FENNEK

Advanced Audio Metering

User Manual

Version 1.2.0 / 14 February 2023

Table of Contents

1 Introduction

FENNEK is the latest audio loudness metering product for audio professionals from zplane.development and is the successor to the popular PPMulator family of metering products. It is designed to help you ensure the content you create meets the requirements of various international standards and content platforms before you submit it.

1.1 Key Features

- Professional-grade audio metering

- Accurate, industry-standard peak and loudness metering algorithms

- A large and growing bank of Presets with audio standards for the world's leading broadcast and streaming networks

- Comprehensive History View that shows measured levels and loudness of your entire project with overdubbing functionality

- Customizable and resizable interface

- Flexible input options for stereo, 5.1, and 7.1 surround sound material

- VST, VST3, AU, and AAX plug-in variants for use in your DAW or video editor of choice

- A standalone application, great for calibrating equipment or to use a computer as a dedicated loudness metering station

1.2 Measurement Technologies

FENNEK performs all of the following measurements simultaneously during its measurement sessions:

- Short-term and Momentary Loudness with calculated variance and maximums

- Integrated Loudness and Integrated Loudness Range

- Dialog Integrated Loudness as well as the percentage of dialog detected in the content

- Instantaneous True Peak Levels and maximums per input channel

1.3 FENNEK Interface

The FENNEK interface is organized into three side-by-side views, two of which can optionally be hidden from view:

Figure 1: FENNEK Interface

1. The Main View is located at the middle
2. The History View is located on the left and is hidden or shown by clicking the **[HIST]** button **(4)**
3. The True-Peak View is located on the right and it can be hidden or shown with the **[TP]** button **(5)**

1.4 Naming Conventions

In this documentation, the names of on-screen buttons, sliders, and indicators will be written in bold font between brackets, such as **[SETUP]** and **[HIST]**.

Selectable options in menus will be written in bold font between quotes, such as **"Stereo"** and **"max. S"**.

References to numbered callouts in images will be written in bold font between parentheses, such as **(1)** and **(2)**.

We have also used the following abbreviations in the program in order to keep things compact and save space:

- Integrated Loudness: "I" or "INTEGRATED"
- Short-Term Loudness: "S" or "SHORT TERM"

- Momentary Loudness: "M" or "MOMENTARY"

- Loudness Range: "LRA"

- True-Peak: "TP"

- Variance: "V"

- Dialog Percentage: "Dia %"

- Dialog Integrated Loudness: "Dia IL"

1.5 Installation

In order to download the installer you need to register your copy with zplane. After the successful registration (more info in chapter 1.6) the installers will be available in the download section of your personal account. Find below a step-by-step description of the installation procedure:

1.5.1 Windows

- Download the FENNEK Windows Installer application (.exe)

- Double-click on the file to launch the installer

- Click **[Next]** in the installer window

- Read the End User License Agreement and, if you agree, click **[Next]**, otherwise, click **[CANCEL]** to abort installation

- Follow the instructions of the installer to complete installation

1.5.2 macOS

- Download the FENNEK macOS Installer disk image (.dmg)

- Double-click on the downloaded .dmg to mount it, then double-click the installer file (.pkg) contained within

- Click **[Continue]** in the installer window

- Read the End User License Agreement and, if you agree, click **[Next]**, otherwise click **[CANCEL]** to abort installation

- Follow the instructions of the installer installation

- When installation is complete, you can unmount the disk image by right-clicking on it and clicking **"Eject"** from the context menu

1.6 Limitations of Demo and Unactivated Versions

When you install it for the first time, or if you install the Demo version, FENNEK will work but with specific limitations:

- **Only 5 minutes of measurement will be allowed.** The software can be run for longer than 5 minutes, but only 5 minutes of actual measurement can be conducted before the software will stop working and require it to be closed.

- **Measurement data from previous sessions will not be reloaded.** Therefore, the History View will be empty each time FENNEK is loaded until it is activated. Once the full version has been activated, any measurement data collected in a previous session will be reloaded in a future session.

- **Settings made in the Setup page will not be saved.** FENNEK will always load with default settings when using the Demo or unactivated versions. Only once the full version is activated will you be able to save and recall settings between sessions and in projects.

In order to remove these limitations and use all features of FENNEK, purchase a FENNEK license then follow the Registration & Activation steps in the next section.

1.7 Registration & Activation

FENNEK is protected by both a *serial number* and a corresponding *unlock key*. The serial number will be sent to you by e-mail upon purchasing FENNEK. You will receive your unlock key by registering FENNEK at the zplane website.

1.7.1 Registering Your Product

In order to receive your unlock key, please log in to your Account at the zplane website —please create a new Account there if you don't have one already. After logging in:

1. Click the **[REGISTER]** button in the menu bar:

WELCOME TO YOUR ACCOUNT

Hi

Welcome to your user area!

Here, you can register your products, download the full versions, and change your account settings.

At anytime you can look up the info of your registered products with their serial numbers and the corresponding unlock keys.

MY PRODUCTS   REGISTER   PROMOTIONS   DOWNLOADS   USER DETAILS
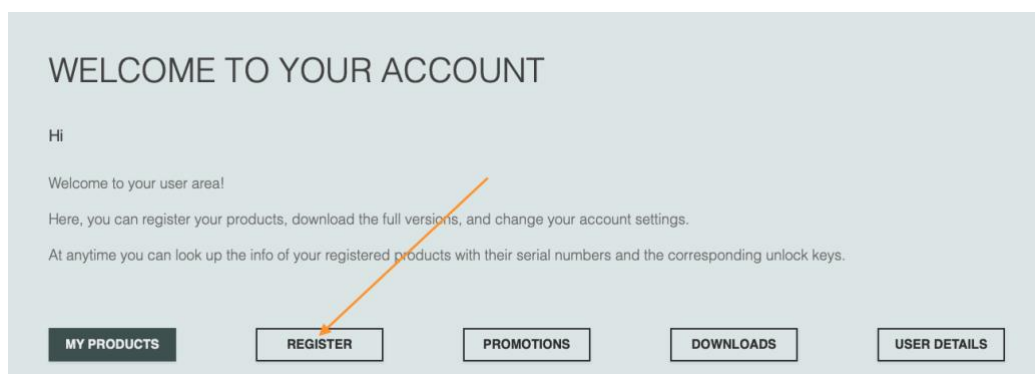
Figure 2: The Account page

2. In the area provided **(1)**, paste in your FENNEK serial number and click the **[REGISTER]** button **(2)** to the right:
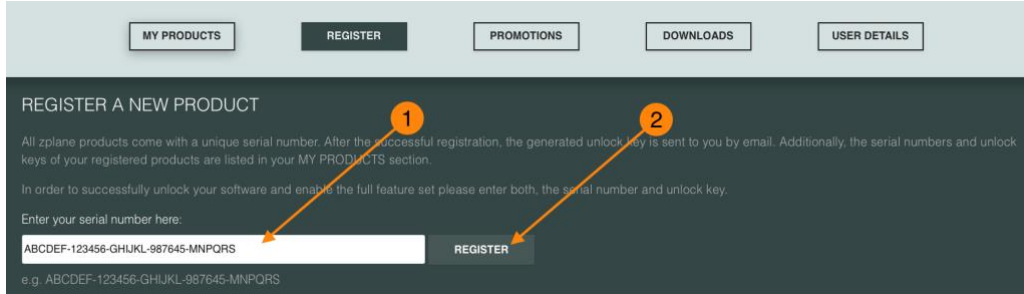
Figure 3: The Product Registration page

3. Your FENNEK unlock code will then be shown.

Note: You can recall any of your serial numbers and unlock codes anytime in the future by logging in to your Account and clicking the **[MY PRODUCTS]** button in the menu. This will display the serial numbers and unlock codes for all the zplane products you have registered in your Account.

