DEWETRON

Simplified XML Setup Specification

VERSION 1.2 – OXYGEN 7.4

EN ISO 14001

ISO 9001

CONTENTS

This xml format was designed to be efficient to write and to reliably configure Oxygen and the required measurement equipment for a specific task. It is a streamlined alternative to the native .dms (DEWETRON Measurement Setup) files, which would need very detailed knowledge of Oxygen internals to update or create manually. Some OXYGEN features are not yet supported in this format.

For performance reasons, most XML processing in OXYGEN is not Namespace-aware, even though a default namespace is sometimes declared in exported XML fragments as a hint! When writing or generating a setup file according to this specification, all element and attribute names have to be used as defined here and without additional qualification. Therefore a colon may appear only in names that were derived from identifiers in OXYGEN, like `ID:TRION-BoardId`.

CHAPTER

ONE

OVERVIEW

The basic structure of setup files is shown below, and all the elements will be described in detail in the following sections. All of the children are technically optional, and some of them may occur multiple times.

```
<MeasurementSetup>
    <HeaderData/>
    <Nodes/>
    <Sync/>
    <Channel/>
    <Recording/>
    <Triggering/>
    <Screen/>
    <Export/>
</MeasurementSetup>
```

CHAPTER

TWO

ELEMENT DESCRIPTION

Most XML Elements, their attributes and children, will be described using the following syntax:

```
<Item param1="string" [param2="scalar|1s"]>
    <A/>+
    [<B/>]
    <C/>|<D/>
</Item>
```

In this case, xml element `Item` has a mandatory attribute `param1` of data type string. Attribute `param2` is scalar value, but is optional and uses a default value of `1s` if absent. Child element `A` has to occur at least once (`+`), `*` would indicate any element that may be present any number of times (including 0). `B` is optional, and one of `C` or `D` has to be used. More information on the semantics of the individual components can then be found in the associated description, if necessary.

This document assumes familarity with OXYGEN, and, specifically, the terms used for features or settings in the English localization. Therefore we will not elaborate on the details of options that closely match the OXYGEN UI or are described in the application manual.

CHAPTER

THREE

<MEASUREMENTSETUP>

```
<MeasurementSetup [version="versionstring|1"] [mode="string|strict"]␣
↪[resetChannels="bool|true"]/>
```

`version`: Version of the format used for this setup

- `1`: initial features as implemented in Oxygen 7.1
- `1.1`: added rearm levels for window trigger (Oxygen 7.3)
- `1.2`: measurement screen configuration (Oxygen 7.4)

`mode`: Defines how the setup file should be interpreted.

- **`strict`: Enforces the following constraints for successful loading:**
  - Setup format has to be equal to the one required by the current version of OXYGEN.
  - Each <Channel> has to match exactly one unique hardware channel.
  - All specified channel properties need to have exactly the same value as written in the file.

`resetChannels`: By default all channels are reset to default values before the setup values are applied. This can be prevented for specific use cases by setting this attribute to `false`.

CHAPTER

FOUR

<HEADERDATA>

This element adds a meta data item to the measurement, which will be visible and editable in “Header Data” section in OXYGEN. The name attribute cannot be an empty string.

```
<HeaderData name="string" value="string" [type="string|text"] [prompt=
↪"string|never"]/>
```

`type`: Currently the only supported option is `text`, which is also the default.

`prompt`: Currently the only supported option is `never`, which is also the default.

CHAPTER

FIVE

<NODES>

This element and its children define the measurement systems and devices that have to be available to successfull apply the setup. Usage of <Local> is implied, if no <Nodes> element exists in the file.

```
<Nodes>
    [<Local/>]
    <TRIONet name="string" serialNumber="digits"/>*
    <OxygenNet name="string" ip="ip_address"/>*
</Nodes>
```

The ordering of the children is arbitrary, but significant for indexing. Loading a setup fails, if any of the nodes is not available.

<Local>: The OXYGEN instance used to load the setup and directly attached measurement equipment.

<TRIONet>: A TRIONet node that will be claimed.

<OxygenNet>: An OXYGEN-NET system that will be claimed.

