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3.7 QWT widgets

3.7.1 Compass

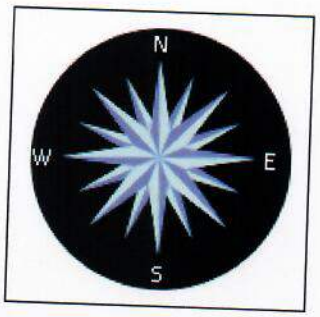


Figure 109: QWT Compass widget

Standard compass widget derived from the qwt widget library wrapper class to instantiate a qwt compass widget.

3.7.1.1 Default Interfaces

- Set Value

  Set the current value of the compass

  Members:

  - Property: value (Type: double)
  - Slot: void setValue (double)

3.7.1.2 Important properties

- type: enum

  The compass type. Available Types are:

Constant	Description
Empty	Empty compass, no needle.
Standard	Standard needle.
Windrose	Needle is painted as windrose.
TickNeedle	Ticking needle style 1 (looks like a dial).
TickNeedle2	Ticking needle style 2 (red/black standard needle).
Numbered	Not implemented yet --> empty compass used.
Filled	Filled compass rose with tick needle style.

Table 13: QWT Compass Types

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- value: double

  The current value

3.7.1.3 Important signals

- void valueChanged(double)

  This signal is emitted if the value has changed

3.7.1.4 Important slots

- void setValue(double)

  This slot is used to set the current value of the dial

3.7.2 Clock



Figure 110: QWT Clock widget

Standard analogue clock widget derived from the qwt widget library wrapper class to instantiate a qwt clock widget.

3.7.2.1 Default Interfaces

- Set Time

  Members

  - Slot: void setTime (QTime)
  - Slot:void setCurrentTime ( )

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3.7.3 Horizon



Figure 111: QWT Horizon Widget

Standard artificial horizon widget derived from the qwt widget library.

3.7.3.1 Default Interfaces

- Angle

  Angle of the horizon

  Members:

  - Property: angle (Type: double)
  - Slot: void SetAngle (double)

- Set Gradient

  The Gradient as relative value from -1 to 1

  Members:

  - Property: gradient (Type: double)
  - Slot: void SetGradient (double)

3.7.3.2 Important properties

- gradient: double

  The pitch of the horizon

- angle: double

  The roll value of the horizon

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3.7.3.3 Important slots

- double GetAngle()

  Returns the current angle value

- double GetGradient()

  Returns the current gradient value

3.7.4 Dial



Figure 112: QWT Dial widget

Standard dial widget derived from the qwt widget library. Dial widgets are used like a speedometer. Added some additional properties and slots for access of the main properties.

3.7.4.1 Default Interfaces

- value

  The current value of the dial

  Members:

  - Property: value (Type: double)

3.7.4.2 Important properties

- Label: string

  The text of the dial. In the screenshot above this is the text “Dial text”

- minValue: double

  Defines the minimum value of the dial

- maxValue: double

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Defines the maximum value of the dial

- value: double

  The current value of the dial. Note that the value can only be set within the dial range defined by the properties minValue and maxValue

- scale: double

  The scaling of the dial

3.7.4.3 Important signals

- void valueChanged(double)

  This signal is emitted if the value of the dial has changed

3.7.4.4 Important slots

- void setValue(double)

  Set the current value. Note that the value can only be set within the dial range defined by the properties minValue and maxValue

3.7.5 Wheel



Figure 113: QWT Wheel widget

The QWT Wheel widget provides a vertical or horizontal thumb-wheel widget. The widget is often used in 2D and 3D applications to control rotation, zooming and scrolling. The rotation of the wheel is translated into an integer value within a specified range.

3.7.5.1 Default Interfaces

- value

  The current value of the wheel

  Members:

  - Property: value (Type: double)
  - Signal: void valueChanged (double)

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3.7.5.2 Important properties

- minValue: double

  Defines the minimum value of the wheel

- maxValue: double

  Defines the maximum value of the wheel

- value: double

  The current value of the wheel. Note that the value can only be set within the wheel range defined by the properties minValue and maxValue

3.7.5.3 Important signals

- void valueChanged(double)

  This signal is emitted if the value of the wheel has changed

3.7.5.4 Important slots

- void setValue(double)

  Set the current value. Note that the value can only be set within the wheel range defined by the properties minValue and maxValue

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3.7.6 Slider

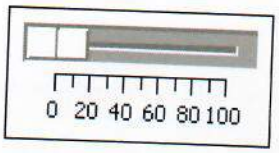


Figure 114:QWT Slider widget

Slider widget with optional scale.

3.7.6.1 Default Interfaces

- value

  The current value of the Slider

  Members:

  - Property: value (Type: double)
  - Signal: void valueChanged (double)

3.7.6.2 Important properties

- minValue: double

  Defines the minimum value of the slider

- maxValue: double

  Defines the maximum value of the slider

- value: double

  The current value of the slider. Note that the value can only be set within the slider range defined by the properties minValue and maxValue

3.7.6.3 Important signals

- void valueChanged(double)

  This signal is emitted if the value of the slider has changed

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3.7.6.4 Important slots

- void setValue(double)

  Set the current value. Note that the value can only be set within the slider range defined by the properties minValue and maxValue

3.7.7 Thermo

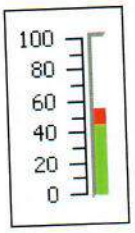


Figure 115: QWT Thermo widget

Value display to show values like a progress bar but with optional scales and an alarm option

3.7.7.1 Default Interfaces

- value

  The current value of the Thermo

  Members:

  - Property: value (Type: double)
  - Signal: void valueChanged (double)

3.7.7.2 Important properties

- minValue: double

  Defines the minimum value of the thermo

- maxValue: double

  Defines the maximum value of the thermo

- value: double

  The current value of the thermo. Note that the value can only be set within the thermo range defined by the properties minValue and maxValue

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- alarmLevel: double

  This value defines the alarm level of the thermo widget. All values above this level will be painted according to the alarmColor property which is by default red (see screenshot above)

3.7.7.3 Important signals

- void valueChanged(double)

  This signal is emitted if the value of the thermo has changed

3.7.7.4 Important slots

- void setValue(double)

  Sets the current value. Note that the value can only be set within the range defined by the properties minValue and maxValue

3.7.8 Knob

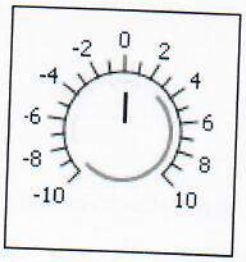


Figure 116: QWT Knob widget

Dial display used as a knob surrounded by a scale.

