

TuneMeasurement Tango Cpp Class

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TuneMeasurement Class Identification :

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

TuneMeasurement Class Inheritance :

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

TuneMeasurement Class Description :

Tune measurement device.

This device computes tune measurement by getting its data from another device attribute (currently BPM or RF), computing a Fast Fourier Transform (FFT) on it with possible averaging, and extracting the maximal value of this FFT inside a predefined interval.

TuneMeasurement Properties :

There is no class properties

| Device Properties | | | |
|---------------------|--|---------|---------------|
| Name | Description | Type | Default Value |
| SrcDevice | Device name where the data are read | String | none |
| SrcDataAttrName | Attribute name read on SrcDevice for the data | String | none |
| SrcSizeAttrName | Attribute name to configure the number of samples in SrcDataAttrName | String | none |
| SrcSizeWriteEnabled | Tells if this device is allowed to control the SrcSizeAttrName, or if it can only read it | boolean | FALSE |
| SkippedFirstSamples | The number of samples that are dropped in the beginning of the data src buffer, before computing the FFT | short | 0 |
| WindowType | The type of window applied to the input signal. Must be one of the following : RECTANGULAR, BLACKMAN, EXACT_BLACKMAN, HAMMING, HANN, FLATTOP, BLACKMAN_HARRIS_3, BLACKMAN_HARRIS_4, BLACKMAN_HARRIS_7, LOW_SIDELOBE | String | HANN |
| FFTMinimalNbPoints | The minimal number of bins in the FFT. Must be a power of 2 (otherwise, rounded to the next power of 2) | int | 1024 |
| ComputationPeriod | The initial internal period in millisecond at which new tune measures are produced | int | 500 |
| AutoStart | if set to `true`, the computation of the tune measure starts automatically when the device is launched | boolean | false |
| FFTWindowSize | The number of points in the src buffer that are used to compute the FFT | int | none |

| TuneMeasurement Class Commands | | | | |
|--------------------------------|------------|------------------|----------|--|
| Name | Input type | Output type | Level | Description |
| State | 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. |
| Status | 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. |
| Start | DEV_VOID | DEV_VOID | OPERATOR | Start the computation of the tune measure |
| Stop | DEV_VOID | DEV_VOID | OPERATOR | Stops the computation of the tune measure |

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 | true | .. |
| Polling Period | Not polled | .. |
| | | |
| Command allowed for | All states | .. |

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 | true | .. |
| Polling Period | Not polled | .. |
| | | |
| Command allowed for | All states | .. |

Command Start :

Start the computation of the tune measure

| Start 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 | <ul style="list-style-type: none"> • FAULT • RUNNING | .. |

Command Stop :

Stops the computation of the tune measure

| 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 | <ul style="list-style-type: none"> • STANDBY | .. |

| TuneMeasurement Class Attributes | | | | | | | |
|-----------------------------------|-----------|----------|------------|------------|-------------------|----------|--|
| Name | Inherited | Abstract | Attr. type | R/W type | Data type | Level | Description |
| NuPeakSearchStart | false | false | Scalar | READ_WRITE | Tango::DEV_DOUBLE | OPERATOR | the beginning value for searching the peak value\n in the FFT that corresponds to the tune measure |
| NuPeakSearchEnd | false | false | Scalar | READ_WRITE | Tango::DEV_DOUBLE | OPERATOR | the end value for searching the peak value\n in the FFT that |

| | | | | | | | |
|--------------------------------|-------|-------|----------|------------|-------------------|----------|--|
| FFTWindowSize | false | false | Scalar | READ_WRITE | Tango::DEV_LONG | OPERATOR | the src buffer that are used to compute the FFT |
| NuRawMagnitude | false | false | Scalar | READ | Tango::DEV_DOUBLE | OPERATOR | Amplitude of the frequency associated to NuRaw |
| FFTabs | false | false | Spectrum | READ | Tango::DEV_DOUBLE | OPERATOR | the abscissa axis of the FFTord attribute |
| FFTord | false | false | Spectrum | READ | Tango::DEV_DOUBLE | OPERATOR | the RMS power spectrum on which nu is searched |
| FFTphase | false | false | Spectrum | READ | Tango::DEV_DOUBLE | OPERATOR | Value of the phase extracted from the computed FFT |

There is no dynamic attribute defined.

Attribute NuPeakSearchStart :

the beginning value for searching the peak value in the FFT that corresponds to the tune measure

| 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 |

| Attribute Properties | |
|----------------------|-------------------|
| label | NuPeakSearchStart |
| unit | |
| standard unit | |
| display unit | |
| format | %6.4f |
| max_value | 0.5 |
| min_value | 0 |
| max_alarm | |
| min_alarm | |

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

| | |
|-------------------------|------------|
| Memorized | true |
| Write hardware at init. | true |
| | |
| Read allowed for | All states |
| Write allowed for | All states |

| | |
|-------------|--|
| 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 NuPeakSearchEnd :

the end value for searching the peak value\n in the FFT that corresponds to the tune measure

| 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 allowed for | All states |
| Write allowed for | All states |

| Attribute Properties | |
|----------------------|-----------------|
| label | NuPeakSearchEnd |
| unit | |
| standard unit | |
| display unit | |
| format | %6.4f |
| max_value | 0.5 |
| 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 Nu :

| 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 | |
| unit | |
| standard unit | |
| display unit | |
| format | %6.4f |
| 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 NuInHigherInterval :

sets the interval of the Nu attribute : if false Nu will be in [0, 0.5], if true Nu will be in [0.5, 1].