1.7.2 Activating Your Product

Activation of FENNEK is done within FENNEK itself. You must therefore first load FENNEK as a plug-in within any host program you have, or you can launch the FENNEK standalone app. With FENNEK running:

1. Click the **[SETUP]** button to open the Setup View:
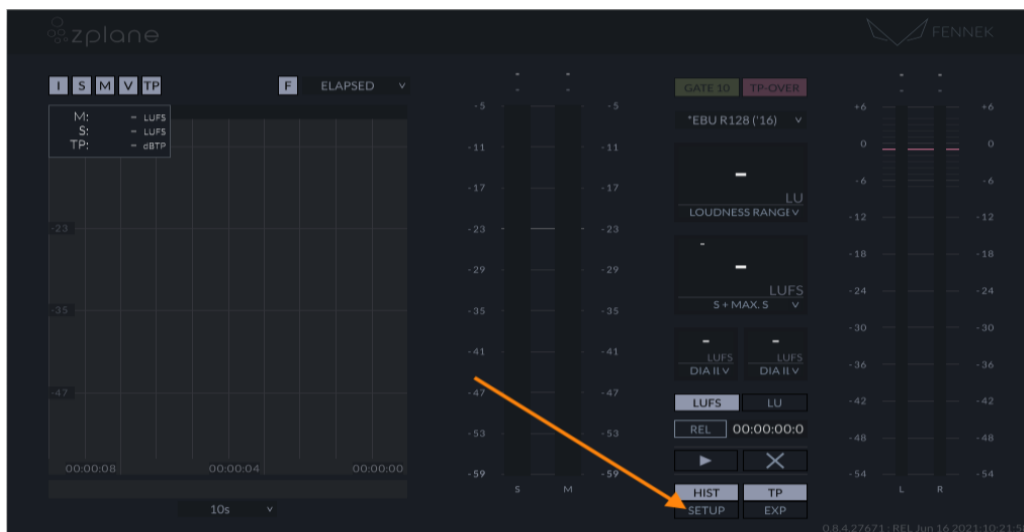
Figure 4: [SETUP] Button

2. The Activation Section is at the top of the Setup View. Paste your serial number and unlock code into the spaces provided shown below:
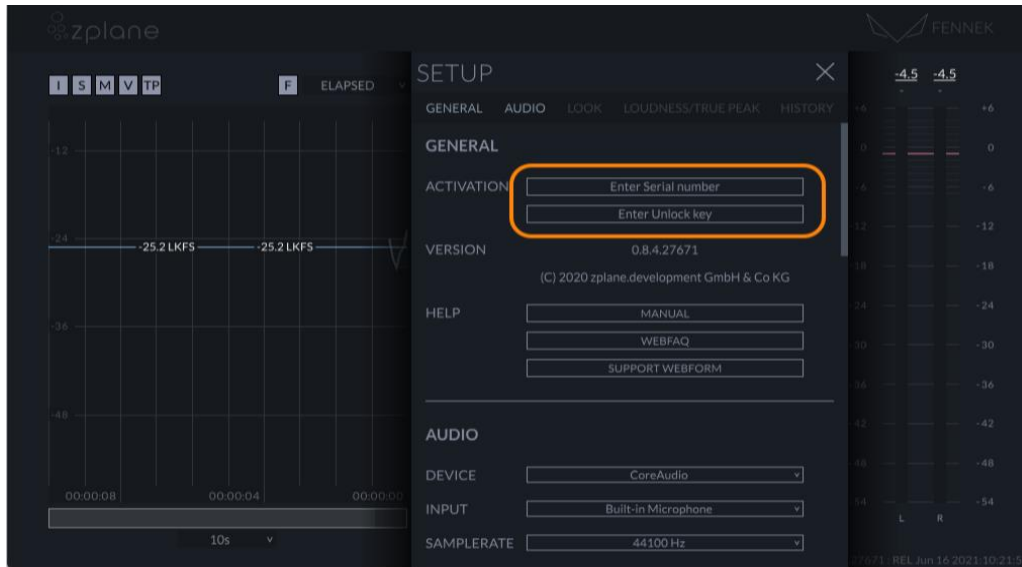
Figure 5: Activation area

3. FENNEK will then be activated and will show your registered serial number.

   Note: Until FENNEK is unlocked, it will behave like the demo version where silence will be introduced once in a while. After successful activation of FENNEK, the screen will look like this:
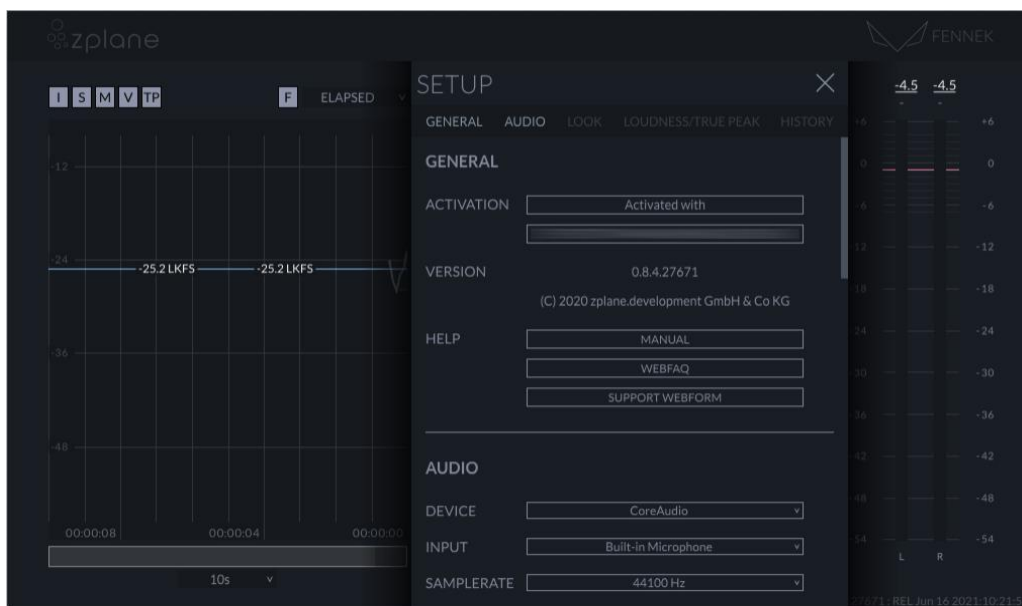
Figure 6: Activated software

1.8 Known Issues in FENNEK 1.2.0

Before getting started with FENNEK, we are aware of a few issues with FENNEK 1.2.0 which are listed below. While we are working on direct solutions to these issues, we hope the following information provides you with adequate workarounds, when known, in order to achieve your needs/goals with FENNEK.

1.8.1 Measurement Doesn't Work in DaVinci Resolve on Windows

While it is possible to load FENNEK into an effect slot in DaVinci Resolve, the plug-in will fail to measure anything during playback. This issue only affects the Windows version of DaVinci Resolve—FENNEK measures correctly when using DaVinci Resolve on macOS. Unfortunately, we do not yet know of any workaround which allows FENNEK to work in DaVinci Resolve on Windows.

1.8.2 Problems with FENNEK in Adobe Premiere

On Windows, the VST3 version will likely not work in Premiere and the VST2 version should be used. Additionally, the "Host" Measurement Timebase may not work and you will need to use either "System" or "Elapsed" instead in order for measurement to work.

1.8.3 Issues with FENNEK in Studio One

The VST plug-in currently doesn't work in Studio One on Mac. As a workaround, please use the AU or VST3 version of FENNEK instead.

1.8.4 Measurement Data Can Randomly Reset in Windows Standalone

We have seen random occurrences where the measurement data collected by FENNEK will spontaneously reset itself. This seems to only occur on Windows when using the FENNEK Standalone app while also using the **"Windows Audio"** Device Driver Type. As a workaround, use one of the other Device Driver Types, like **"Windows Audio (Exclusive Mode)"**.

1.8.5 Measurement Data Can Reset after Render in Reaper

FENNEK can be used during the Render process to quickly measure the loudness of your project faster than real-time. We have seen cases in Reaper where, if your audio device is configured for a sample rate which differs from the Render sample rate, FENNEK will be reset upon closing the Stats window that appears after the Render. To prevent this, make sure your audio device and render use the same sample rate.

2 Main View

The Main View collects the most important information and controls critical to the operation and usage of FENNEK. The Main View is always visible, though the neighboring History and True-Peak views can be hidden if desired.
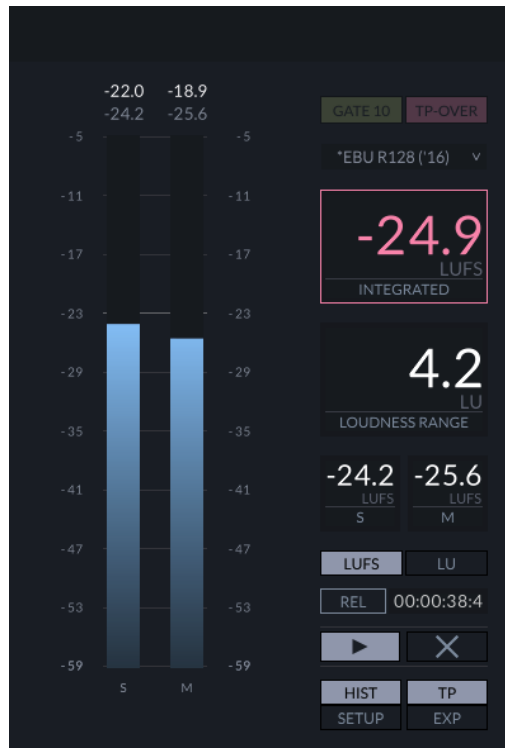
Figure 7: Main View

The Main View contains the controls for selecting the Loudness Standard Preset to measure against, shows the most useful measurement results in a combination of numerical displays and barmeters, and provides the buttons for starting, pausing, and resetting measurement sessions.