3.7.8.1 Default Interfaces

- value

  The current value of the knob

  Members:

  - Property: value (Type: double)
  - Signal: void valueChanged (double)

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3.7.8.2 Important properties

- minValue: double

  Defines the minimum value of the knob

- maxValue: double

  Defines the maximum value of the knob

- value: double

  The current value of the knob. Note that the value can only be set within the range defined by the properties minValue and maxValue

3.7.8.3 Important signals

- void valueChanged(double)

  This signal is emitted if the value of the knob has changed

3.7.8.4 Important slots

- void setValue(double)

  Set the current value. Note that the value can only be set within the range defined by the properties minValue and maxValue

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3.7.9 Extended Spin Box

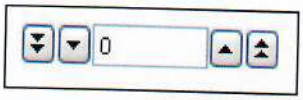


Figure 117: QWT Extended Spin Box widget

The extended spin box is a spin box, where up to three buttons for up and down can be shown and set to different step sizes.

3.7.9.1 Default Interfaces

- value

  The current value of the knob.

  Members:

  - Property: value (Type: double)
  - Signal: void valueChanged (double)

3.7.9.2 Important properties

- minValue: double

  Defines the minimum value of the knob

- maxValue: double

  Defines the maximum value of the knob

- value: double

  The current value of the knob. Note that the value can only be set within the range defined by the properties minValue and maxValue

- numButtons: int

  Amount of up and down buttons. This property can hold the values from 0 to 3

- stepButton1: int

  Step size for the first up and down button

- stepButton2: int

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Step size for the second up and down button

- stepButton3: int

  Step size for the third up and down button

3.7.9.3 Important signals

- void valueChanged(double)

  This signal is emitted if the value of the spin box has changed

3.7.9.4 Important slots

- void setValue(double)

  Set the current value. Note that the value can only be set within the range defined by the properties minValue and maxValue

3.7.10 Time-Plot

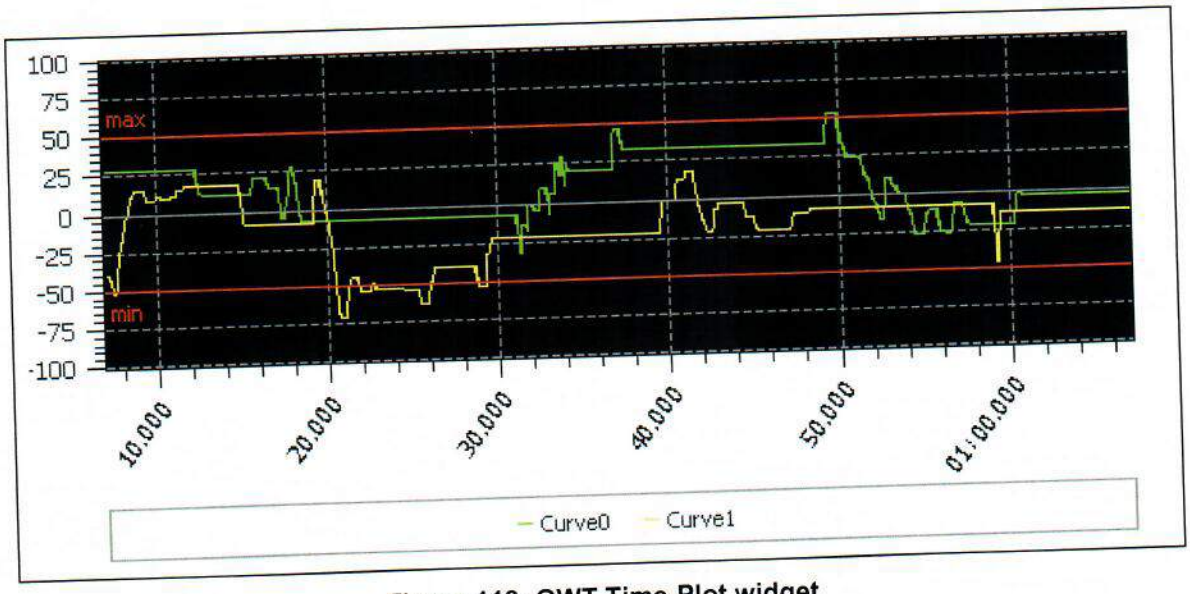


Figure 118: QWT Time-Plot widget

The time plot is a widget for plotting two-dimensional graphs. An unlimited number of plot items can be displayed on its canvas. Plot items might be curves, the grid or markers. In addition to this the plot provides features like zooming in and out as well as freezing the current plot state.

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3.7.10.1 Default Interfaces

For each curve the following interface is available. (Curve0 is used as reference interface)

- Curve0

  Adds a value to Curve0

  Members:

  - Property: value (Type: double)
  - Slot: void AddValue (double)
  - Slot: void AddValue (int)
  - Slot: void AddValue (uint)
  - Slot: void AddValue (bool)

3.7.10.2 Important properties

- axisBottomTiming: enum

  This property sets the time axis where supported types are Elapsed, CurrentTime and IrigTime

- axisLeftMax: double

  The maximum value of the left value axis

- axisLeftMin: double

  The minimum value of the left value axis

- axisLeftStep: double

  The major step size of the left value axis (in the screenshot above, this value is set to 25)

- curveCount: int

  The amount of curves the plot holds

- markerCount: int

  The amount of markers the plot holds

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- dataUpdateRate: int

  The data update rate in milliseconds where the range is from 25ms to 60000ms

- timeRangeSec: double

  The time range of the plot in seconds where the range is from 1s to 86400s

- updateRangeMSec: int

  The update rate in ms. This value specifies how often the plot should be repainted. The provided range is from 50ms to 60000ms. Note that a very small value might cause a high performance demand

3.7.10.3 Curve and Marker setup

To setup a curve or a marker of the plot. Select it via the "Current" entry of the widget design explorer and the widget design explorer tabs will be updated accordingly.

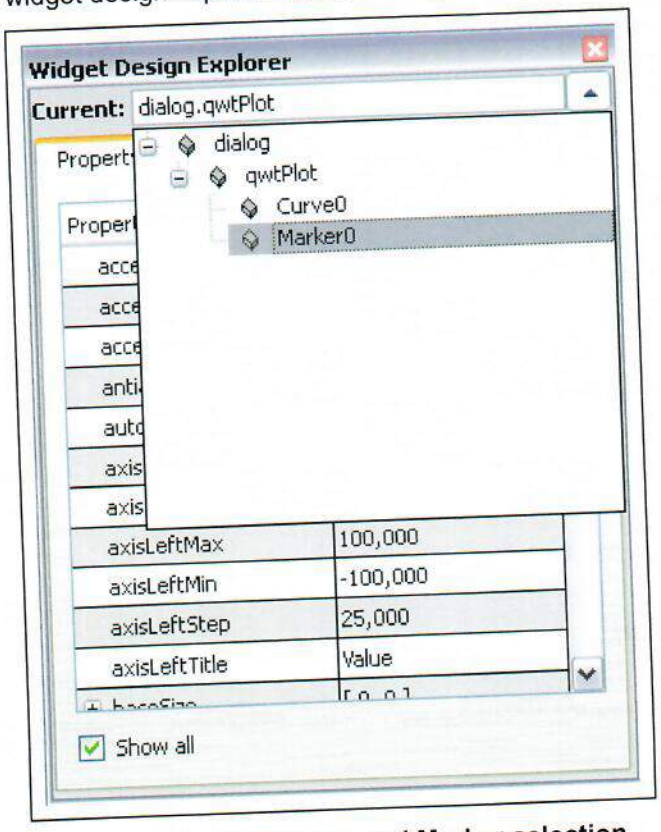


Figure 119: QWT Curve and Marker selection

3.7.10.4 Important curve properties

- value: double

This property holds the last written value of the curve. To add a value just set this property or call one of the AddValue slots