| 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 | |

| Attribute Properties | |
|----------------------|--------------------|
| label | NuInHigherInterval |
| unit | |
| standard unit | |
| display unit | |
| format | |
| max_value | |
| min_value | |
| max_alarm | |
| min_alarm | |
| max_warning | |
| min_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 |
| | |

| | |
|-------------------|------------|
| hardware at init. | true |
| Read allowed for | All states |
| Write allowed for | All states |

| | |
|------------|--|
| 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 NuRaw :

the reduced frequency of the FFT maximum searched in the interval [0, 0.5]

| 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 | NuRaw |
| unit | |
| standard unit | |
| display unit | |
| format | %6.4f |
| 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 FFTNbPoints :

| 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 | FFTNbPoints |
| unit | |
| standard unit | |
| display unit | |
| format | %6d |
| 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 SkippedFirstSamples :

the number of samples that are dropped in the beginning\n of the src buffer, before computing the FFT

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

| Attribute Properties | |
|----------------------|---------------------|
| label | SkippedFirstSamples |
| 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 | false |

| | |
|-------------------|------------|
| Write allowed for | All states |
|-------------------|------------|

| | |
|-----------------------------------|---------|
| code | |
| Push Archive event by user code | false |
| Push DataReady event by user code | Not set |

Attribute FFTAveraging :

the number of successive FFT taken to compute the averaged FFT

| Attribute Definition | |
|----------------------|-------------------|
| Attribute Type | Scalar |
| R/W Type | READ_WRITE |
| Data Type | Tango::DEV_USHORT |
| Display Level | OPERATOR |
| Inherited | false |
| Abstract | false |
| Polling Period | Not polled |
| Memorized | Not set |
| Read allowed for | All states |
| Write allowed for | All states |

| Attribute Properties | |
|----------------------|--------------|
| label | FFTAveraging |
| unit | |
| standard unit | |
| display unit | |
| format | %3d |
| max_value | |
| 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 |

Attribute EstimCompuTime :

the estimated time needed to get data from the src device and compute a new FFT



| 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 | EstimCompuTime |
| unit | ms |
| standard unit | ms |
| display unit | ms |
| 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 ComputationPeriod :

The internal period in millisecond at which new tune measures are produced.

| 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 | Not set |
| Read allowed for | All states |
| Write allowed for | All states |

| Attribute Properties | |
|----------------------|-------------------|
| label | ComputationPeriod |
| unit | ms |
| standard unit | ms |
| display unit | ms |
| 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 FFTWindowSize :

the number of points in the src buffer that are used to compute the FFT

| 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 | Not set |
| Read allowed for | All states |
| Write allowed for | All states |

| Attribute Properties | |
|----------------------|---------------|
| label | FFTWindowSize |
| unit | |
| standard unit | |
| display unit | |
| format | %6d |
| 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 NuRawMagnitude :

Amplitude of the frequency associated to NuRaw

| Attribute | Attribute | Attribute Event Criteria |
|-----------|-----------|--------------------------|
|-----------|-----------|--------------------------|

| 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 |

| Properties | |
|---------------|-----------|
| label | Magnitude |
| unit | a.u. |
| standard unit | a.u. |
| display unit | a.u. |
| format | %.4f |
| 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 FFTabs :

the abscissa axis of the FFTord attribute

| Attribute Definition | |
|----------------------|---------------------|
| Attribute Type | Spectrum (131072) |
| 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 | FFTabs |
| 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 FFTord :

the RMS power spectrum on which nu is searched

| Attribute Definition | |
|----------------------|---------------------|
| Attribute Type | Spectrum (131072) |
| 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 | FFT |
| 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 FFTphase :

Value of the phase extracted from the computed FFT

| Attribute Definition | |
|----------------------|--|
| | |

| Attribute Properties | |
|----------------------|--|
| | |

| Attribute Event Criteria | |
|--------------------------|-----|
| | Not |

| | |
|------------------|---------------------|
| Attribute Type | Spectrum (131072) |
| 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 |

| | |
|---------------|--|
| label | |
| unit | |
| standard unit | |
| display unit | |
| format | |
| max_value | |
| min_value | |
| max_alarm | |
| min_alarm | |
| max_warning | |
| min_warning | |
| delta_time | |
| delta_val | |

| | |
|-----------------------------------|---------|
| Periodic | 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 |

| TuneMeasurement Class States | |
|------------------------------|--|
| Name | Description |
| FAULT | An error occurred either during initialization, connection to the BPM device or tune measurement itself |
| RUNNING | The device is currently computing the tune measure. Depending on the averaging configurations, output data may not be available yet (for example just after an initialization phase). Users should wait that the first averaged result be available. |
| STANDBY | The computation of the tune measure is stopped |