2.1 Loudness Standard Preset Selector
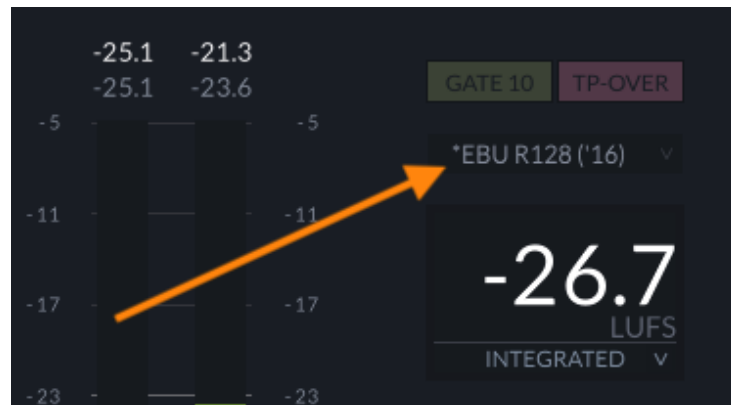
Figure 8: Loudness Standard Preset Selector

This drop-down menu near the top of the Main View is for selecting a Loudness Standard Preset. The menu includes industry-standard loudness standards as well as platform-specific standards for many of the top content distribution platforms.
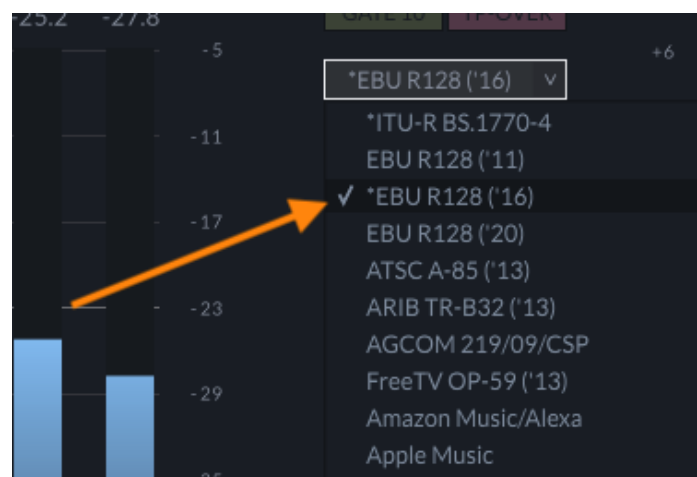
Figure 9: Loudness Standard Preset List

Each Preset is configured for the target values specified by these standards so that you can simply measure your content and look for any red warnings in FENNEK at the end of the measurement session. These warnings indicate that specific adjustments will be necessary to the audio in order to fit the selected loudness standard.
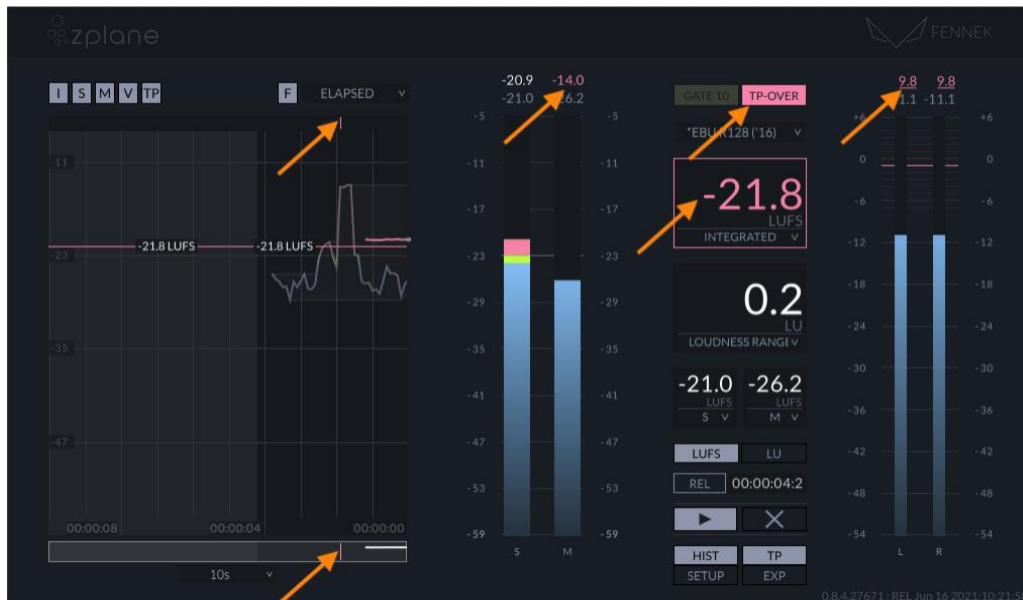
Figure 10: Examples of various red Measurement Warnings

When you conduct a measurement session that no longer results in any warning indications, your content meets the requirements of the selected loudness standard.

See section 4 References near the end of this manual for a full list of all Presets and links to the reference documents and standards for each.

2.2 Measurements and Displays

The FENNEK Main View contains four numerical displays which can each be configured to show one of many different measurement results which FENNEK performs simultaneously.
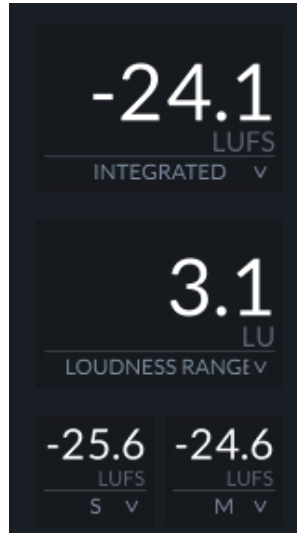
Figure 11: The Measurement Displays

The measurement value to be shown on a display can be changed by clicking on the measurement name at the bottom of each display and then choosing a new measurement from the drop-down menu—the two larger displays have a few extra display options which the two smaller displays beneath them do not.
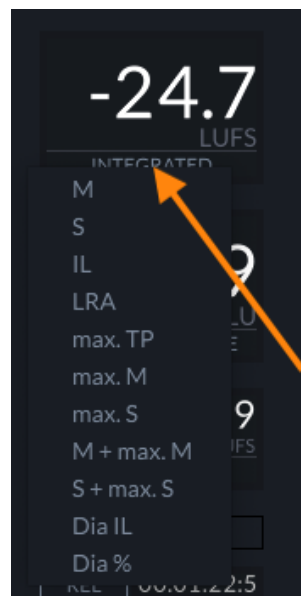
Figure 12: Measurement Options Menu

16

2.2.1 Momentary Loudness Measurement

The Momentary Loudness Measurement, abbreviated as **"M"** in the drop-down menu, shows the level calculated from the last 400 milliseconds of audio, therefore providing you a sense of the loudness "right now".

2.2.2 Short Term Loudness Measurement

The Short Term Loudness Measurement, abbreviated as **"S"** in the drop-down menu, shows the level calculated from the last 3 seconds of audio. It therefore reacts a bit slower than the Momentary Loudness as it is less-sensitive to brief spikes or drops in loudness.

2.2.3 Integrated Loudness Measurement

Sometimes referred to as Long Term Loudness, the Integrated Loudness Measurement, abbreviated as **"IL"** in the drop-down menu, is the average loudness calculated for the *entire* measurement session. While you will see this value constantly being updated while measurement is running, it actually doesn't have any true meaning until the entire content has been measured and FENNEK is stopped; it is only the final Integrated Loudness measurement that needs to be compared against the targets specified in the various content submission standards.

This display will turn red at the end of a measurement session if the loudness measurement exceeds the current Integrated Loudness Warning Threshold.

Because this is one of the most important datapoints in content submission specifications, the top-most Measurement Display in FENNEK is set to show Integrated Loudness by default.

2.2.4 Loudness Range Measurement

The Loudness Range Measurement, abbreviated as **"LRA"** in the drop-down menu, is a value that shows how much the Integrated Loudness tends to vary over the entire measurement session.

If, for example, you were to measure a test tone of constant pitch and amplitude, the resulting Loudness Range would be "0 LU" because the loudness never deviated from the Integrated Loudness Measurement for the entire measurement session.

On the other hand, if there are sections of your content which are significantly quieter for long periods of time, this will cause the Loudness Range measurement to increase.

Some content standards want you to keep the Loudness Range below a certain threshold so that listeners don't have to manually adjust the playback volume in an attempt to compensate for any extreme and/or prolonged volume changes in

the content. As a result, this display will turn red at the end of a measurement session if the Loudness Range Warning is enabled and exceeded.