3.7.10.5 Important curve slots

- double GetCurrentValue()

  Returns the last written value

- various AddValue slots:

  Adds a new value to the curve

3.7.11 XY-Plot

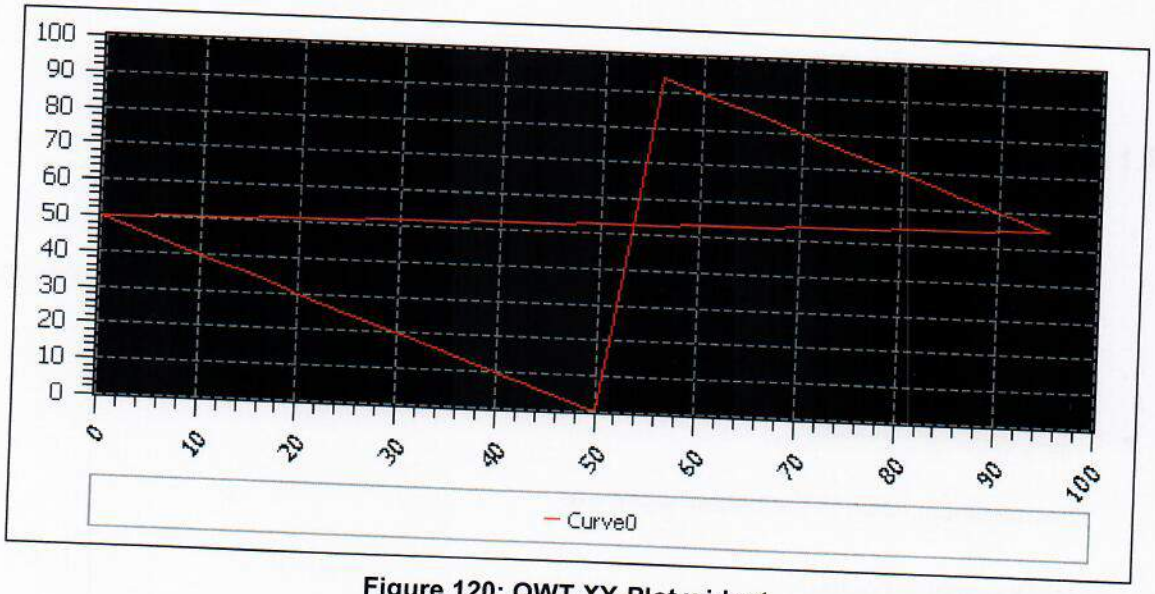


Figure 120: QWT XY-Plot widget

The xy-plot is a widget for plotting two-dimensional value pairs like lissajou figures. An unlimited number of plot items can be displayed on its canvas. Plot items might be curves, the grid or markers.

In addition to this the plot provides features like zooming in and out as well as freezing the current plot state.

3.7.11.1 Default Interfaces

- SetCurve0-X

  Adds an X value to Curve0

  Members:

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- Property: valueX (Type: double)
- Slot: void AddXValue (double)
- Slot: void AddXValue (int)

- Set Curve0-Y

  Adds an Y value to Curve0

  Members:

  - Property: valueY (Type: double)
  - Slot: void AddYValue (double)
  - Slot: void AddYValue (int)

3.7.11.2 Important properties

- axisBottomTiming: enum

  This property sets the time axis where supported types are Elapsed, CurrentTime and IrigTime.

- axisBottomMax: double

  The maximum value of the bottom value axis

- axisBottomMin: double

  The minimum value of the bottom value axis

- axisBottomStep: double

  The major step size of the bottom value axis.

- axisLeftMax: double

  The maximum value of the left value axis

- axisLeftMin: double

  The minimum value of the left value axis

- axisLeftStep: double

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The major step size of the left value axis (in the screenshot above this value is set to 10)

- curveCount: int

  The amount of curves the plot holds

- markerCount: int

  The amount of markers the plot holds

- dataUpdateRate: int

  The data update rate in milliseconds where the range is from 25ms to 60000ms

- displayTime: double

  The time range of the plot in seconds where the range is from 1s to 86400s

- updateRangeMSec: int

  The update rate in ms. This value specifies how often the plot should be repainted. The provided range is from 50ms to 60000ms. Note that a very small value might cause a high performance demand

3.7.11.3 Curve and Marker setup

See the time plot section above for further information. In contrast to the value property of the time curves, xy curves hold two properties: valueX and valueY.

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3.8 ActiveX widgets (Windows only)

For users who are running the PBA.pro under windows, the designer offers ActiveX items to support ActiveX controls within the PBA.pro designer.

3.8.1 Generic ActiveX interface widgets



Figure 121: Generic ActiveX interface widget

The PBA.pro offers two generic interface controls which are named "ActiveX Widget" resp. "ActiveX Object". While the "ActiveX Object" is a non graphical item, the "ActiveX Widget" is used for graphical ActiveX controls.

To use such a control, select the "ActiveX Widget" resp. "ActiveX Object" node of the designer tree and drag it onto a designable dialog.

To specify an ActiveX control select the ActiveX item, right click on it and select "Set ActiveX Control". The ActiveX selection Dialog will pop up, where the user can select the control from the list which holds every registered ActiveX control of the PC:

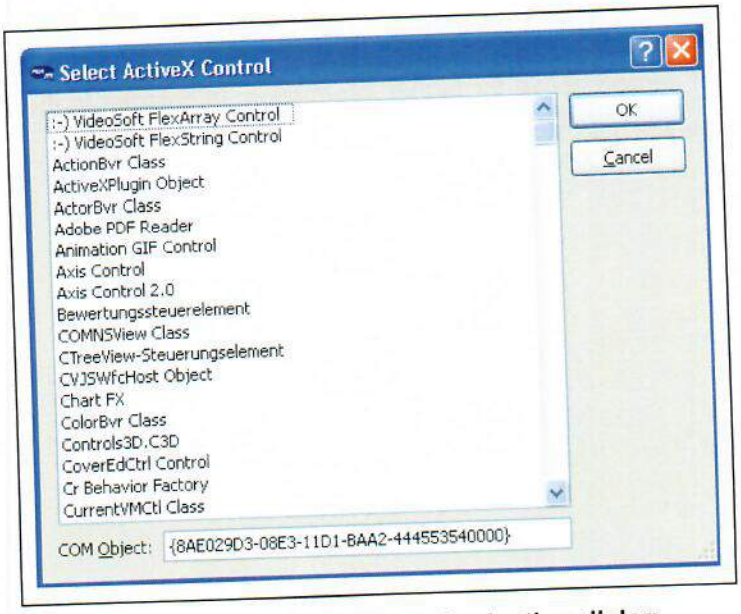


Figure 122: ActiveX Control selection dialog

Note: As the Properties, Signals and Slots depend on the selected ActiveX control no list of the important ones can be provided here.

