

Portable API Reference

Build a display control once in C# with the Portable API and use it in both the Windows clients and the browser: one source file, compiled into a WPF build and an HTML5 build.

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A portable control is a WPF `UserControl` that implements `T. Toolkit.IPortableControl` and is compiled twice from the same source: once for the WPF clients and once, through OpenSilver, for the HTML5 (browser) client. After you copy the two DLLs into the FrameworkX installation, the Designer lists the control in the Components panel like a built-in control, with its own configuration panel.

This page covers **building** the control, **deploying** it to FrameworkX and **finding it** in the Designer, using a downloadable template.



A portable control is not placed with the WPF Control element. For a control that only needs to run on WPF clients, see [WPF Control API Reference](#). For one that only runs in the browser, see [Blazor Control API Reference](#).

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Download the template

Download [PortableControl-SampleGauge.zip](#). It contains a complete portable control, `TSampleGauge`: a circular gauge linked to a tag, with a minimum, a maximum, a header and a Designer configuration panel.

File	Compiled into	Role
SampleGauge\TSampleGauge.cs	Both (linked)	The control: properties, user interface, runtime tag binding and the <code>IPortableControl</code> members.
SampleGauge\TSampleGaugeConfig.xaml/.xaml.cs	WPF only	The configuration panel the Designer opens when you double-click the control.
SampleGauge\TSampleGauge.png	WPF only	The icon shown in the Components panel.
SampleGauge.HTML5\SfCircularGauge.cs	HTML5 only	The wrapper: a C# class with the same members as the WPF gauge, implemented on the JavaScript gauge.
nuget.config		Adds the OpenSilver package feed the HTML5 project needs.
SampleGauge.sln		Opens both projects.

Validated with FrameworkX 10.1.5, in the WPF client and in the browser.

How a portable control works

One control source file is linked into two projects. Each project produces a DLL with the **same file name**, and each DLL goes to its own folder of the FrameworkX installation:

	WPF build	HTML5 build
Project	SampleGauge\TSampleGauge.csproj	SampleGauge.HTML5\TSampleGauge.HTML5.csproj
Target	.NET Framework 4.8	.NET Standard 2.0 + OpenSilver
User interface	WPF components (the template uses the Syncfusion WPF gauge shipped with FrameworkX)	JavaScript components driven from C# through a wrapper class (the template uses the Syncfusion JavaScript gauge from the web client's Libraries folder)
Output	T.Portable.Controls.TSampleGauge.dll	T.Portable.Controls.TSampleGauge.dll

Deploy to	C:\Program Files\Tatsoft\FrameworkX\fx-10\WpfControls\	C:\Program Files\Tatsoft\FrameworkX\fx-10\HTML5\ExtensionControls\
Used by	The Designer, the RichClient and the SmartClient	The HTML5 client in the browser, which downloads it by name

There is no registration step. When the Designer starts, it scans the WpfControls folder and lists every control it finds there. If a DLL with the same name is also in HTML5\ExtensionControls, the control is portable; if not, it is listed with a (WPF) suffix and works only on WPF clients.

Requirements

- Windows and Visual Studio with the **.NET desktop development** workload, and a current .NET SDK (the template was built with .NET SDK 10).
- A FrameworkX installation. Both projects reference the FrameworkX assemblies (T.Library, T.Toolkit and, for WPF, T.Library.Wpf, T.Toolkit.Wpf, T.Kernel, T.Wpf and the Syncfusion gauge) from C:\Program Files\Tatsoft\FrameworkX\fx-10\.
- Access to nuget.org and to the OpenSilver package feed <https://www.myget.org/F/opensilver/api/v3/index.json>, declared in the template's nuget.config.
- Place the control on a **Portable** display to use it in the WPF clients (Windows, RichClient, SmartClient) and in the browser.

Rules

Follow these rules for every portable control. Breaking one usually produces no error: the control is missing from the Components panel, shows as (WPF), or does not load in the browser.