Loudness Range is the default setting for the lower of the two large Measurement Displays on the Main View.

2.2.5 Maximum True Peak Level

The Maximum True Peak Level, abbreviated as **"max TP"** in the drop-down menu, shows the highest True Peak Level detected on all of the audio channels during the current measurement session. It can be useful to display this value when using FENNEK with the True Peak View hidden as you'll still be able to see if any channel exceeds a particular True Peak Level.

This display will turn red if the True Peak Measurement of any audio channel exceeds the Maximum True Peak Level Warning threshold.

2.2.6 Maximum Momentary Loudness

The Maximum Momentary Loudness, abbreviated as **"max. M"** in the drop-down menu, shows the highest Momentary Loudness Measurement achieved during the current measurement session.

This level can be important to monitor if the content submission standard requires that a Momentary Loudness Measurement is never exceeded at any point in the content.

This display will turn red if the Maximum Momentary Loudness Warning is enabled and exceeded during the measurement session.

2.2.7 Maximum Short Term Loudness

The Maximum Short Term Loudness, abbreviated as **"max. S"** in the drop-down menu, shows the highest Short Term Loudness Measurement achieved during the current measurement session.

This level can be important to monitor if the content submission standard requires that a Short Term Loudness Measurement is never exceeded at any point in the content.

This display will turn red if the Maximum Short Term Loudness Warning is enabled and exceeded during the measurement session.

2.2.8 Momentary Loudness + Maximum Momentary Loudness

This is a combination display setting which is only available for the two larger Measurement Displays on the FENNEK Main View—it is not a selectable option for the two smaller displays.

When this is selected, abbreviated as **"M + max. M"** in the drop-down menu, two values will be shown in the Measurement Display simultaneously:

- The large number in the Measurement Display is the [Momentary Loudness Measurement](#).
- The smaller number in the upper-left corner of the Measurement Display is the [Maximum Momentary Loudness](#).

As usual, one or both of these numbers will turn red if their warning thresholds are exceeded.

2.2.9 Short Term Loudness + Maximum Short Term Loudness

This is a combination display setting which is only available for the two larger Measurement Displays on the FENNEK Main View—it is not a selectable option for the two smaller displays.

When this is selected, abbreviated as **"S + max. S"** in the drop-down menu, two values will be shown in the Measurement Display simultaneously:

- The large number in the Measurement Display is the [Short Term Loudness Measurement](#).
- The smaller number in the upper-left corner of the Measurement Display is the [Maximum Short Term Loudness](#).

As usual, one or both of these numbers will turn red if their warning thresholds are exceeded.

2.2.10   Dialog Integrated Loudness Measurement

The Dialog Integrated Loudness Measurement, abbreviated as **"Dia IL"** in the drop-down menu, is similar to Integrated Loudness in that it only becomes valid when the *entire* content has been measured. However, the Dialog Integrated Loudness only averages together the loudness results of content identified as dialog.

This display will turn red at the end of the measurement session if an adequate percentage of the content is identified as dialog *and* the resulting Dialog Integrated Loudness exceeds the Integrated Loudness Warning threshold. See [Dialog Percentage Integrated Loudness Warning](#) section for full details.

2.2.11   Dialog Percentage Measurement

The Dialog Percentage Measurement, abbreviated as **"Dia %"** in the drop-down menu, shows the ratio of content detected as dialog versus all content for the entire measurement session.

If the content is only dialog with no background music or effects, then this measurement will be very high, near "100%". Conversely, if the content is instrumental music, this measurement will be extremely low.

While this measurement isn't so important on its own in terms of content submission standards, it is an important value to consider because some content standards will specify different target values when the percentage of dialog in the content exceeds a certain amount. This value is therefore an important part of the Dialog Percentage Integrated Loudness Warning.

2.2.12 Auto Integrated Loudness

The Automatic Integrated Loudness display, abbreviated as **"IL Auto"** in the drop-down menu, is a special display that works in combination with the Dialog Percentage Measurement and is important for the new **"Netflix"** and **"Dialog LKFS"** presets.

This display will show the most relevant loudness measurement, be it the Integrated Loudness Measurement or the Dialog Integrated Loudness Measurement, based on whether the content being measured is above or below the specified Dialog Percentage Integrated Loudness Warning amount.

If the measured content contains a Dialog Percentage Measurement below the current Dialog Percentage Integrated Loudness Warning level, then this display will be showing the Integrated Loudness Measurement since this is the most relevant loudness measurement for the measured content. But if the Dialog Percentage Measurement is higher than the Dialog Percentage Integrated Loudness Warning level, then this display will show the Dialog Integrated Loudness Measurement since that is now the most relevant loudness measurement for the content.

This is important because, using this **"IL Auto"** display, you will be presented with a red warning at the end of the measurement session if the relevant loudness measurement doesn't meet the specified targets—this avoids the issue that the warning is hidden. For example, if you have **"IL"** selected for display but the content exceeds the Dialog Integrated Loudness Measurement target, you would not see any warning (because **"Dia. IL"** is not in view). Using **"IL Auto"** ensures that you see a warning and, therefore, **"IL Auto"** is now the default display for the top Measurement Display window and, in most cases, you can just leave it set there for all measurement tasks.

2.3 Main Barmeters

The left side of the Main View includes two Barmeters for showing two specific measurement values.
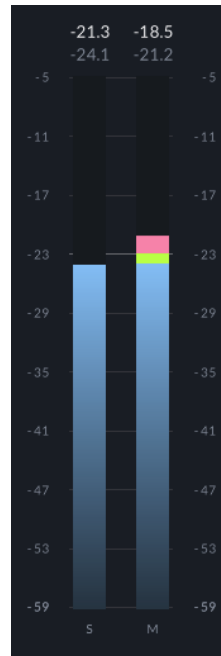
Figure 13: Main Barmeters

2.3.1 Short Term Loudness Barmeter

The left of the two meters is the Short Term Loudness Barmeter, labeled at the bottom with the abbreviation **"S"**. It is a graphic representation of the Short Term Loudness Measurement.

There are two numbers at the top of this barmeter:

- The top number is the Maximum Short Term Loudness.
- The lower number is the numeric representation of the Short Term Loudness Measurement.

2.3.2 Momentary Loudness Barmeter

The right of the two meters is the Momentary Loudness Barmeter, labeled at the bottom with the abbreviation **"M"**. It is a graphic representation of the Momentary Loudness Measurement.

There are two numbers at the top of this barmeter:

- The top number is the Maximum Momentary Loudness.
- The lower number is the numeric representation of the Momentary Loudness Measurement.

2.4 Measurement Indicators

At the top of the Main View are two indicator lights which turn on and off under specific conditions.
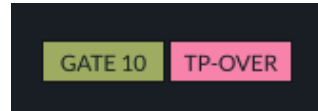
Figure 14: Measurement Indicators

2.4.1 GATE 10 Indicator

The **[GATE 10]** indicator on the left is part of the dialog-detection system which contributes to the Dialog Integrated Loudness Measurement. When this indicator is bright green, it means the gate is closed because dialog is not being detected in the audio and thus no new data is added to the Dialog Integrated Loudness calculation. When the indicator goes dim, it means dialog has been detected and the gate is now off, allowing new measurement data to be added to the Dialog Integrated Loudness calculation.

2.4.2 TP-OVER Indicator

The **[TP-OVER]** indicator on the right is in a dim state at the start of a new measurement session and will light up bright red the moment the True Peak level of any audio channel exceeds the value of the Maximum True Peak Level Warning. This can be helpful if you have the True Peak View hidden as you can receive an immediate alert that a maximum has been crossed; you can usually stop your measurement session prematurely at this point since you will know one of the critical content standard specifications has already been exceeded, thus invalidating the content for submission.

2.5 Measurement Unit Selectors

FENNEK can display measurement results using the ITU LKFS (Loudness, K-weighted, relative to Full Scale) scale, the EBU LUFS (Loudness Units relative to Full Scale) scale, or simple LU (abstract Loudness Units, where 1LU = 1dB) scale, wherever appropriate.

While there used to be a subtle difference between LKFS and LUFS, where the EBU decided to ignore audio that was below a certain level so that long sections of intentional quietness wouldn't artificially bring down the LUFS loudness measurement, the ITU has, as of March 2011, adopted this same "gated" approach for calculating LKFS...without simply changing over to LUFS. As a result, there are now two loudness units—LKFS and LUFS—that are really the same thing.

Clicking the left **[LKFS/LUFS]** button will display results and scales with LKFS or LUFS while clicking the right **[LU]** button will use LU for results and scales; the measurement unit of the left button will change depending on the Loudness Standard Preset that has been selected merely to match the terminology used by that particular standard.