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3.8.2 GMS ActiveX Widgets

The GMS ActiveX controls are a commercial set of widgets which are provided by the PBA.pro designer component as additional nodes under the "ActiveX Widget" category.

3.8.2.1 GMS Aircraft Instruments

The GMS Aircraft Instruments provides various functionalities according to the specified central property DisplayMode. The DisplayMode can be set to twelve different states which are shown below:

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Figure 123: GMS Aircraft Instruments widgets

In the following sections some important properties for the different display modes are described. For further information about the GMS Aircraft instruments control resp. its properties see file "Air.hlp" in the ActiveX directory of the PBA.pro installation.

3.8.2.1.1 Compass

All properties which are related to this Display Mode have the prefix "Compass".

3.8.2.1.1.1 Default Interfaces

- Set Heading

  Determines the compass' direction (in degrees) on the compass instrument

  Members:

  Property: CompassHeading (Type: double)

  Slot: void SetCompassHeading (double)

3.8.2.1.1.2 Important properties

- CompassStyle: enum

  Determines the Display Mode of the compass face which can be either *Stationary* or *Floating*.

- Stationary

  The compass face remains stationary while the compass needle rotates to indicate the control's direction

- Floating

  The compass needle always points to the top of the control while the compass face rotates to indicate the control's direction

- CompassHeading: double

  Determines the compass direction (in degrees) on the compass instrument.

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3.8.2.1.2 Heading Indicator

All properties which are related to this Display Mode have the prefix "Heading".

3.8.2.1.2.1 Default Interfaces

- Set Heading Indicator

  Members:

  - Property: HeadingIndicator (Type: double)
  - Slot: void SetHeadingIndicator (double)

3.8.2.1.2.2 Important properties

- HeadingIndicator: double

  Determines the heading indicator's direction (in degrees)

3.8.2.1.3 Altimeter

All properties which are related to this Display Mode have the prefix "Alt".

3.8.2.1.3.1 Default Interfaces

- Set Altitude

  Members:

  - Property: Altitude (Type: double)
  - Slot: void SetAltitude (double)

3.8.2.1.3.2 Important properties

- AltBarometer: double

  Determines the barometric pressure (in inches of mercury) displayed on the altimeter

- Altitude: double

  Determines the aircraft's altitude on the altimeter

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3.8.2.1.4 Climb Rate

All properties which are related to this Display Mode have the prefix "Climb".

3.8.2.1.4.1 Default Interfaces

- Set Climb Rate

  Members:

  - Property: ClimbRate (Type: double)
  - Slot: void SetClimbRate (double)

3.8.2.1.4.2 Important properties

- ClimbRate: double

  Determines the rate of climb on the climb rate indicator

- ClimbRateMax: double

  Determines the maximum rate of climb

3.8.2.1.5 Airspeed

All properties which are related to this Display Mode have the prefix "Air".

The following properties define annular regions on an airspeed indicator which specify the airspeed limitations (V-speeds) of the aircraft.

- White annular region: Indicates safe operating range with flaps down. It is bounded by AirspeedVS0 and AirspeedVFE
- Green annular region: Indicates the safe operating speed with flaps up. It is bounded by AirspeedVS1 and AirspeedVNO
- Yellow annular region: Indicates the caution operating range. It is bounded by AirspeedVNO and AirspeedVNE
- Red annular region: Indicates the never exceed operating range. It is bounded by AirspeedVNE and AirspeedVMax

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3.8.2.1.5.1 Default Interfaces

- Set Airspeed

  Members:

  - Property: Airspeed (Type: double)
  - Slot: void SetAirspeed (double)

3.8.2.1.5.2 Important properties

- Airspeed: double

  Determines the aircraft's airspeed on the airspeed indicator

- AirspeedVS0: double

  Indicates stall speed with flaps down

- AirspeedVS1: double

  Indicates stall speed with flaps up

- AirspeedVFE: double

  Indicates max safe speed with flaps down (extended)

- AirspeedVNO: double

  Indicates max structural safe speed

- AirspeedVNE: double

  Indicates never exceed airspeed

- AirspeedVMax: double

  Indicates maximum displayed speed

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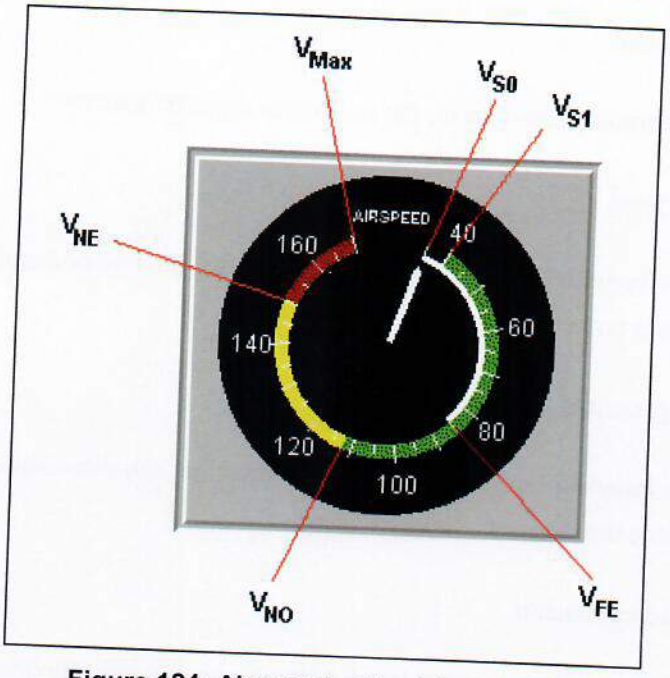


Figure 124: Airspeed widget description

3.8.2.1.6 HSI (Horizontal Situation Indicator)

All properties which are related to this Display Mode have the prefix "HSI".