<Nodes> is optional, and, if not present in the file, only the <Local> system is used. Nodes that are listed here can be referenced (using the 0-based index of the child) in the <Sync> section, if any advanced synchronization settings are required.

CHAPTER

SIX

<SYNC>

This element can be used once, if some customization of the synchronization inputs or outputs of the devices used in the measurement is required. If not specified, an automatic setup, as defined by OXYGEN, will be used.

```
<Sync [autoSetup="bool|true"]>
    <Enclosure .../>*
</Sync>
```

`autoSetup`: Control automatic sync configuration between nodes and their enclosures for non-standard use-cases.

```
<Enclosure [node="string|LocalNode"] [index="unsigned|0"]>
    [<SyncInput>
        <Mode>string</Mode>
        [<.../>]
    </SyncInput>]

    <SyncOutput name="string">*
        <Mode>string</Mode>
        [<.../>]
    </SyncOutput>
</Enclosure>
```

`node`: Name of one of the devices listed in <Nodes>. The <Local/> entry can be referenced using the name “LocalNode”, but this is also the default value if the attribute is not specified.

`index`: Zero-based index of the enclosure on the selected node.

`SyncOutput.name`: Name of the sync output connector

<SyncInput> and <SyncOutput> contain all the relevant settings for the given sync feature. <Mode> is manatory, and specifies the operation mode. Depending on this setting and the hardware capabilities addition parameters can be specified using the same syntax.

Here is an example of a sync output configuration:

```
<SyncOutput name="SyncOutAux">
    <Mode>TRION/Aux</Mode>
    <Frequency>12345 Hz</Frequency>
    <ContinuousOutput>False</ContinuousOutput>
</SyncOutput>
```

6.1 Available settings

The supported connectors, modes and parameters can be discovered on the sync settings page in OXYGEN when using the english localization.

Either the internal (“SyncOutAux”) or connector (“AUX”) names can be use to select sync outputs.

The supported modes for each connector are represented by the radio buttons and the label text is usually the string that has to be used in the XML. There are a few exceptions, where the XML value differs from the label:

- Option `Trion (SYNC I/O)`: XML `TRION/DEWE2SyncIO`
- Option `Trion (SYNC OUT)`: XML `TRION/DEWE2SyncOut`
- Option `Frequency (AUX)`: XML `TRION/Aux`

CHAPTER

SEVEN

<CHANNEL>

A <Channel> element describes the required configuration of a hardware channel.

```
<Channel [tag="string"] [...]>
    [<.../>]
</Channel>
```

`tag`: This attribute specifies an alias that can be referenced to use the respective channel in trigger setups etc. Tags can be of arbitrary length, but have to start with an upper or lower case character. ASCII Characters, digits and the symbols '-', '_' and '.' are allowed after that.

Internally, each Oxygen channel has a set of so-called ConfigItems, whose names and supported values depend on the device, type and configuration. A collection of associated metadata constrains the valid values or indicates other important properties of the item (readonly,...).

For example, a TRION analog channel might have an editable item called 'Mode' which supports values like 'Bridge' or 'Resistance'.

There are also items using a name prefixed by 'ID:', which exist specifically to address the channel.

In this XML format all of those items can be used directly via their name, but due to XML syntax rules a small transformation is required:

- Each forward slash (`/`) has to be replaced by a dash (`-`)

For example, the config item `ID:TRION/BoardId` would appear as `ID:TRION-BoardId` in the file.

Within the <Channel> element, config items are used in two different places:

- The XML attributes filter the hardware channels to find the one that has to be configured. Usually only items with names prefixed by `ID:` are used for this purpose. For TRION systems the attributes `ID:TRION-BoardId`, `ID:TRION-ChannelType` and `ID:TRION-ChannelIndex` are usually a good pick. To address OXYGEN-NET nodes, `ID:OXYNET-NodeName` should be added.
- Once the channel is found, all the configuration settings specified as XML child elements will be applied.

Here is a simple example of how a <Channel> element could look like:

```
<Channel ID:TRION-BoardId="1" ID:TRION-ChannelIndex="5" tag="Analog1">
  <Neon-Name>a1</Neon-Name>
  <Mode>Bridge</Mode>
  <InputType>BRQUARTER4W</InputType>
</Channel>
```

Channel elements are processed in the order in which they appear in the file. This is important, if the channels are not independent. For example, for some hardware channels there are settings that are shown per channel, but affect the entire device and all its channels.