Figure 15: Measurement Unit Selector buttons

2.6 Measurement Session Controls

Your measurement session in FENNEK is controlled and monitored with a group of buttons and displays near the bottom of the Main View.

Figure 16: Measurement Session Controls in Relative and Absolute modes

2.6.1 Measurement Time Display

The numerical display above the control buttons shows the elapsed time of the current standalone measurement session, or the timebase location of the host when using FENNEK as a plug-in.

To the left of the display is a combinations button/indicator which shows either **"REL"** or **"ABS"**, referring to *Relative Mode* and *Absolute Mode*, respectively. The defining characteristics of these two modes are:

- **"REL"** simply shows the amount of measurement time that has elapsed since the session was first started, omitting any time that the session was paused.

- **"ABS"** shows a timebase that is inherited from some other component in the system such as the host's timeline or the computer's realtime clock.

The measurement time shown here, as well as the display modes available, are dictated by the Measurement Session Timebase selector located above the History View.

2.6.2 Start / Pause / Stop Measurement Button

The function of this button toggles between various states:

- Clicking the Start **[▶]** button will start or resume measurement

- Clicking the Pause **[||]** button will pause measurement if currently running

- Clicking the Stop **[■]** button will stop the measurement session permanently

None of the FENNEK measurements, barmeters, or History View will update while measurement is paused.

2.6.3 Reset Measurement Data Button

Clicking the Reset **[□]** button and confirming the following dialog will erase all the collected measurement data, thus preparing FENNEK for a new measurement session. In this state, the TP Meters will also show the live input level.

This button can be clicked while measurement is underway or while paused. If measurement data is reset while measurement is underway, the data collected up to that point will be discarded and new data will start collecting immediately.

2.6.4 Lock To Host Button

When running FENNEK as a plug-in within a host application, a third button will appear between the Start **[▶]** and Reset **[□]** buttons—this button has a "chainlink" icon and is called the Lock To Host **[⊘]** button.

When this button is engaged, you will notice that the Start **[▶]** button on the left becomes dim and no longer clickable. This is because FENNEK will now automatically start and stop measurement in sync with the host. That is, when you start playback in your host, FENNEK will also start measuring. When you stop the host, FENNEK will also stop. This is a very helpful way to ensure that only the content you play gets measured and is also the best way to perform [measurement overdubbing](#).

When the Lock To Host **[⊘]** button is disabled, the Start **[▶]** button will be re-enabled, meaning that FENNEK will only measure when you engage Start **[▶]** manually. You will therefore be in full control of when measurement starts and stops, regardless of when you start or stop playback in your host.

3 History View

Figure 17: History view

The History View sits on the left side of the Main View and visualizes many of the FENNEK loudness measurements graphically and over time. Not only does this sometimes provide a more intuitive way to understand the levels of your content, but it also provides a sort of "log" for your whole measurement session such that you can simply review the results visually at the end of the measurement session rather than having to stare intently at the various Measurement Displays and Barmeters for the duration of the content.

It also provides further insight into problems in your content when various loudness targets of the Loudness Standard Preset are missed because, rather than just seeing red warning indications for one or more of the measurement results, you can see in the History View if those measurement targets were missed *multiple times* during the session, thus allowing you to go back and rework each one of them to ensure the next measurement session has fewer or no warnings at all.

Figure 18: Three sections of the History View

The History View is split into three basic sections:

1. The History Display Configuration controls are across the top
2. The History Detail Display is at the center
3. The History Overview and view control is along the bottom

3.1 History Display Configuration

At the top of the History View are a set of buttons used for toggling various measurement results on and off in the viewing areas beneath them.

Figure 19: History Display Configuration controls

3.1.1 History Detail Display Toggles

The five buttons at the left toggle the visibility of various measurement results in the History Detail Display. Turning off some of the measurement results can help to unclutter the view so that you can focus more clearly on specific measurement results. They are, from left to right:

- **[I]** for Integrated Loudness

- **[S]** for Short Term Loudness

- **[M]** for Momentary Loudness

- **[V]** for Variance, which is the minimum and maximum Momentary Loudness level measured within the visualized area of time

- **[TP]** for True Peak Warning Indicators, which appear at the top of the History Detail Display and within the History Overview

3.1.2 History Detail Display Follow Mode

To the right of the five History Detail Display toggles, the **[F]** button enables or disables Follow Mode. When enabled, the History Detail Display will automatically scroll to keep the newest measurement data in view as it enters on the right side. **[F]** will turn off automatically if you manually scroll to a new location with the View Box in the History Overview.

3.1.3 Measurement Timebase

To the right of all the toggle buttons is a drop-down menu which selects the timebase used for capturing measurement data. The timebase selected here not only changes how the data in the History View and logs are displayed, but also impacts how FENNEK syncs to a host application. The options are as follows:

- **"Host"** is only available when using FENNEK as a plug-in in a host application. This setting uses the absolute timebase from the host as the timescale running along the bottom of the History Detail, thus keeping the measurements in FENNEK aligned with the host's timeline—this enables [measurement session overdubbing](#). When using this mode, the host's transport will need to be running/playing in order for FENNEK to take measurements; stopping the host will also stop the measurement session in FENNEK. If the Lock To Host **[⚲]** button is enabled, FENNEK will always start and stop measurement when the host is started and stopped. If the Lock To Host button is off, FENNEK will only measure if the host is running *and* the Start **[▶]** button is enabled.

- **"System"** uses the current system time—the current time of day—as the timescale for capturing measurement data. When using this mode, you will only be able to make one contiguous measurement session. You'll notice that, once measurement is underway in this mode, the usual Pause **[||]**

button actually becomes a Stop **[■]** button. Once the measurement is stopped, either by clicking Stop **[■]** or by stopping the host while the Lock To Host **[⧉]** button is on, it will not be possible to resume the measurement session—you must always first click Reset **[□]** before starting a new measurement. When using this mode, it is also possible to toggle between **"ABS"** and **"REL"** time displays by clicking the **[ABS/REL] button**—the **"REL"** display simply shows how much time has elapsed since the measurement session was started, though all captured measurement data is still be timestamped with the system time.

- **"Elapsed"** simply uses the duration of the current measurement session as the timescale for the History Detail with the start of the measurement session corresponding to timestamp 00:00:00. This allows you to use the Relative timescale if you wish, even when running FENNEK as a plug-in.

3.2 History Detail Display

Most of the History View is dominated by the central History Detail Display which provides visualization of multiple measurement results over time. It has various interactions to view the values of various datapoints in the display which provides guidance for quickly fixing any level issues identified in the audio content. You can use the mouse wheel to freely adjust the zoom level of the History Detail Display.
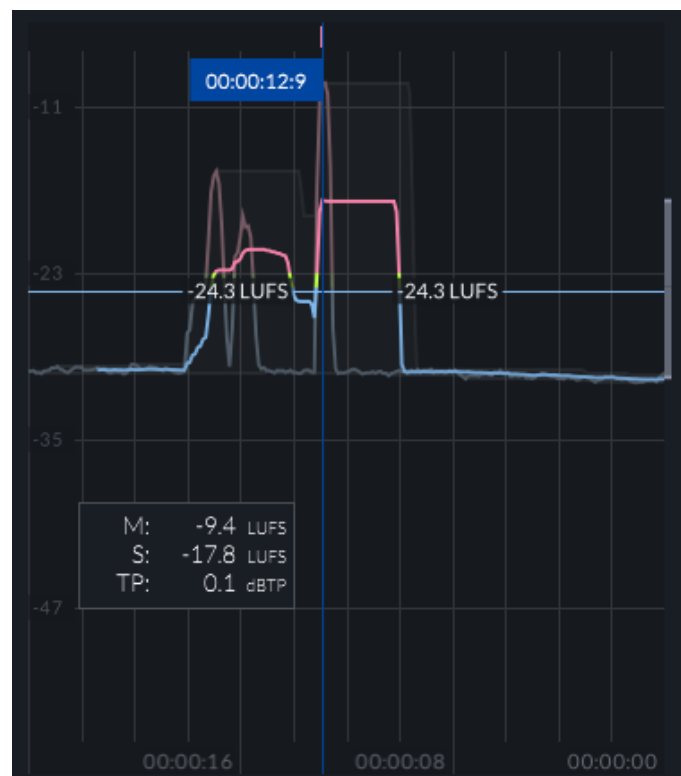
Figure 20: History Detail Display with the floating Cursor Datapoint window

3.2.1 Integrated Loudness Display
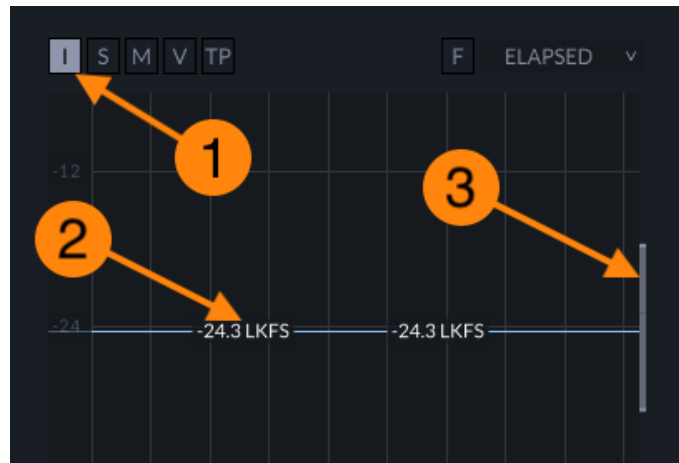
Figure 21: The components of the Integrated Loudness Display

When the **[I]** button **(1)** above the History Detail Display is enabled, you will see a flat line running across the display that shows the position of the Integrated Loudness Measurement **(2)** as well has a vertical bar at the right edge which represents the Loudness Range Measurement **(3)**.