1. **Name the assembly T.Portable.Controls.T<Name>, with RootNamespace T.Portable.Controls.** The Designer only loads DLLs from WpfControls whose file name contains T.Portable..
2. **Both builds have the same file name.** The WPF build goes to fx-10\WpfControls\, the HTML5 build to fx-10\HTML5\ExtensionControls\. The browser downloads the HTML5 build by that name.
3. **The control class is public and implements IPortableControl** (namespace T.Toolkit). The Designer registers every public class in the DLL that implements it.
4. **The static GetIconImage() returns the icon.** Its pack:// URI must name your own assembly and .png file. If it returns nothing, the Designer skips the control without an error.
5. **The class name decides where the control appears.** The Components panel label is the class name without the leading T. The section is chosen by a case-sensitive text match on the class name: Chart goes to **Charts**, Gauge to **Gauges**, View to **Viewer**; any other name goes to **Extensions**.
6. **Do not reuse a product control name.** Your DLL would replace the product's. Four retired names are also never listed in the Components panel: TCircularGauge, TCenterValueCircularGauge, TRangeCircularGauge and TSemiCircleCircularGauge.
7. **The control source is linked into both projects, never copied.** Put platform differences behind #if OPENSILVER. The configuration panel and the icon belong to the WPF project only.
8. **The OpenSilver package version matches the FrameworkX web client.** For FrameworkX 10.1.5 it is 3.4.0-preview-2026-07-03-134452-d65dd77f, with System.Formats.Asn1 and System.Security.Cryptography.Xml 10.0.10. A different version builds, but the HTML5 build fails to load in the browser.
9. **FrameworkX assemblies are referenced, not copied.** Every FrameworkX and third-party reference has <Private>False</Private>, and you deploy only the control DLL from each output folder.
10. **Close the Designer before replacing the DLLs, and restart it to see a new control.** The Designer keeps the DLLs loaded, and it scans WpfControls only when it starts.

Build, deploy and use the template

1. Build

Open SampleGauge.sln and build in Release. If FrameworkX is not installed in C:\Program Files\Tatsoft\FrameworkX, change FrameworkXPath in both project files to your installation's fx-10 folder, keeping the trailing backslash. The two builds are:

- WPF: SampleGauge\bin\Release\T.Portable.Controls.TSampleGauge.dll
- HTML5: SampleGauge.HTML5\bin\T.Portable.Controls.TSampleGauge.dll

Both output folders also contain other assemblies. Copy only the control DLL (rule 9).

2. Deploy to FrameworkX

1. Close the Designer (rule 10).
2. Copy the WPF build to C:\Program Files\Tatsoft\FrameworkX\fx-10\WpfControls\.
3. Copy the HTML5 build to C:\Program Files\Tatsoft\FrameworkX\fx-10\HTML5\ExtensionControls\.

Both folders are under Program Files, so copying may require administrator rights.

3. Find it in the Designer

Open the Designer and a Portable display in **Displays / Draw**. In the Components panel, open the **Gauges** section: the control is listed as **SampleGauge**, without a (WPF) suffix. A control whose class name contains none of Chart, Gauge or View is listed in an **Extensions** section instead (rule 5).

4. Place it and link a tag

Drag **SampleGauge** onto the display and double-click it to open its configuration panel. Enter a tag in **Linked Value** (for example Tag.Level) and, if needed, the **Minimum Value**, **Maximum Value** and **Header**. Run the solution: the gauge follows the tag in the WPF client and in the browser.

5. Make it your own control

Choose a class name that follows rules 1, 5 and 6, then change it everywhere below. SfcircularGauge is the name of the JavaScript gauge wrapper, not of the control, and can stay.

File	What to change
File and folder names	TSampleGauge.*, TSampleGaugeConfig.*, and the SampleGauge / SampleGauge.HTML5 folders.
TSampleGauge.csproj and TSampleGauge.HTML5.csproj	AssemblyName, the Compile, Page and Resource items, and the linked source path in the HTML5 project.
TSampleGauge.cs	The class and constructor names, the configuration class in GetConfigControl(), and the assembly and file name in the pack://URI inside GetIconImage().
TSampleGaugeConfig.xaml / .xaml.cs	x:Class, the class name, the control type it casts to, and the design-time DataContext type.
Properties\AssemblyInfo.cs, SampleGauge.sln	The title, product and project names.

How the code works

One source, two platforms

The shared file switches between the WPF gauge and the JavaScript wrapper with a conditional using. The OpenSilver package defines the OPENSILVER symbol in the HTML5 project.

TSampleGauge.cs
<pre>#if OPENSILVER using T.Portable.Components.Gauges; #else using Syncfusion.UI.Xaml.Gauges; #endif</pre>

Linking a tag

Every bindable property is a string that holds a link: a constant, a tag or an expression. The setter applies constants immediately so the Designer preview updates. Tag and expression values arrive at runtime.