3.8.2.1.6.1 Default Interfaces

- Set Heading

  Members:

  - Property: HSIHeading (Type: double)
  - Slot: void SetHSIHeading (double)

3.8.2.1.6.2 Important properties

- HSIDistance: double

  Determines the distance displayed in the upper left hand corner of the horizontal situation indicator

  This property only applies when the property HSIDistanceDisplay is set to DME, TCN or WPT. Only three place holders are allowed to display the distance so when the value is less than 100, it is displayed with one decimal point; when the value is between 100 and 999, no decimal point values are displayed; and when the value is 1000 or greater, "999" is displayed. If the distance is set to a negative number, the control will display "---", indicating that the distance is not available.

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- HSIHeading: double

  Determines the heading indicator on the horizontal situation indicator

- HSIBearing: double

  Determines the bearing indicator direction displayed on the horizontal situation indicator, where the value is bound between 0 and 360 degrees

- HSIBugHeading: double

  Determines the Heading Bug displayed on the horizontal situation indicator. The Heading Bug is used to indicate the desired course heading

- HSICourseHeading: double

  Determines the course heading displayed in the horizontal situation indicator, where the value is bound between 0 and 360 degrees

3.8.2.1.7 Artificial Horizon

All properties which are related to this Display Mode have the prefix "AH".

3.8.2.1.7.1 Default Interfaces

- Set Heading

  Members:

  - Property: AHHeading (Type: double)
  - Slot: void SetAHHeading (double)

- Set Pitch

  Members:

  - Property: AHPitch (Type: double)
  - Slot: void SetAHPitch (double)

- Set Roll

  Members:

  - Property: AHRoll (Type: double)

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- Slot: void SetAHRoll (double)

3.8.2.1.7.2 Important properties

- AHHeading: double

  Determines the aircraft heading on the artificial horizon indicator

- AHPitch: double

  Determines the aircraft pitch (in degrees) on the artificial horizon indicator

- AHRoll: double

  Determines the aircraft roll (in degrees) on the artificial horizon indicator

3.8.2.1.8 Turn Coordinator

All properties which are related to this Display Mode have the prefix "TC".

3.8.2.1.8.1 Default Interfaces

- Set Turn

  Members:

  - Property: TCTurn (Type: double)
  - Slot: void SetTCTurn (double)

3.8.2.1.8.2 Important properties

- TCInclinometer: double

  Determines the position of the inclinometer ball displayed in the turn coordinator

  It is a measure of the coordinated use of aileron and rudder during a turn. The units are in degrees and indicate the angle between the aircraft vertical acceleration direction and the airframe vertical direction.

  The visible range of the inclinometer is -10 to 10 degrees.

- TCTurn: double

  Determines the turn rate displayed in the turn coordinator

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The units are in degrees and indicate the turn angle the aircraft will make in 2 minutes. The tic marks below the level flight tic marks indicate a 360 degree turn in 2 minutes.

3.8.2.1.9 *Course Indicator*

All properties which are related to this Display Mode have the prefix "CI".

3.8.2.1.9.1 Default Interfaces

- Set Actual Course

  Members:

  - Property: CIActCourse (Type: double)
  - Slot: void SetCIActCourse (double)

- Set Ordered Course

  Members:

  - Property: CIOrdCourse (Type: double)
  - Slot: void SetCIOrdCourse (double)

3.8.2.1.9.2 Important properties

- CIActCourse: double

  Determines the actual course on the course indicator

- CIOrdCourse: double

  Determines the ordered course on the course indicator

3.8.2.1.10 *ADF (Automatic Direction Finder)*

All properties which are related to this Display Mode have the prefix "ADF".

3.8.2.1.10.1 Default Interfaces

- Set Bearing

  Members:

  - Property: ADFBearing (Type: double)

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- Slot: void SetADFBearing (double)

3.8.2.1.10.2 Important properties

- ADFBearing: double

  Determines the Automatic Direction Finder's displayed value

3.8.2.1.11 RMI (Radio Magnetic Indicator)

All properties which are related to this Display Mode have the prefix "RMI".

3.8.2.1.11.1 Default Interfaces

- Set Compass

  Members:

  - Property: RMICompass (Type: double)
  - Slot: void SetRMICompass (double)

3.8.2.1.11.2 Important properties

- RMIBearing1: double, RMIBearing2: double

  These properties determine the bearings displayed on the radio magnetic indicator

- RMICompass: double

  Determines the heading indicated by the radio magnetic indicator's compass card

3.8.2.1.12 OBI (Omni Bearing Indicator)

All properties which are related to this Display Mode have the prefix "OBI".

3.8.2.1.12.1 Default Interfaces

- Set Course

  Members:

  - Property: OBICourse (Type: double)
  - Slot: void SetOBICourse (double)

- Set Course Deviation

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Members:

- Property: OBICourseDeviation (Type: double)
- Slot: void SetOBICourseDeviation (double)

- Set Glide Slope

  Members:

  - Property: OBIGlideSlope (Type: double)
  - Slot: void SetOBIGlideSlope (double)

3.8.2.1.12.2 Important properties

- OBICourse: double

  Determines the course displayed on the Omni-Bearing Indicator

- OBICourseDeviation: double

  Determines the deviation from the course defined by OBICourse on the Omni-Bearing Indicator. The left figure below shows a course deviation whereas the right figure shows an aircraft which is on course



Figure 125: Omni Bearing Indicator OBICourseDeviation indicator

- OBIGlideSlope: double

  Determines the deviation from the ILS glide slope on the Omni-Bearing Indicator. The left figure below indicates a glide slope deviation whereas the right figure shows an aircraft with no deviation

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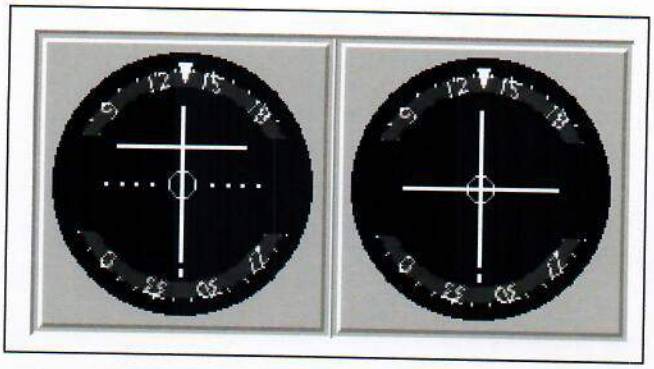


Figure 126: Omni Bearing Indicator OBIGlideSlope indicator

3.8.2.2 GMS Aircraft Joystick



Figure 127: GMS Aircraft Joystick widget

The Joystick Custom Control supports up to four axes joysticks with floating point precision. Each axis may be calibrated using defined options for minimum, maximum, centre position, and dead zone. A weight option is also included for non-linear mapping of stick input to output. Other features include movement and button events, throttle and rudder control, point of view control, graphical joystick for mouse control and stick input display.