Note: As explained before in this document, the Integrated Loudness and Loudness Range measurements don't really have any meaning until the entirety of the content has been measured from beginning to end. Nevertheless, you will see both of these components updating in real-time while the measurement session is running. It can be interesting to see how various sections of your content impact these calculations, but you don't need to be concerned if the values were temporarily higher or lower than your target values at some point during the measuring process. All that matters for the sake of conforming to the submission standards is the *final* values of these measurements.

3.2.2 Short Term Loudness Graph

Figure 22: The Short Term Loudness Graph

When the **[S]** button **(1)** is enabled, you will see the <u>Short Term Loudness Measurement</u> displayed as a line graph in the History Detail Display. This line is just a plotting of the **"S"** measurement over time and is colored using the same colors selected with the **[L COLORS]** <u>slider</u> in the Setup Window.

3.2.3 Momentary Loudness Graph
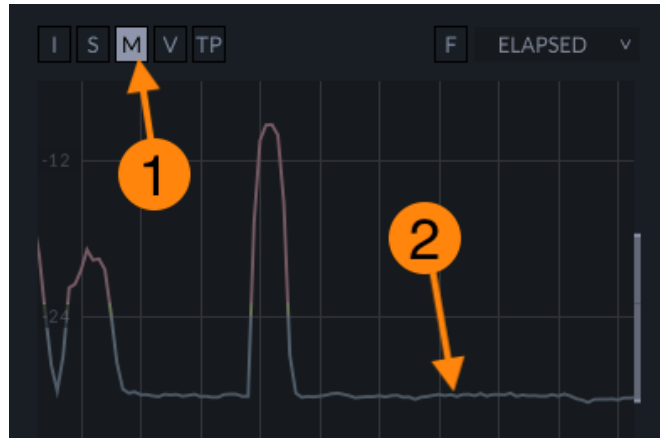
Figure 23: The Momentary Loudness Graph

When the **[M]** button **(1)** is enabled, you will see the <u>Momentary Loudness Measurement</u> displayed as a line graph in the History Detail Display. This line is just a plotting of the **"M"** measurement over time and is colored using the same colors selected with the **[L COLORS]** <u>slider</u> in the Setup Window.

3.2.4 Variance Envelope Display

Figure 24: The Variance Envelope Display

When the **[V]** button **(1)** is enabled, this will display the Variance Envelope **(2)** which is the minimum and maximum <u>Momentary Loudness Measurement</u> that occurred in that particular timeslice of the measurement session.

3.2.5 Maximum True Peak Level Warning Indicators

Figure 25: The Maximum True Peak Warning Indicators in the History Detail Display

When the **[TP]** button **(1)** is enabled, small red "tick" indicators **(2)** will appear above the History Detail View wherever the True Peak level of any channel exceeded the level set for the Maximum True Peak Level Warning. So while the **[TP-OVER] indicator** may be lit up at the end of a measurement session, these Maximum True Peak Warning Indicators show you where and how often these overs occurred, making it faster and easier to go rework these problem spots in the content.

Note: The same type of indicators will always be shown in the History Overview, even if the **[TP]** button above the History Detail Display is turned off.

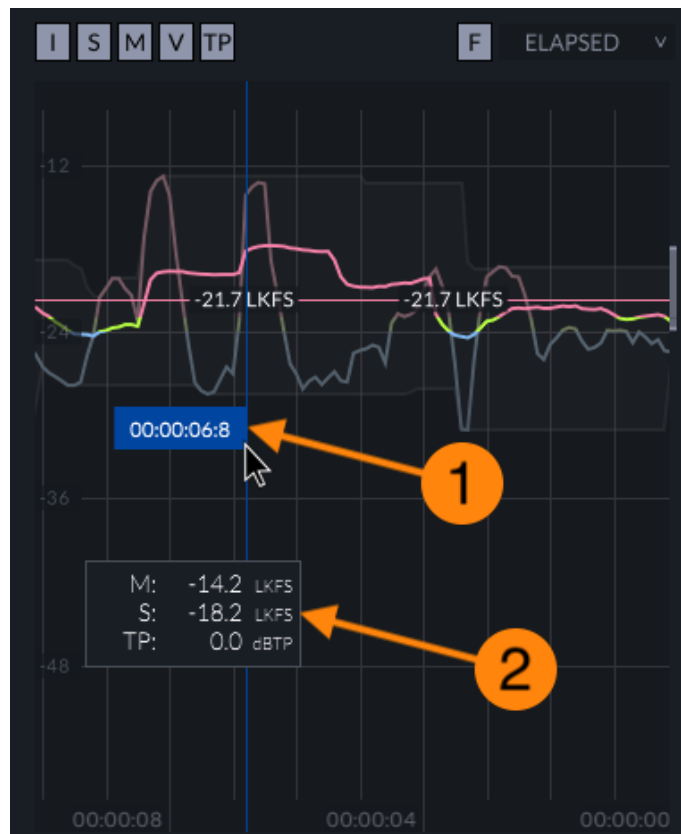## 3.2.6 Cursor Position and Datapoint Display

Figure 26: Cursor Position and Datapoint Display

When you float your mouse pointer over the History Detail Display, a blue vertical bar will appear with a connected flag showing the timestamp of the current position **(1)**. Additionally, a small Datapoint Display window **(2)** will appear showing the exact Momentary Loudness **"M"** and Short Term Loudness **"S"** measurements at that same location in time. If a True Peak Over also occurred at this location, the measured **"TP"** amount will be shown.

You can also freely reposition and resize the Datapoint Display by floating your mouse over it and dragging the left edge **(3)** to a new position or dragging the bottom-right corner **(4)** to a new size.

Figure 27: Repositioning and resizing the Datapoint Display

3.3 History Overview

At the bottom of the History View is a small History Overview element which provides a "zoomed out" view of all the data collected in the measurement session.

Figure 28: History Overview with the View Box and View Width controls

Within this History Overview, you will see:

- A white line indicating either the Short Term Loudness or Momentary Loudness, depending on the setting selected in the History Section in the Setup Window.

- Red vertical lines anywhere a channel exceeded the setting of the Maximum True Peak Level Warning.

- A *View Box* which shows which portion of the collected measurement data is being visualized in the main graph area, above. You can click and drag this View Box left and right to scroll around in the upper view. At the very

bottom of the History View is a drop-down menu for choosing the View Width of the History Detail Display with settings as low as 1 second in length all the way up to an hour or the full length of the measurement session.

3.4 Measurement Session Overdubbing

One very helpful benefit you receive from the History View when running FENNEK as a plug-in is the ability to "overdub" corrections to your measurements after you make changes to parts of your mix.

For example, imagine you're working on a show in your video software that is about 30 minutes in length. You place FENNEK on the master bus and conduct a measurement session of the whole show. At the end of the session, FENNEK shows you that the level gets too loud between times 17:00 and 18:30. It's only a small fraction of the audio in the whole show, but it still needs to be fixed to meet the content submission specifications.

All you have to do now is go back to location 17:00 in your software and make the needed adjustments to the mix. When the changes are made, engage the Lock To Host button. Now, when you commence playback from 17:00 to 18:30, FENNEK will capture new measurement data for this time-range, incorporate it into the entire measurement history, and calculate new levels for the entire content based on the updated measurement data. This is possible because FENNEK uses Absolute time when running as a plug-in thus keeping its data synced to the host timeline at all times.

