

TopCon Series

TopCon API

.Net API Access

Regatron AG
Feldmühlestrasse 50
CH-9400 Rorschach
Tel +41 71 846 67 44
Fax +41 71 846 67 77
www.regatron.com
tc.support@regatron.ch

Getting Started

Version V 1.4

© 2010- 2020Regatron AG

This document is protected by copyright.

All rights, including translation, re-printing and duplication of this manual or parts of it, reserved. No part of this document is allowed to be reproduced or processed using electronic systems, copied or distributed in any form (by photocopying, microfilming or any other process), also not for educational purposes, without the written approval of Regatron AG.

This information in this documentation corresponds to the development situation at the time of going to print and is therefore not of a binding nature. Regatron AG reserves the right to make changes at any time for the purpose of technical progress or product improvement, without stating the reasons. In general we refer to the applicable issue of our “Terms of delivery”.

Overview of versions		
TopConAPI	Version	V 1.1.0
Document Version	Version	V 1.4

All information is subject to technical changes without prior notice.

Content

Content	3
1. Overview	4
1.1. Content	4
1.2. Precondition / Dependencies	4
1.3. LIMITED EDITION END USER LICENSE AGREEMENT	4
1.3.1. Licenses of used components	6
2. General Architecture	10
2.1. Components	10
3. Battery Simulation in C# .Net	11
3.1. Components	11
3.1.1. Source Code	11
3.1.2. References	12
3.1.3. Namespace	12
3.2. Battery Simulation	13
3.2.1. Battery Simulation Control	13
4. Change log	14

1. Overview

The TopCon .Net API can be used to access the TopCon device programmatically and perform a certain set of operations.

It cannot substitute the TopControl, SASControl or ESSControl PC Software, but offers some methods to automate operations.

The main configuration and error analysis can only be done with the ESSControl or TopControl software.

For more details please see the doxygen documentation and the example application

1.1. Content

This document provides a guideline how to access the TopCon .net API.

It does not explain all the method that the API exposes. To get a complete method and class description of the API, please refer to the Doxygen documentation.

1.2. Precondition / Dependencies

To be able to use the TopCon .Net API the following frameworks and libraries have to be installed on the target system:

- Microsoft Visual C++ 2008 Redistributable Package (x86 / x64)
- Microsoft Visual C++ 2017 Redistributable Package (x86 / x64)
- Microsoft .NET Framework 4.7
- Windows 10 Anniversary Update (for Windows 10 OS)

Note:

In order to be able to install the .NET Framework 4.7 on Windows 7 and Windows 8 operating systems, the Windows Update KB4019990 is needed.

1.3. LIMITED EDITION END USER LICENSE AGREEMENT

LICENSE

REGATRON AG, Rorschach distributes the software TopCon .net API, an API program to support the development of electrical devices.

DISCLAIMER OF WARRANTY

The software is provided on an "AS IS" basis, without warranty of any kind, including without limitation the warranties of merchantability, fitness for a particular purpose and non-infringement. The entire risk as to the quality and performance of the Software is borne by you. Should the Software prove defective, you and not REGATRON AG, Rorschach assume the entire cost of any service and repair. In addition, the security mechanisms implemented by REGATRON AG, Rorschach software have inherent limitations, and you must determine that the Software sufficiently meets your requirements. This disclaimer of warranty constitutes an essential part of the agreement.

SOME JURISDICTIONS DO NOT ALLOW EXCLUSIONS OF AN IMPLIED WARRANTY, SO THIS DISCLAIMER MAY NOT APPLY TO YOU AND YOU MAY HAVE OTHER LEGAL RIGHTS THAT VARY BY JURISDICTION.

SCOPE OF GRANT

You may:

- use the Software on one or more computers
- use the PC based part of the software TopCon .net API on a network, provided that each power supply that the software accesses has a valid Regatron AG license
- copy the Software for archival purposes, provided any copy must contain all of the original Software's proprietary notices.
- permit other individuals to use the Software except under the terms listed above

You may not:

- modify, translate, reverse engineer, decompile, disassemble (except to the extent applicable laws specifically prohibit such restriction), or create derivative works based on the Software
- rent, lease, grant a security interest in, or otherwise transfer rights to the Software
- remove any proprietary notices or labels on the Software

You must:

- keep the copyright notices of all embedded parts with any copy of the software

TITLE

Title, ownership rights, and intellectual property rights in the Software shall remain at REGATRON AG, Rorschach and/or its suppliers. The Software is protected by copyright laws and treaties. Title and related rights in the content accessed through the Software is the property of the applicable content owner and may be protected by applicable law. This License gives you no rights to such content.