In the following section the most important properties for the joystick are described. For further information about the GMS Aircraft joystick control resp. its properties see file "Joy10.*hlp*" in the ActiveX directory of the PBA.pro installation.

3.8.2.2.1 Default Interfaces

- X-Position

  Members:

  - Property: XPos (Type: double)
  - Signal: void JoyMove ( )

- Y-Position

  Members:

  - Property: YPos (Type: double)

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- Signal: void JoyMove ( )

- Z-Position

  Members:

  - Property: ZPos (Type: double)
  - Signal: void JoyMove ( )

3.8.2.2.2 Important properties

- XPos: double

  Defines the control position for each the X-Axis

- YPos: double

  Defines the control position for each the Y-Axis

- ZPos: double

  Defines the control position for each the Z-Axis

- RPos: double

  Defines the control position for each the R-Axis

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3.8.2.3 GMS Angular Gauge



Figure 128: GMS Angular Gauge widget

This ActiveX widget is a multi-purpose, highly customizable angular gauge custom control. Its dynamic property pages provide a powerful tool for designing gauges with full control of scales, needles, fonts, captions, annulars and tics.

- Annulars:

  Annulars are used for aesthetics as well as indicators of operating ranges. Properties are provided to modify the annular's start-stop values, inner-outer radii, colour, and associated scale. Multiple annular regions can be placed on a single gauge

- Captions:

  The gauge can be embellished with multiple captions to indicate the type of measurement being displayed, units used or any other informative or decorative labelling

- Hubs:

  Hubs are decorative caps over the axis of rotation of a given needle. Properties are used to modify the hub's style, radius, and associated scale

- Needles:

  Needles can be displayed in a variety of shapes and sizes. Properties are used to modify the needle's style, length, width, colour and associated scale. Multiple needles can be placed on a single gauge

- Scales:

  Scales are used to define the extent of the units displayed by the gauge, the location of the gauge centre, and the gauge's start and stop angles. Multiple scales are supported

- Tics:

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Tics are used to mark intervals on the gauge's face. Properties are used to set the tic's style, start-stop values, interval, inner-outer radii, width, colour, label positions, and associated scale

In the following section the most important properties for the gauge are described. For further information about the GMS Angular Gauge control resp. its properties see file "AGauage.chm" in the ActiveX directory of the PBA.pro installation.

3.8.2.3.1 Default Interfaces

- Set NeedleValue

  Members:

  - Property: NeedleValue (Type: double)
  - Slot: void SetNeedleValue (double)

3.8.2.3.2 Important properties

- NeedleValue: double

  Determines the value of the needle currently selected by NeedleID. The NeedleValue is a number between the two properties ScaleMinValue and ScaleMaxValue. The corresponding scale is referenced by the NeedleScaleID property.

- NeedleID: int

  When multiple needles exist, this property is used to index the needle to which the other needle properties apply. The total number of needles is determined by the needles property. NeedleID has valid values from 0 to Needles-1

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3.8.2.4 GMS Knob

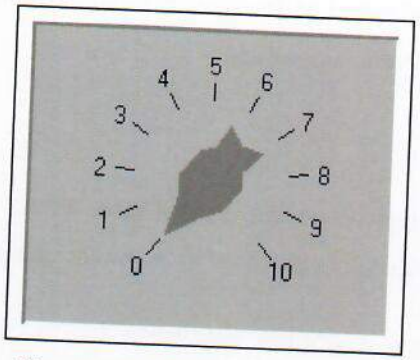


Figure 129: GMS Knob widget

The Knob control is a highly customizable knob or dial control. Its dynamic property pages provide a powerful tool for interactively designing knobs or dials with full control of styles, scales, tics, annulars, captions, border and background.

- Annulars:

  Annulars are used for aesthetics as well as indicators of operating ranges. Properties are provided to modify annular's start-stop values, inner-outer radii, and colour. Multiple annular regions can be placed on a single control

- Captions:

  The control can be embellished with multiple captions to indicate the type of measurement being displayed, units used or any other informative or decorative labelling

- Knobs:

  There are several styles of knobs. Properties are provided to modify the knob's style, inner-outer radius, width, and colour. Additionally, user defined knob shapes may be specified

- Mark:

  Each knob may be adorned with a single mark. Properties are provided to modify the mark's style, inner-outer radii, width, and colour. Additionally, user defined mark shapes may be incorporated into the control

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- Scale:

  Scale is used to define the extent of the units displayed on the knob, the location of the knob centre, and the knob's start and stop angles

- Tics:

  Tics are used to mark intervals on the control face. Properties are provided to set the tic's style, start-stop values, interval, inner-outer radii, width, colour, and label positions

In the following section the most important properties for the knob are described. For further information about the GMS knob control resp. its properties see file "Knob.chm" in the ActiveX directory of the PBA.pro installation.

3.8.2.4.1 Default Interfaces

- Knob Value Changed

  Members:

  - Property: KnobValue (Type: double)
  - Signal: void KnobValueChanged (double)

3.8.2.4.2 Important properties

- KnobValue: double

  Determines the value of the knob whose range is defined by the ScaleMinValue and ScaleMaxValue properties

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3.8.2.5 GMS LED



Figure 130: GMS LED widget

LED provides a highly customizable Light Emitting Diode (LED) interface. Its dynamic property pages provide full control of the LED's size, shape, colours and bitmaps. Horizontal or vertical arrays of LEDs may be used to display meter levels or dip switch settings.

In the following section the most important properties for the LED are described. For further information about the GMS LED control resp. its properties see file "Led.chm" in the ActiveX directory of the PBA.pro installation.

3.8.2.5.1 Default Interfaces

- Set Value

  Members:

  - Property: Value (Type: int)

3.8.2.5.2 Important properties

- StyleOffColor: colour

  Determines the "OFF" colour of the LED currently selected by the property LEDIndex

- StyleOnColor: colour

  Determines the "ON" colour of the LED currently selected by the property LEDIndex

- LEDIndex: int

  If multiple LEDs exist, LEDIndex is used to index the LED to which the other LED properties apply. The total number of LEDs is determined by the NumLEDs property and LEDIndex has valid values from 0 to NumLEDs-1

- NumLEDs: int

  Defines the number of LEDs that appear in the control

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- LEDStatus: enum

  Selects the ON (LEDStatusOn) or OFF (LEDStatusOff) status of the currently selected LED.

3.8.2.6 GMS Linear Gauge

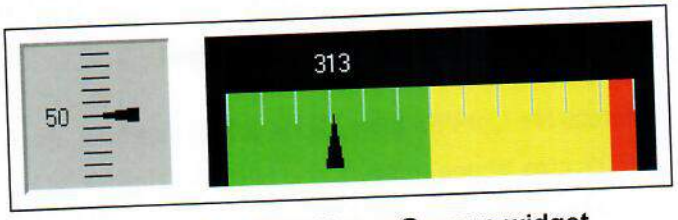


Figure 131: GMS Linear Gauage widget

This ActiveX widget is a multi-purpose, highly customizable linear gauge that can be configured as a slider for input or as a meter for output. Its dynamic property pages provide a powerful tool for designing gauges with full control of scales, pointers, fonts, operation bands, and tics.