TSampleGauge.cs: a bindable property

```
public ObjectReference linkedValueRun = null;
private string _linkedValue = "";
[DefaultValue("")]
public string LinkedValue
{
    get { return _linkedValue; }
    set
    {
        if (this._linkedValue != value)
        {
            this._linkedValue = value;
            NotifyDesignPropertyChanged();
            if (IsStaticValue(value))
            {
                double x = TConvert.ToDouble(value);
                gPointer.Value = x;
                if (gPointer2 != null)
                {
                    gPointer2.Value = x;
                }
            }
        }
    }
}
```

StartRuntime() runs when the display opens. It turns each link into an ObjectReference and registers HandleTagEvent, which runs on every change and pushes the new value into the gauge. Dispose() releases each reference with WK.Dispose when the display closes.

TSampleGauge.cs: StartRuntime (start and end)

```
public void StartRuntime()
{
    UpdateColors();

    this.headerRun = ObjectReference.ParseString(WK.UntokenizeObjectName(this.HeaderLink).Trim(''));
    if (!WK.IsUpdatingReport && this.headerRun != null)
        this.headerRun.RegisterEvent(this.HandleTagEvent);

    this.linkedValueRun = ObjectReference.ParseExpression(this.LinkedValue.Trim(), null);
    if (!WK.IsUpdatingReport && this.linkedValueRun != null)
        this.linkedValueRun.RegisterEvent(this.HandleTagEvent);

    ObjectReference.AddEventToExecute(this.HandleTagEvent);
}
```

TSampleGauge.cs: inside HandleTagEvent

```
if (this.linkedValueRun != null)
    gScale.Pointers[0].Value = TK.To<double>(await this.linkedValueRun.GetValueAsync());
```

Symbols, copy and paste, and saving

Every link must also be listed in the token, label, clipboard and save members, one line per link. Leaving them empty compiles and seems to work, then breaks symbol parameters, renames, copy and paste, and cross references.

TSampleGauge.cs: GetTokens and OnSave

```
public void GetTokens(object symbol)
{
    WK.GetTokens(symbol, MinValueLink, eFieldTypeTk.NumberOrObject);
    WK.GetTokens(symbol, MaxValueLink, eFieldTypeTk.NumberOrObject);
    WK.GetTokens(symbol, LinkedValue, eFieldTypeTk.Expression);
    WK.GetTokens(symbol, HeaderLink, eFieldTypeTk.ObjectOrString);
    WK.GetTokens(symbol, RimThicknessLink, eFieldTypeTk.NumberOrObject);
    WK.GetTokens(symbol, PointerThicknessLink, eFieldTypeTk.NumberOrObject);
    WK.GetTokens(symbol, MajorTicksQuantityLink, eFieldTypeTk.NumberOrObject);
    WK.GetTokens(symbol, MinorTicksPerIntervalLink, eFieldTypeTk.NumberOrObject);
}

public void OnSave(int displayId, object el)
{
    OnStartClipboardCopy();
    OnFinishClipboardCopy();

    WK.SaveHelper.SaveStart(displayId, el);

    WK.SaveHelper.SaveLink(LinkedValue, "LinkedValue");
    WK.SaveHelper.SaveLink(MinValueLink, "MinValue");
    WK.SaveHelper.SaveLink(MaxValueLink, "MaxValue");
    WK.SaveHelper.SaveLink(HeaderLink, "HeaderLink");
    WK.SaveHelper.SaveLink(RimThicknessLink, "RimThickness");
    WK.SaveHelper.SaveLink(PointerThicknessLink, "PointerThickness");
    WK.SaveHelper.SaveLink(MajorTicksQuantityLink, "MajorTicksQuantity");
    WK.SaveHelper.SaveLink(MinorTicksPerIntervalLink, "MinorTicksPerInterval");
}
```

Icon and configuration panel

TSampleGauge.cs

```
static public byte[] GetIconImage()
{
    string _imageUri = @"pack://application:,,,/T.Portable.Controls.TSampleGauge;component
/TSampleGauge.png";
    return WK.GetImageFromUri(_imageUri);
}

public IControlConfig GetConfigControl()
{
    #if OPENSILVER
        return null;
    #else
        return new TSampleGaugeConfig();
    #endif
}
```

The browser side

The HTML5 build declares the JavaScript and CSS files the web client loads before the control renders, through `IHTML5ControlDependencies`. Paths are relative to the web client root or absolute URLs.