The user holds the rights on all scripting programs written by the user. Especially for all effects resulting from executing of such scripts, the exclusion of liability (see below) applies.

TERMINATION

The license will terminate automatically if you fail to comply with the limitations described herein. On termination, you must destroy all copies of the Software.

EXPORT CONTROLS

None of the Software or underlying information or technology may be downloaded or otherwise exported or reexported (i) into (or to a national or resident of) Cuba, Iraq, Libya, North Korea, Iran, Syria or any other country to which Switzerland has embargoed goods. Any exceptions must be negotiated with Regatron AG. By downloading or using the Software, you are agreeing to the foregoing and you are representing and warranting that you are not located in, under the control of, or a national or resident of any such country or on any such list.

LIMITATION OF LIABILITY. UNDER NO CIRCUMSTANCES AND UNDER NO LEGAL THEORY, TORT, CONTRACT, OR OTHERWISE, SHALL REGATRON AG, Rorschach OR ITS SUPPLIERS OR RESELLERS BE LIABLE TO YOU OR ANY OTHER PERSON FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY CHARACTER INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF GOODWILL, WORK STOPPAGE, COMPUTER FAILURE OR MALFUNCTION, OR ANY AND ALL OTHER COMMERCIAL DAMAGES OR LOSSES. THIS LIMITATION OF LIABILITY SHALL NOT APPLY TO LIABILITY FOR DEATH OR PERSONAL INJURY TO THE EXTENT APPLICABLE LAW PROHIBITS SUCH LIMITATION. FURTHERMORE, SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS LIMITATION AND EXCLUSION MAY NOT APPLY TO YOU.

HIGH RISK ACTIVITIES

The Software is not fault-tolerant and is not designed, manufactured or intended for use or resale as on-line control equipment in hazardous environments requiring fail-safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines, or weapons systems, in which the failure of the Software could lead directly to death, personal injury, or severe physical or environmental damage ("High Risk Activities"). REGATRON AG, Rorschach and its suppliers specifically disclaim any express or implied warranty of fitness for High Risk Activities.

MISCELLANEOUS

If the copy of the Software you received was accompanied by a printed or other form of "hard-copy" End User License Agreement whose terms vary from this Agreement, then the hard-copy End User License Agreement governs your use of the Software. This Agreement represents the complete agreement concerning this license and may amended only by a writing executed by both parties. If any provision of this Agreement is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it

enforceable. This Agreement shall be governed by the laws of Switzerland. The application the United Nations Convention of Contracts for the International Sale of Goods is expressly excluded.

1.3.1. Licenses of used components

We are very grateful to be allowed to use various software components in the Topcon API. We respect the rights of the software developers, thus tried to evaluate the licenses very thoroughly and hope that we do not violate any rights of other developers. If you feel that our work infringes upon such third-party rights, we assume that the reader advises Regatron on this assumption.

By using the TopCon API and redistributing programs and tools that depend on the TopCon API, you accept/agree the following licences:

Licenses for JINT

Some parts of JINT use(d) the tool ANTLR, therefore we list the related license.

The JINT itself is licensed under MIT.

ANTLR 3 License

[The BSD License]
Copyright (c) 2003-2008, Terence Parr
All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.

Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

Neither the name of the author nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The MIT License (MIT)

Copyright (c) 2009 Evaluant

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

License for package NPlot

3-clause-BSD license

NPlot - A charting library for .NET

Copyright (C) 2003-2006 Matt Howlett and others.