The child elements of <Channel> also have an optional attribute `type`, which can be used if the interpretation of the value is not obvious based on the usage context. Currently the following types are supported:

- `channel`: converts a single channel tag to an item of type `ChannelID`.
- `channels`: converts a sequence of channel tags, separated by `,`, to an item of type `ChannelIDList`.
- `xml`: uses the subtree as an xml-string item. This is usually automatically detected based on the content of the element.

7.1 Config Items in OXYGEN

OXYGEN can be started in experimental mode, which enables some features that are not intended for regular measurements. In this mode there is an additional “inspect” icon on the per-channel setup page (top-right corner) that displays the currently available items and their values. The “Copy XML” button copies a <Channel> element with current settings to the clipboard.

Clicking on an item name displays more information of the current and allowed values. In conjunction with the contents of the setup page, the meaning of these items should be easy to recognize.

CHAPTER

EIGHT

<RECORDING>

This element controls recording modes and DMD storage and split settings.

All attributes expecting a time duration have to be specified as scalar values using the unit “s” (seconds).

```
<Recording [stopAfter="scalar"]>
    [<WaveformRecording .../>]
    [<StatisticsRecording .../>]
    [<DMDSettings .../>]
</Recording>
```

`stopAfter`: If this attribute is used, the measurement ends automatically after the specified time

8.1 <WaveformRecording>

```
<WaveformRecording [mode="string|continuous"] [preTime="scalar"] [postTime=
↪"scalar" | pauseAfter="scalar"]/>
```

mode: Defines how raw samples are recorded:

- `continuous`: Record the entire measurement
- `triggered`: Record based on the recording actions configured in the `<Triggering>` element
- `disabled`: Do not store waveform data at all

`preTime`, `postTime`, `pauseAfter`: These settings are only useful in triggered mode. If any of these attributes are specified, the corresponding setting is actived using the specified parameter. Only one of postTime or pauseAfter may be used.

8.2 <StatisticsRecording>

```
<StatisticsRecording [mode="string|disabled"] [window="scalar|1s"]/>
```

mode: Defines how statistical data is recorded:

- `continuous`: Record the entire measurement
- `disabled`: Do not store statistical data at all

`window`: Defines the statistical window length in seconds.

8.3 <DMDSettings>

```
<DMDSettings [namePattern="string"] [outputPath="string"]>
    [
    <SplitByDuration interval="scalar"/>
    |
    <SplitByNumberOfEvents count="positive_integer"/>
    ]
</DMDSettings>
```

WARNING: The following two options will be stored globally and remain in use even after OXYGEN is restarted! The current OXYGEN settings are used, if the attributes are not specfied.

`namePattern`: Describes how the dmd filename(s) will be constructed.

`outputPath`: The absolute path where output files will be created. By default, a subdirectory will be used, if the file split feature is used.

One of the SplitBy elements may be specified as a child to enable the associated functionality.

- `SplitByDuration`: Start a new file after *interval* seconds of data was stored.
- `SplitByNumberOfEvents`: Start a new file after *count* number of recording events were stored.

CHAPTER

NINE

<TRIGGERING>

This subtree allows configuration of triggered events, each with one or more conditions and actions.

```
<Triggering>
    <Event name="string" [active="bool|true"]>*
        <LevelCondition .../>*
        <WindowCondition .../>*

        [<RecordingAction action="string">]
    </Event>
</Triggering>
```

9.1 <Event>

`name`: Displayed in OXYGEN

`active`: Can be used, if the event should be disabled initially

9.2 LevelCondition

```
<LevelCondition mode="string" threshold="number" [rearmLevel="number"]>
    <Channel ref="channeltag"/>+
</LevelCondition>*
```

`mode`: Either “high” or “low”

`threshold`: Trigger level

`rearmLevel`: If this attribute is used, the trigger only rearms after crossing the specified level

9.3 WindowCondition

```
<WindowCondition mode="string" lower="number" upper="number">
    <Channel ref="channeltag"/>+
</WindowCondition>*
```

`mode`: Either “in” or “out”

`lower`, `upper`: The value range covered by the window

`upperRearmLevel`, `lowerRearmLevel`: If these attributes are used, the trigger only rearms after crossing the specified level (since version 1.1)

9.4 RecordingAction

Controls storing of measurement data and can stop the measurment. WaveformRecording mode has to be set to `triggered`, if the action is used to control recording.