This means *you do not need to re-measure the entire 30-minute show just because you made an adjustment over a tiny area*. Even if there are multiple small areas throughout the show that need to be corrected, you can just make the needed corrections and play just those updated sections into FENNEK. The History View will update to show the new levels in those areas, and the overall measurements like Integrated Loudness and Loudness Range will also be immediately recalculated.
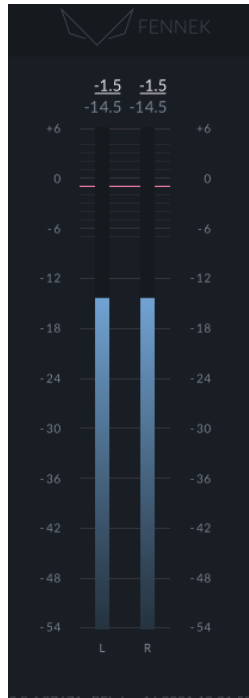
4 True Peak View

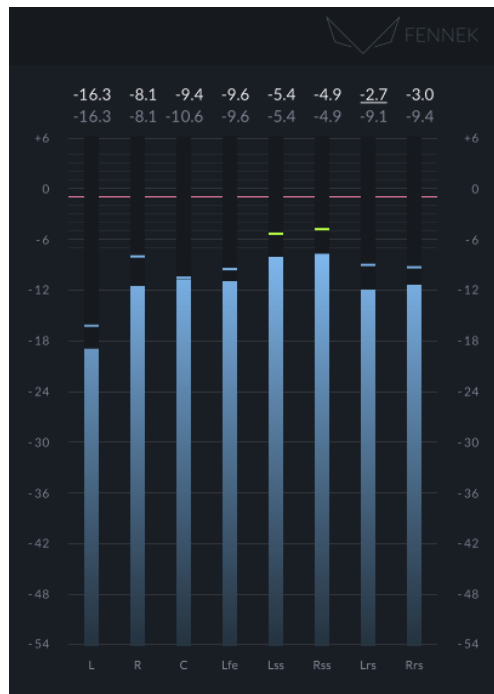**Figure 29: True Peak View in Stereo configuration**

Figure 30: True Peak View in 7.1 Surround configuration

The True Peak View shows the instantaneous levels of the audio input channels coming in to FENNEK based on the current Routing configuration so you can see if any channel exceeds the Maximum True Peak Level.

Each meter shows the following information:

Figure 31: Information shown in the True Peak View

1. The top number is the Maximum True Peak Level for the associated channel. It will turn red if the channel ever exceeds the value set for the Maximum True Peak Level Warning.

2. The bottom number is a numerical representation of the channel's True Peak Level being shown in the barmeter.

3. The red line that extends across all of the True Peak barmeters is a visual representation of the current value set for the Maximum True Peak Level Warning. Any barmeter that shows values above this line will trigger the warning for that channel (see item #1, above) and also trigger the **[TP-OVER] indicator** on the Main View.

4. A small Temporary Peak Indicator will be shown in the barmeters. It visually represents the highest True Peak Level measured for the channel within the last few seconds.

5. The main barmeter shows the True Peak Level for the channel.

5 Export Window

The Export Window, which is accessed by clicking the **[EXP]** button in the Main View, provides a few different ways to export measurement data out of FENNEK for other purposes.

To use the export features, you first select the measurement data you want to export or capture, and then you choose to either generate a Report file from the current measurement session or enable the recording of a Constant Log.

5.1 Export Parameter Selectors

The top section of the Export window contains the Export Parameter Selectors, a group of boxes which, when enabled, specify which measurement data should be included in the Report or Constant Log.
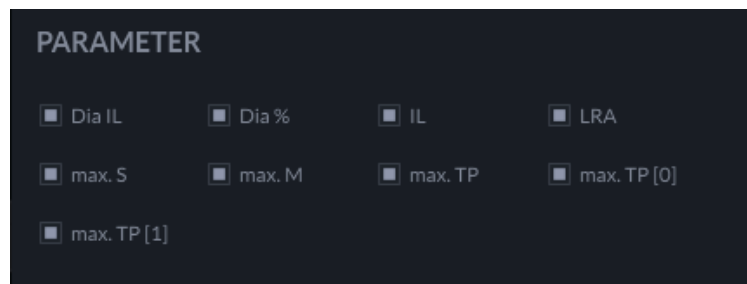
Figure 32: Export Parameter Selectors

5.2 Report Section

The Report feature is used for collecting the *current measurement session data* into a file that is either written directly to disk or attached to a new e-mail in your default mail client. This serves as a way to make a text backup of the recent measurement data (since the last time you clicked the Reset **[□] button** in the Main View) which you can save next to an associated project or audio file.

Figure 33: Report Export Buttons

- Clicking the **[SAVE TO FILE]** button will open a standard system dialog box allowing you to specify a filename and location where to save this data. Click **[SAVE]** to write the file.

- Clicking **[SEND VIA EMAIL]** will launch your default mail client and create a new message where the report is already attached to it. The Report will have the name "Fennek Report <dd.mm.yy>.txt" and all you need to do is provide a "To:" address and any additional text you'd like to include in the e-mail. You can then click the Send button in your e-mail client to transmit the e-mail.

5.3 Constant Log Section

The Constant Log is a report that is automatically written to a specified location on your computer *whenever measurement in FENNEK is active* using a time-interval that you specify. Measurement data is added to the Constant Log with timestamps, and the contents of the Constant Log is *not* cleared when clicking the Reset **[▢]** button in the Main View. There are three parameters which control the Constant Log:
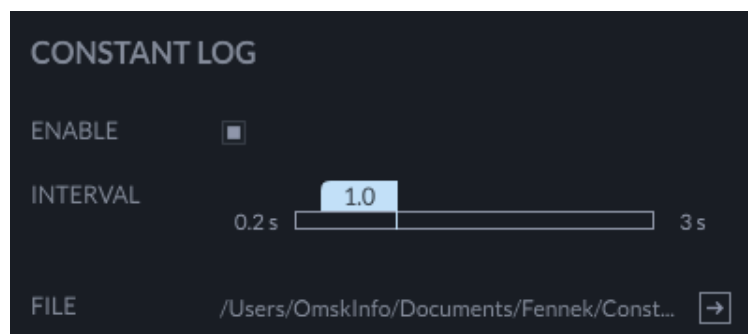
Figure 34: Constant Log configuration parameters

- The **[ENABLE]** button is used to toggle the writing of the Constant Log on and off. When this is enabled, the Constant Log will be updated whenever measurement is active.

- The **[INTERVAL]** slider sets the frequency at which FENNEK will write new data into the Constant Log. The smaller the value, the more often data will be written to the Constant Log (causing the log to grow in size more quickly). The minimum value is one update every 0.2 seconds while the maximum value is one update every 3.0 seconds.

- The final **[FILE]** section is where you specify the location for the Constant Log to be written. Clicking the **[→]** button at the right will open a standard system dialog where you can provide a new location for the Constant Log as well as changing the name of the log that is written.

6 Setup Window

The Setup Window, opened with the **[SETUP]** button on the Main View, provides access to numerous parameters relating to the operation of FENNEK.
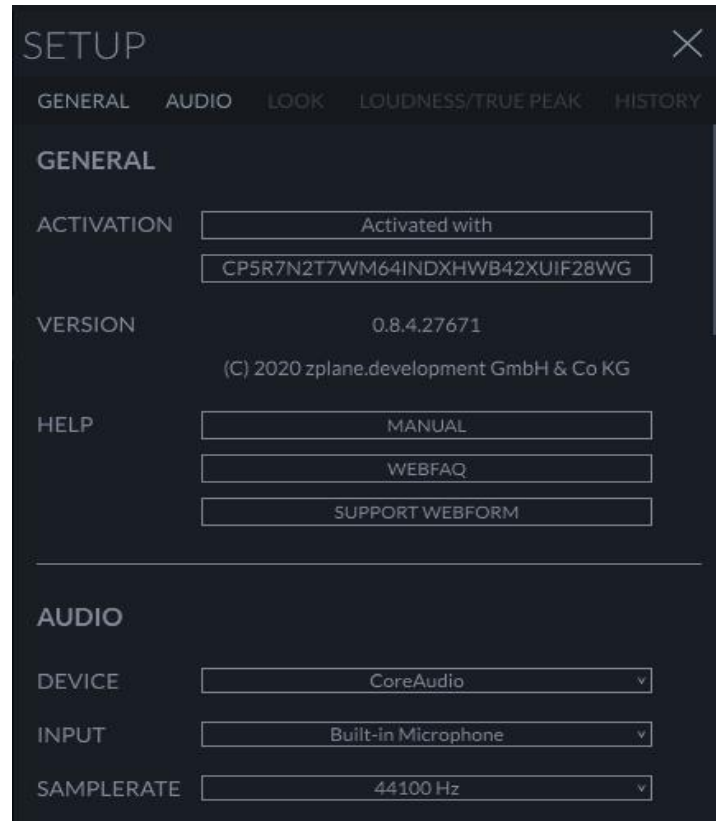

Figure 35: The Setup Window

6.1 General Section

Figure 36: The General section of the Setup Window

6.1.1 Activation

The first section of the Setup Window contains general information about FENNEK, starting with the Activation section. For more information on how to activate FENNEK, please see section 1.2 Registration & Activation earlier in this manual. After activation is complete, this section simply shows the registered product serial number.