- Bands:

  Bands are used for aesthetics as well as indicators of operating ranges. Properties are provided to modify the band's start-stop values, inner-outer positions, colour, and associated scale. Multiple bands can be placed on a single gauge

- Captions:

  The gauge can be embellished with multiple captions to indicate the type of measurement being displayed, units used or any other informative or decorative labelling

- Pointers:

  Pointers can be displayed in a variety of shapes and sizes. Properties are used to modify the pointer's style, size, width, colour and associated scale. Multiple pointers can be placed on a single gauge

- Scales:

  Scales are used to define the extent of the units displayed by the gauge, the location of the gauge centre, and the gauge's start and stop positions. Multiple scales are supported

- Tics:

  Tics are used to mark intervals on the gauge's face. Properties are used to set the tic's style, start-stop values, interval, inner-outer positions, width, colour, label positions, and associated scale

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In the following section the most important properties for the gauge are described. For further information about the GMS Linear Gauge control resp. its properties see file "LGauge.chm" in the ActiveX directory of the PBA.pro installation.

3.8.2.6.1 Default Interfaces

- Set Pointer Value

  Members:

  - Property: PointerValue (Type: double)
  - Slot: void SetPointerValue (double)

3.8.2.6.2 Important properties

- PointerValue: double

  Sets or returns the value (if PointerType is set to "Value") of the pointer currently selected by PointerID. The PointerValue is a number between ScaleMin and ScaleMax as defined by PointerScaleID

- PointerID: int

  When multiple pointers exist, this property is used to index the pointer to which the other pointer properties apply. The total number of pointers is determined by the Pointers property. PointerID has valid values from 0 to Pointers-1

3.8.2.7 GMS Numeric LED



Figure 132: GMS Numeric LED widget

The Numeric LED control provides a highly customizable digital display. Its dynamic property pages provide full control of the control's sizes, colours and bitmaps. It may be used to display either numeric or alphanumeric values.

In the following section the most important properties for the numeric LED are described. For further information about the GMS Numeric LED control resp. its properties see file "NumLed.chm" in the ActiveX directory of the PBA.pro installation.

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3.8.2.7.1 Default Interfaces

- Set Value

  Members:

  - Property: Value (Type: double)
  - Slot: void SetValue (double)

3.8.2.7.2 Important properties

- DisplayMode: enum

  Determines the type of value which may be displayed by the control. (Numeric or Alpha_Numeric)

- Value: int

  Sets or returns the control's displayed value when DisplayMode is set to Numeric

- AlphaNumeric: string

  Sets or returns the control's displayed value when DisplayMode is set to Alpha_Numeric

3.8.2.8 GMS Progress Bar



Figure 133: GMS Progress Bar widget

This control is a versatile percentage interface used to indicate a level or progress. Progress bars can be set directly by the user or indirectly by allowing the control to calculate them. The user can define the number of percentage areas and shapes (bar, ellipse, tank, user-defined).

In the following section the most important properties for the progress bar are described. For further information about the GMS Progress Bar control resp. its properties see file “Pct.chm” in the ActiveX directory of the PBA.pro installation.

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3.8.2.8.1 Default Interfaces

- Set Portion Value

  Members:

  - Property: PortionValue (Type: double)
  - Slot: void SetPortionValue (double)

3.8.2.8.2 Important properties

- PortionValue: double

  Determines the numeric value associated with the portion currently selected by PortionID

  The size of each portion is determined by the PortionValue and the PercentMode that is currently selected:

  - If PercentMode is set to 0 (Simple) or 1 (Percent), portion sizes are determined by setting PortionValue to a percentage value (0-100 %)
  - If PercentMode is set to 2 (Value), portion sizes are determined by setting PortionValue to a numeric value between Min and Max
  - If PercentMode is set to 3 (Ratio), each portion's size is determined by the ratio of its PortionValue to the sum of PortionValues of all portions

- DisplayMode: enum

  Determines whether the control fills linearly (LinearDisplay) or radial as pie (RadialDisplay)

- DigitalFormat: string

  Determines the format of the numbers associated with the control. This format is similar to that used in C. For example:

  "%0.2f" = x.xx

  "%0.0f %%"= xx %

  "%0.3f Percent" = x.xxx Percent

- Min: double, Max: double

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Sets or returns the maximum or minimum value for the percentage indicator. The percentage caption displays the percent property and is calculated by changing the value property: Percent = ((Value-Min) / (Max-Min)) * 100.

The Value property can be changed by changing the percent property:

Value = ((Percent-Min) / 100) * (Max - Min)

3.8.2.9 GMS Selector

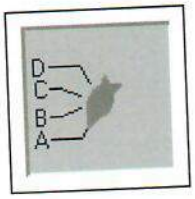


Figure 134: GMS Selector widget

The Selector control is a knob-style control that can be used to choose between discrete options. It can be used as a replacement for option buttons and provides the user with an easy-to-use and intuitive mouse input.

- Captions:

  The control can be embellished with multiple captions to indicate the type of measurement being displayed, units used or any other informative or decorative labelling. These captions are in no way related to the captions defined for each selection

- Knob:

  There are several styles of knobs that may be used in the selector switch control. Properties are provided to modify the knob's style, inner-outer radii, width, and colour. Additionally, user defined shapes may be specified

- Lines and Offsets:

  The control's lines are controlled by the user. Properties are available to change the line's inner radius and thickness as well as whether or not lines are visible. Offsets, on the other hand, may be controlled automatically or by the user. The length and angle of each offset can be set

- Mark:

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Each knob may be adorned with a single mark. Properties are provided to modify the mark's style, inner-outer radii, width, and colour. Additionally, user defined mark shapes may be incorporated into the control

- Selections:

Each switch may have several possible selections. The caption, colour, alignment, and offset of each selection is controlled by the user. Additionally, there are automatic features that define the control with minimal work required

In the following section the most important properties for the selector are described. For further information about the GMS Selector control resp. its properties see file "Select.chm" in the ActiveX directory of the PBA.pro installation.

3.8.2.9.1 *Default Interfaces*

- Value Changed

Members:

  - Property: Value (Type: int)
  - Signal: void ValueChanged (int)

3.8.2.9.2 *Important properties*

- Value: int

Indicates the current value or visual selection. The value property has valid values from 0 to Selections-1

3.8.2.10 GMS Slider



Figure 135: GMS Slider widget

The Slider control is a versatile input/ output tool used to create sliders, gauges, meters, etc. that incorporate a sliding mechanism. It uses dynamic property pages for easy design of unique sliding displays in short time.