`action`: One of `start_recording`, `pause_recording`, `toggle_recording` or `record_event`.

CHAPTER

TEN

<SCREEN>

These elements allow configuration of the measurement screens that will be shown in Oxygen. Each <Screen> element appends a new screen, the first of which will be displayed initially. If no screen is defined in the setup file, a single default one will be configured with a saturation meter to give an overview about all analog measurement channels.

```
<Screen [template="string"]>
    <Instrument .../>*
</Screen>
```

`template`: Specifies the name of an existing screen template to load instruments from.

Each screen contains <Instrument> elements, which are used to either create new instruments or configure those loaded from a template. Channels referenced as children will be added to the instrument in order.

The location of an instrument is specified by coordinates in the range of 0.0 to 1.0 for both axis. The origin (0.0, 0.0) is located at the top left corner of the screen, with values increasing to the right and bottom.

The first syntax creates a new instrument at the specified location:

```
<Instrument type="string" [x="number|0.0"] [y="number|0.0"] [w="number|0.1
↪"] [h="number|0.1"]>
    <Channel ref="channeltag"/>*
</Instrument>
```

`type`: One of the following identifiers:

- `oxy::analog` - Analog meter
- `oxy::bar` - Bar meter
- `oxy::digital` - Digital meter
- `oxy::indicator` - Indicator
- `oxy::saturation_meter` - Saturation meter
- `oxy::chart_recorder` - Chart recorder
- `oxy::recorder` - Recorder
- `oxy::scope` - Scope
- `oxy::xyplot` - XY plot
- `oxy::array` - array chart

- `oxy::intensity_diagram` - Intensity diagram
- `oxy::spectrogram` - Spectrogram
- `oxy::spectrum_analyzer` - Spectrum analyzer
- `oxy::image_display` - Image
- `oxy::text_display` - Text
- `oxy::gpsplot` - GPS plot
- `oxy::gpsquality` - GPS quality
- `oxy::audioplayer` - Audio player
- `oxy::control` - Control
- `oxy::output_channel` - Outpt channel
- `oxy::power_group` - Power
- `oxy::table` - Table
- `oxy::video` - Video

`x`, `y`: Coordinates of the left and upper border of the instrument. The valid range is [0.0, 1.0).

`w`, `h`: Width and height of the instrument. The results of the terms x+w and y+h have to be in the range (0.0, 1.0].

The second second version is used to configure an instrument that was loaded from a template:

```
<Instrument ref="string">
    <Channel ref="channeltag"/>*
</Instrument>
```

`ref`: Selects an existing instrument of a template for configuration. The value is a series of zero-based indices separated by a dot, which describe the path across groups to reach the wanted instrument.

Most screens do not use instrument groups, therefore a single index is usually sufficient to address any instrument. The internal structure of more complex screens can be discovered by inspecting the XML content of the template file (.screen).

CHAPTER

ELEVEN

<EXPORT>

```
<Export format="string" [autoExport="bool|false"] [autoExportPath="string
↪"]>
    <Channel ref="channeltag"/>*
</Export>
```

`format`: select the export format. The following values are allowed:

- `CSV` - Comma separated values
- `DAT` - Diadem
- `DATX` - DSPCon
- `Excel` - Microsoft Excel
- `Excel_V2` - Microsoft Excel (improved exporter)
- `h5` - Hierarchical Data Format
- `IMC2` - Famos IMC2
- `Matlab` - Matlab
- `MDF4` - ASAM MDF4
- `netCDF` - netCDF
- `nt` - Dynaworks
- `rpc` - MTS RPC III
- `Txt` - Text file
- `TDMS` - NI TDMS
- `UFF` - Universal File Format 58
- `WAV` - Wave

The referenced channels will be selected for export in the specified order.

`autoExport`: state of the “export on measurement end” option

`autoExportPath`: destination for automatically exported files