TSampleGauge.cs: IHTML5ControlDependencies

```
public string[] ControlDataJS
{
    get
    {
        return new string[] {
            @"Libraries/ej2-base/dist/global/ej2-base.min.js",
            @"Libraries/ej2-circulargauge/dist/global/ej2-circulargauge.min.js",
        };
    }
}

public string[] ControlDataCSS
{
    get
    {
        return new string[] {
            "Libraries/ej2-popups/styles/material.css",
            "https://fonts.googleapis.com/css?family=Roboto:400,500"
        };
    }
}
```

The wrapper exposes the same members as the WPF gauge. Each property that affects rendering must push its value to the JavaScript object in its setter. A property that is only stored in C# compiles, but a tag change never reaches the browser.

SfCircularGauge.cs: a property that pushes to JavaScript

```
public double Value
{
    get => objValue;
    set
    {
        objValue = value;
        if (this.CircularGaugeWebAssemblyObject == null || this.circularPointer == null)
            return;

        OpenSilver.Interop.ExecuteJavaScript("$0.value = $1", this.circularPointer, objValue);
    }
}
```

The IPortableControl members

Member	When FrameworkX calls it	What the control does
GetConfigControl()	The Designer opens the configuration panel	Returns the configuration panel on WPF, null under OPENSILVER.
StartRuntime()	The display opens at runtime	Turns links into ObjectReference objects and registers the change handler.
Dispose()	The display closes	Releases every ObjectReference and event it attached.
GetTokens, ApplyTokens	The control is used in a symbol	Exposes every link so symbol parameters are replaced.
GetLabels, ResolveLabels	Symbol labels are renamed	Same links, so renames reach the control.
GetStrings, ApplyStrings	Translation	Exposes fixed texts for localization.
OnStartClipboardCopy, OnFinishClipboardCopy, OnFinishClipboardPaste	Copy and paste	Keeps every link valid, one line per link.

OnSave(int displayId, object el)	The display is saved	Calls WK.SaveHelper.SaveStart, then SaveLink for each link. This feeds cross references.
GetIconImage()	The Designer lists the control	Static method, not part of the interface. Returns the icon.

Optional interfaces used by the template: IHTML5ControlDependencies (JavaScript and CSS for the browser), IWKUpdateColors (theme changes) and INotifyPropertyChanged (refreshes the Designer preview from the configuration panel).

Troubleshooting

Symptom	Cause	Fix
The control is not in the Components panel.	The DLL is not in WpfControls, its name does not contain T.Portable., the Designer was not restarted, GetIconImage() returns nothing, or the class uses a retired name.	Check rules 1, 3, 4, 6 and 10.
The control appears in a different section than expected.	The section comes from the class name, with a case-sensitive match.	See rule 5.
The control shows (WPF).	No DLL with the same name in HTML5\ExtensionControls.	Deploy the HTML5 build with the exact same file name (rule 2).
It works in the WPF client but not in the browser.	OpenSilver version mismatch, a missing JavaScript or CSS dependency, or a wrapper property that does not push to JavaScript.	Check rule 8, IHTML5ControlDependencies, and the wrapper setters.
Restore fails: package not found.	The OpenSilver preview packages are not on nuget.org.	Keep the template's nuget.config with the OpenSilver feed.
Build error NU1605, package downgrade of System.Security.Cryptography.Xml.	An older version is referenced than the one OpenSilver requires.	Use version 10.0.10 (rule 8).
The WPF output folder is full of FrameworkX DLLs.	A reference lacks <Private>False</Private>.	Set it on every FrameworkX reference, and deploy only the control DLL (rule 9).
Copying fails: "being used by another process".	The Designer or a client has the DLL loaded.	Close them and copy again (rule 10).

Source code

The complete source of this template is in PortableControl-SampleGauge.zip, available under **Download the template** at the top of this page. That zip is the single, authoritative copy of the code. The code on this page is excerpts only, to explain how the template works.

Related

- [Custom Control API Reference](#): choose between WPF, Blazor and Portable controls.
- [WPF Control API Reference](#): a WPF-only control placed with the WPF Control element.
- [Blazor Control API Reference](#): a browser-only control built with Razor components.

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