- Bars:

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The slider bar properties allow the user to manipulate the On/ Off characteristics of the slider separately. Colours or bitmaps may be used to fill the ON or OFF bar area. Also, the orientation, width, border, and position of the bar can be controlled through properties

- Knob:

  There are also properties available to manipulate the knob's appearance. Knob properties exist for scaling, offset, colour, shape, and bitmap

- Tics:

  Tic properties were set up in an array fashion. The user can place as many sets of tic marks on any slider control as he likes. Each set of tic marks can be adjusted with colour, increment, start and stop value, size, and placement

  In the following section the most important properties for the slider are described. For further information about the GMS Slider resp. its properties see file “Slide.chm” in the ActiveX directory of the PBA.pro installation.

3.8.2.10.1 Default Interfaces

- Set Value

  Members:

  - Property: Value (Type: double)

3.8.2.10.2 Important properties

- Value: double

  Determines the value for the control. The Value is a number that falls between the properties Min and Max

- Min: double, Max: double

  Determines the maximum and minimum values available on the instrument

- OffColor: colour, OnColor: colour

  Determines the colours used in the "On" and "Off" portions of the control

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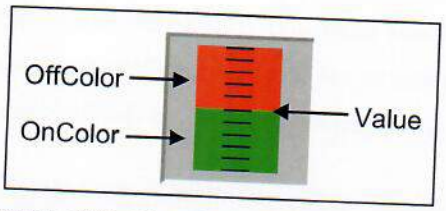


Figure 136: On off colour description

3.8.2.11 GMS Strip Chart

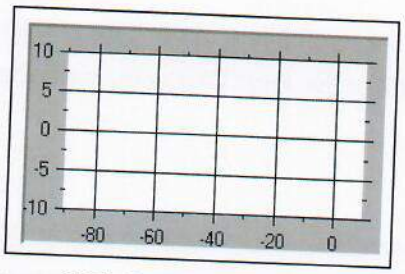


Figure 137: GMS Strip Chart widget

The Strip Chart ActiveX Control is a dynamic two-dimensional charting control that provides an ideal interface for viewing one or more streams of real-time data. Panning and zooming functionality allows for quick review and in-depth analysis of data trends. Its dynamic property pages provide a powerful tool for designing charts with full control of scales, captions, fonts, and tics. Additionally, multiple methods are provided to easily pass data to the control.

- Time property relationships

  We get a lot of questions about how the x-axis properties are inter-related when using the Strip Chart control with XTicMode set to Time_Date (I.e. the X Axis represents time). The primary thing to understand is that the XSpan property is referenced to 24 hours. Therefore if you want to display a full day of data on the plot, you would set XSpan=1. For 1 hour of data, you set XSpan=0.01667 (1/24), 1 minute XSpan=0.000694 (1/24/60), and so on. XSpan sets the width extents of the plot when the plot is configured horizontally and the height extents when it is configured vertically.

  The LastX property is the time value you want to begin the plot at. If you are performing real-time analysis, that time is likely to be the right now. You need to set the LastX in code if this is the case. In Visual Basic you can simply place the code Strip1.LastX=Now in the Form Load module. Do not try to type "Now" into the LastX property at design time – "Now" is a function, not a value!

  We recommend using the AddXY or the AddXYArray methods whenever plotting time. The AddY and AddYArray methods are intended for use in plots that are typically using the x-axis as a counter with a fixed increment. If your time increment is fixed and you are comfortable

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with the way Windows timers work and you decide to use either the AddY or the AddYArray methods, then you will need to set the VariableDeltaX property for each variable. Again, the VariableDeltaX property is referenced to 24 hours like the other x-axis properties.

The only other property, which needs attention, is the MaxBufferSize property that allows you to set the total size of the holding array buffer for the data. In other words, if you set the MaxBufferSize to 1000, the Strip Chart control will allocate enough memory for 1000 data points. MaxBufferSize uses a FIFO (First In First Out) memory structure.

The last thing to do is pick the appropriate method for sending data to the control. Once again, we suggest using the AddXY or the AddXYArray method when using time for your x-axis.

- Time formats

  The Strip Chart control allows the user to define the way Time is displayed on the x-axis. The properties for defining the Time formats include the following properties; TimeSecondsFormat, TimeMinutesFormat, TimeHoursFormat, TimeDaysFormat, TimeYearsFormat, TimeDateFormat, and TimeMonthsFormat. The reason that all of these different Time formatting properties are available is due to the effect of zooming in and zooming out around data sets. As you zoom in and out about the data displayed on the Strip Chart control, different requirements are met. The Strip Chart control automatically assumes the most appropriate Time scale (seconds, minutes, hours, days, etc.) for the current viewable data set. The user can define each of these Time scale definitions using the Time formatting properties or he can use the default settings

- Built in statistical features

  The Strip Chart includes some simple built in statistical features that track minimums, maximums and averages for each variable plotted. For more information, see the topics for the VariableVisibleMax, VariableMax, VariableVisibleMin, VariableMin, VariableVisibleAvg, VariableAvg, VariableVisibleStdDev, and VariableStdDev properties

- Data drop-out/ skipping data

  The strip chart has a built-in feature that allows representation of invalid or missing data (commonly referred to as data drop-out). Simply send it the Y value, 2E+200, along with an appropriate X value and the control will not draw that point. However, it will resume plotting when valid data has been restored

For further information about the GMS Strip chart resp. its properties see file “Strip.chm” in the ActiveX directory of the PBA.pro installation.

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3.8.2.11.1 Default Interfaces

- Add Value

  Members:

  - Property: Y (Type: double)
  - Slot: void SetY (double)

3.8.2.12 GMS Slider



Figure 138: GMS Slider widget

The Toggle Switch control is a TRUE/ FALSE, YES/ NO, or ON/ OFF indicator. It displays either captions or pictures to represent the switch's state. It has sound playing capabilities to indicate the switch turning on or off and timers to provide automatic cut off and blinking to draw attention to the control.

- Remarks:

  Wave files (*.wav) used with the control will not be stored in the control as the bitmap files are. Therefore all wave files need to accompany your application when distributed

  Windows has a limited number of timer handles available so be careful when using several timers and blinking controls on a single form

  In the following section the most important properties for the slider are described. For further information about the GMS Slider resp. its properties see file "Slide.chm" in the ActiveX directory of the PBA.pro installation.

3.8.2.12.1 Default Interfaces

- Value Changed

  Members:

  - Property: Value (Type: bool)
  - Signal: void ValueChanged (bool)

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3.8.2.12.2 *Important properties*

- Value: bool

  This property determines whether the current control state is "On" or "Off"

3.8.3 Other component widgets

All other widgets which are provided by other components will be placed in the miscellaneous section of the designer.

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