All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. Neither the name of NPlot nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

License for log4net

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at

For more information see: <http://logging.apache.org/log4net/license.html>

Apache License, Version 2.0

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for

inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition,

"submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

(a) You must give any other recipients of the Work or Derivative Works a copy of this License; and

(b) You must cause any modified files to carry prominent notices stating that You changed the files; and

(c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and

(d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You

agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at

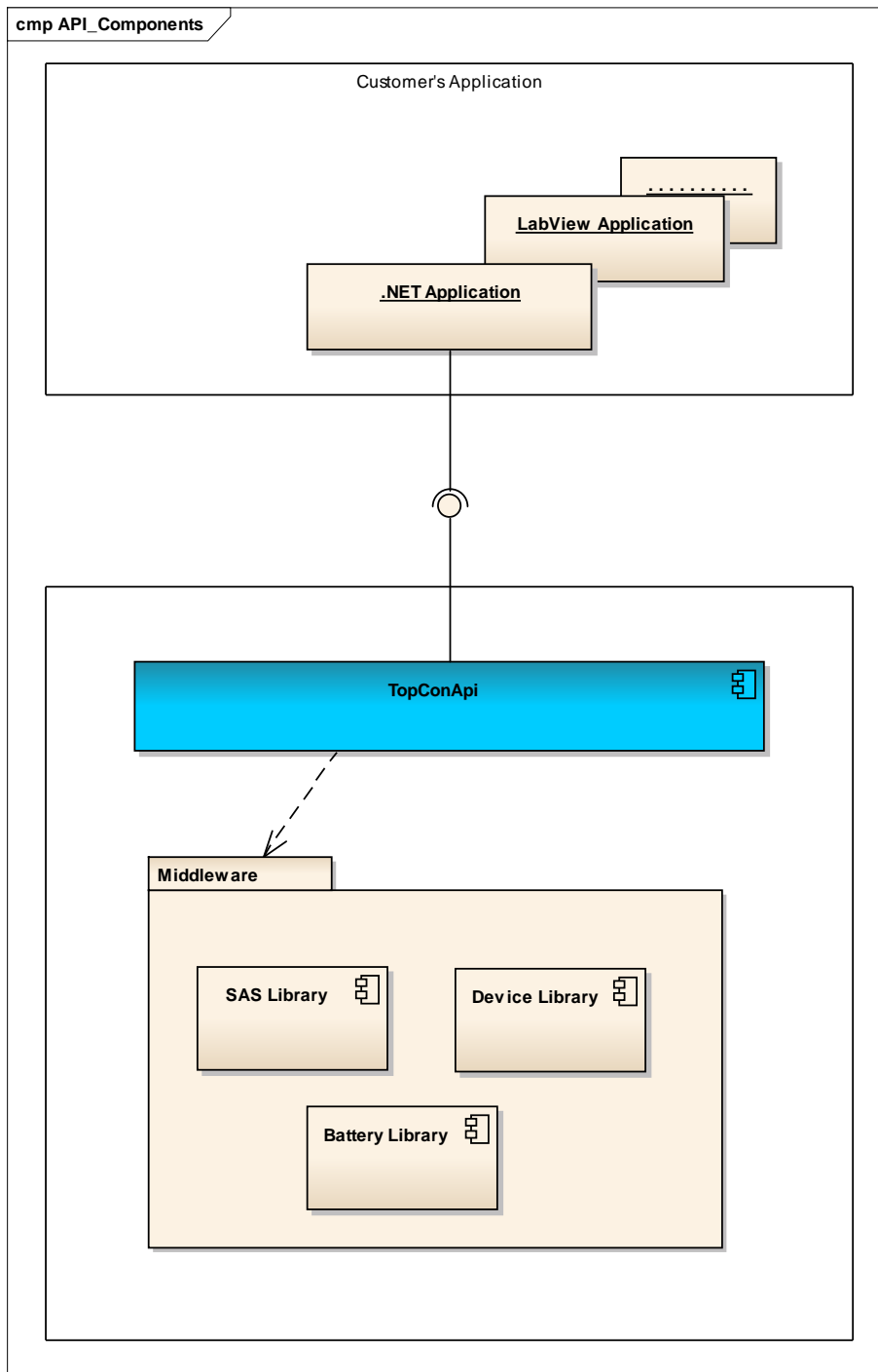
<http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

2. General Architecture

2.1. Components

The architecture looks like this:



You only have to reference the TopConApi.dll in your project. Public methods of other dll's that are delivered along with the TopConApi.dll mustn't be accessed.

3. Battery Simulation in C# .Net

There is an example project (“TopConApi WPF Example”) that shows how to access the API written in C# using a WPF GUI.

Important to mention is that this example project is not a productive program. It could throw exceptions at many places if an unexpected situation occurs. It does also not serve as an example project that shows how to use WPF and MVVM; it simply uses this technique to get a quick and easy test tool. There is much space for improvement.

