
  **DEV_VOID** : none.

- **Argout:**
  **DEV_STATE** : State Code

- **Command allowed for:**
  - Tango::OFF
  - Tango::ON
  - Tango::ALARM
  - Tango::STANDBY

## 3 - Status

- **Description:** This command gets the device status (stored in its *device_status* data member) and returns it to the caller.

- **Argin:**
  **DEV_VOID** : none.

- **Argout:**
  **CONST_DEV_STRING** : Status description

- **Command allowed for:**
  - Tango::OFF
  - Tango::ON
  - Tango::ALARM
  - Tango::STANDBY

## 4 - StartCalibration

- **Description:** Start the automatic image calibration

- **Argin:**
  **DEV_VOID** :

- **Argout:**
  **DEV_VOID** :

- **Command allowed for:**
  - Tango::OFF

- Tango::ON
- Tango::ALARM
- Tango::STANDBY

## 5 - StopCalibration

- **Description:** Stop the automatic image calibration

- **Argin:**
  **DEV_VOID** :

- **Argout:**
  **DEV_VOID** :

- **Command allowed for:**
- Tango::OFF
- Tango::ON
- Tango::ALARM
- Tango::STANDBY

## 6 - On

- **Description:** Switch on the camera and BPM devices

- **Argin:**
  **DEV_VOID** :

- **Argout:**
  **DEV_VOID** :

- **Command allowed for:**
- Tango::OFF
- Tango::ALARM
- Tango::STANDBY

## 7 - Off

- **Description:** Switch off the CCD and the BPM devices

- **Argin:**
  **DEV_VOID** :

- **Argout:**
  **DEV_VOID** :

- **Command allowed for:**
  - Tango::ON
  - Tango::ALARM
  - Tango::STANDBY

## 8 - Reset

- **Description:** Reset the ROI of the CCD device to the full image

- **Argin:**
  **DEV_VOID** :

- **Argout:**
  **DEV_VOID** :

- **Command allowed for:**
  - Tango::OFF
  - Tango::ON
  - Tango::ALARM
  - Tango::STANDBY

## 9 - SetRoi

- **Description:** Appli the ROI specified by the four ROI coordinate attributes on the CCD device

- **Argin:**
  **DEV_VOID** :

- **Argout:**
  **DEV_VOID** :

- **Command allowed for:**
  - Tango::OFF
  - Tango::ON
  - Tango::ALARM
  - Tango::STANDBY

## 10 - SetFullImage

- **Description:** Appli the ROI to the full image size on the CCD device

- **Argin:**
  **DEV_VOID** :

- **Argout:**

**DEV_VOID** :

- **Command allowed for:**
  - Tango::OFF
  - Tango::ON
  - Tango::ALARM
  - Tango::STANDBY