The main purpose of this program is to show how the API can be accessed and used.

This section explains brief the different components of the example application and what they do.

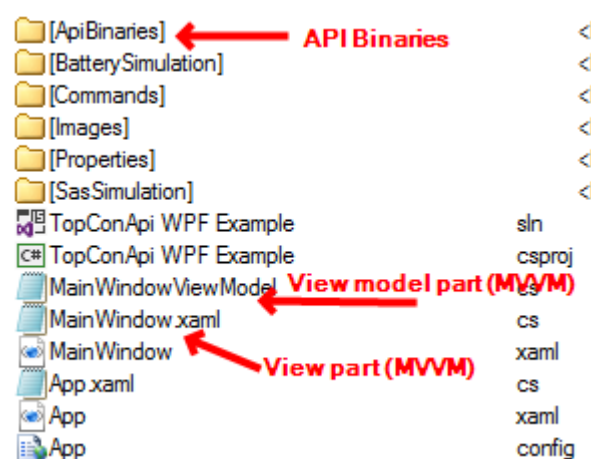
The source code can be opened with any editor, but the project and solution file requires the Microsoft Visual Studio (2017).

3.1. Components

This section brief explains the contents of the Test Application and what they do.

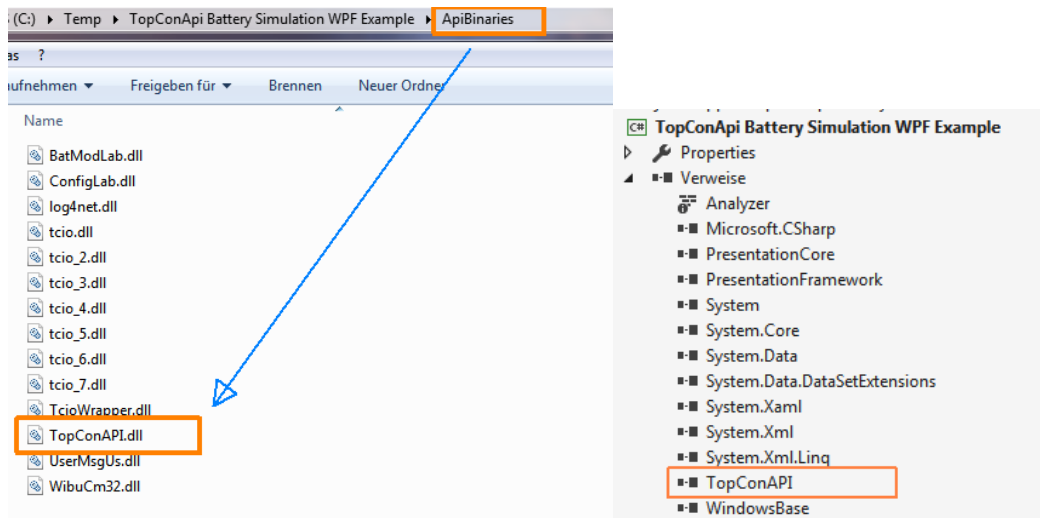
3.1.1. Source Code

Here the most important files and folders are listed. Those that are not described are standard files that are created by VisualStudio when creating a new WPF application



3.1.2. References

The only reference that has to be set is to the assembly TopConApi.dll in the ApiBinaries Folder



3.1.3. Namespace

The namespace of the API methods is:
Ch.Regatron.HPPS

```
using DEV = CH.Regatron.HPPS.Device;  
  
using Timer = System.Timers.Timer;  
  
namespace Ch.Regatron.TopCon.Example.TopConAPIDotNet4WPFExample  
{  
    public sealed class MainWindowViewModel:INotifyPropertyChanged  
    {  
        #region Members and Properties  
        ...  
    }  
}
```

3.2. Battery Simulation

To run a battery simulation there are two preconditions:

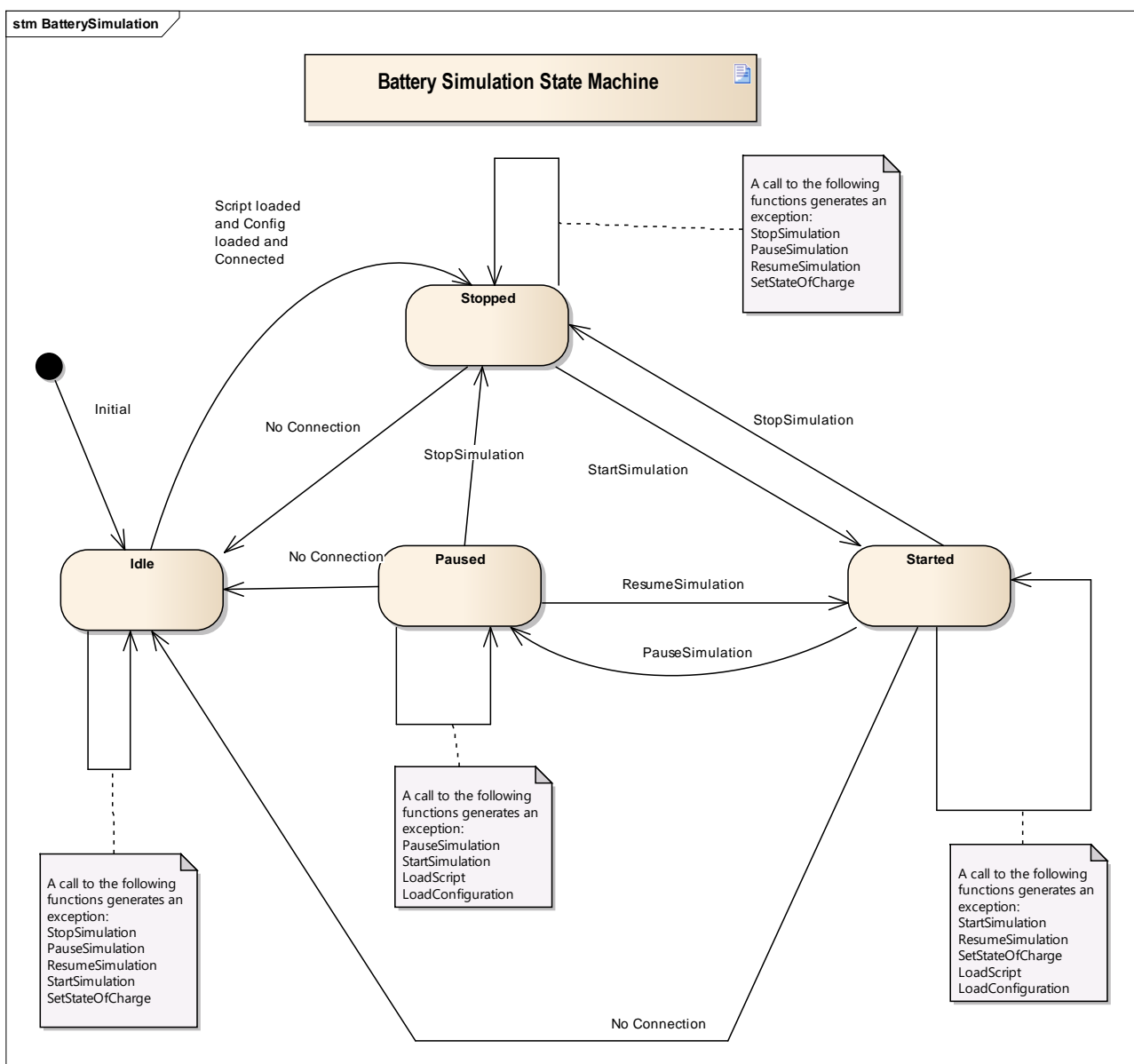
1. Load a predefined battery configuration *.batsimcfg
2. Load a predefined simulation script *.batsim

Beside the default files that are delivered together with the ESSControl application, you also can create your own battery configuration files.

3.2.1. Battery Simulation Control

The battery simulation has several states and commands that allows you to control the simulation procedure.

This diagram gives an overview about the states and its transitions:



4. Change log

This change log contains a list of changes in the previous versions of the documentation

Version	Date	Changes in documentation
1.0	2017-September-09	Initial documentation
1.2	2018-March -12	Update to newest API version
1.3	2019-February-11	Update to newest API Version
1.4	2020-February-10	Update to newest API Version



Address: Feldmühlestrasse 50
CH-9400 Rorschach
WWW: www.regatron.com
Email: tc.support@regatron.ch

Tel: +41 71 846 67 44
Fax: +41 71 846 67 77