6.1.2 Version

Following this is a display showing the version of FENNEK you are running. Please provide this version number if you ever need to report a bug to zplane Support.

6.1.3 Help

Lastly is the Help section which includes three quick access buttons:

- **[MANUAL]** opens this document
- **[WEBFAQ]** launches your default web browser and points it to the FENNEK FAQ on the zplane website
- **[SUPPORT WEBFORM]** launches your default web browser and points it to the Support Form on the zplane website

6.2 Audio Section

A portion of the Audio Section is only relevant when running the FENNEK standalone application, so some of the parameters described below will not appear when FENNEK is running as a plug-in within a host application.
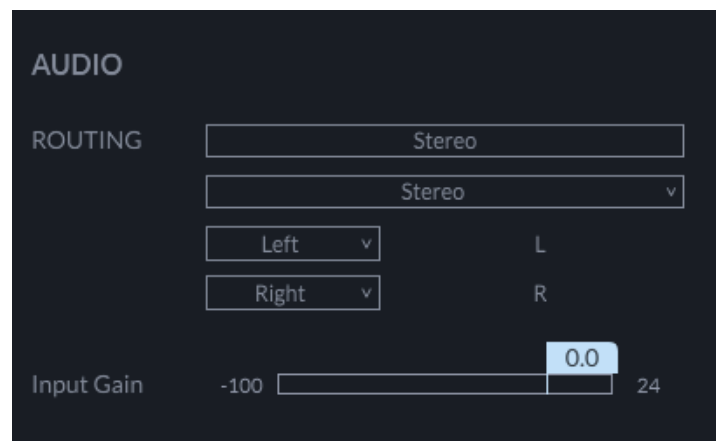

Figure 37: Reduced Audio Section when FENNEK is used as a plug-in

Figure 38: Expanded Audio section in standalone mode

6.2.1 Device Driver Type

When used as a standalone application, **[DEVICE]** provides a drop-down of the hardware Device Type / Driver Type you want to use with FENNEK.

On macOS, this will likely just show **"Core Audio"** as the only option, but Windows users will usually find additional choices here such as **"Windows Audio (Exclusive Mode)"**, **"ASIO"**, and **"DirectSound"**, depending on the audio drivers available on the computer. The selection made here will govern the options available in the following menu.

6.2.2 Input Audio Device

When used as a standalone application, **[INPUT]** provides a drop-down menu for selecting an audio device to use as the audio inputs into FENNEK.

Note: If you are not seeing the hardware or virtual device you want to use, ensure you've chosen the correct Device Driver Type for the device in the previous menu.

6.2.3 Audio Device Sample Rate

[SAMPLE RATE] sets the sample rate for the Input Audio Device—the exact options available here will be dependent on the sample rates supported by the Input Audio Device and the Device Driver Type in use. In the case of using the

"**ASIO**" Device Driver Type, you will often need to set the hardware sample rate in the input device's own control panel software.

6.2.4 Audio Buffer Size

[BUFFER] sets the size of the input audio buffer. Generally speaking, this will affect the apparent "lag" or delay between a sound coming in to your Input Audio Device and when you see the measurement result actually appear in FENNEK. Setting this to a low value will make FENNEK more responsive—there will be less lag between the sound coming in and the measurement appearing. However, if this value is set too low, it will put too much strain on your computer and this might start causing errors in the measurement data.

6.2.5 Routing

The Routing Section is where you configure FENNEK for stereo or surround use by assigning the various input channels of the selected Input Audio Device or host application to the measurement channels in FENNEK.

Figure 39: Routing Display and Configuration

The top display **(1)** in the Routing Section indicates the potential configurations possible with the selected Input Audio Device or host configuration. The two possibilities are:

- **"Stereo only"** which means that there are only 2 audio channels coming in to FENNEK so only stereo processing is possible.

- **"Discrete #"** which means there are multiple discrete channels coming in to FENNEK, thus allowing one or more of the surround configurations to be used (see menu, below).

Below this display is a drop-down menu **(2)** which allows you to choose the channel configuration of FENNEK ranging from basic stereo operation through a multitude of multi-channel surround configurations.

- **"Stereo"** is for standard stereo content with Left and Right channels

- **"LCR"** is for "live stereo" with Left, Center, and Right channels

- **"LRS"** is for minimal surround with Left and Right channels plus a single rear Surround channel

- **"LCRS"** is for basic surround, akin to the original Dolby Pro Logic format, with Left, Center, and Right channels plus a single rear Surround channel.

- **"5.0 Surround"** is like 5.1 Surround, below, but without the dedicated Low-frequency effect channel.

- **"5.1 Surround"** is ITU 775 surround format with Left, Center, Right, Left surround, Right surround, and Low-frequency effect channels.

- **"6.0 Surround"** is a surround setup with Left, Center, and Right channels at the front plus Left, Center, and Right surround speakers at the rear. It has no dedicated Low-frequency effect channel.

- **"6.0 (Music) Surround"** is like 6.0 Surround, above, but "rotated" such that the speakers are Left and Right at the front, Left and Right at the sides, and Left and Right surrounds at the rear. There are no center channels and no dedicate Low-frequency effect.

- **"7.0 Surround"** is like the 6.0 (Music) Surround, above, but adds a Center channel at the front.

- **"6.1 Surround"** is like 6.0 Surround, but adds a Low-frequency effect channel.

- **"6.1 (Music) Surround"** is like 6.0 (Music) Surround, but adds a Low-frequency effect channel.

- **"7.1 Surround"** is the 8-channel standard used by many home theater setups supported by BluRay and HD DVD formats. It is like 5.1 surround but expands the surround capabilities by adding Left and Right side surround channels.

- **"7.0.2 Surround"** is a Dolby Atmos format which is like 7.1.2 Surround, below, but without the dedicated Low-frequency effect channel.

- **"7.1.2 Surround"** is the 10-channel Dolby Atmos format which adds Left and Right top surround channels so that sounds can have vertical placement in the mix.

Once you have selected an audio routing configuration, a set of channel assignment drop-down menus will appear allowing you to assign the audio channels coming in to FENNEK, either from the Input Audio Device or the host application, to their respective locations in the selected channel configuration.

6.2.6 Input Gain

The last control in the Audio section is the **[Input Gain]** slider which can increase or decrease the audio level going in to FENNEK. Normally, this slider should remain at the **"0.0"** position which represents unity gain so that FENNEK reports the actual loudness of the audio being measured.

However, if your circumstances demand it, you can adjust this value as needed—reducing this slider to **"-6.0"**, for example, will result in FENNEK reporting levels that are 6dB lower than what the content actually contains.

Note: This control only affects the audio level going in to the FENNEK measurement algorithms. It has no effect on the audio passing through FENNEK when used as a plug-in on a host channel.

6.3 Look Section

The parameters in the Look Section govern the appearance of FENNEK.
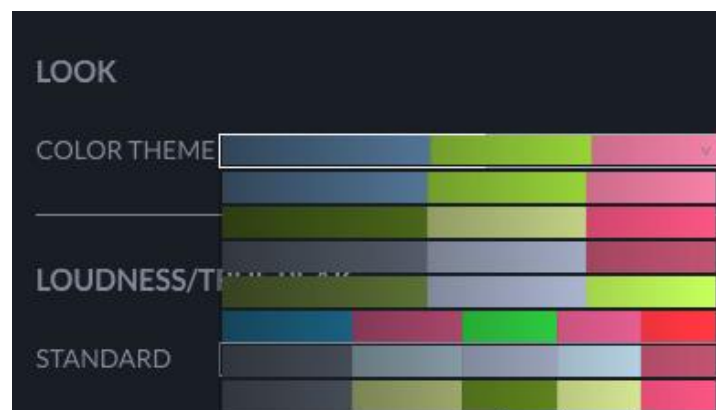

Figure 40: FENNEK Color Scheme options

The **[COLOR THEME]** menu contains various color schemes which are applied to the Barmeters and History View.

6.4 Loudness / True Peak Section

The Loudness / True Peak Section is where the details of the current measurement standard, parameters, and sub-tests can be configured. Many of the settings here govern the warning indications that will appear in the Main View at the end of a measurement session.

6.4.1 Loudness Standard Preset

[STANDARD] is a drop-down menu for selecting one of the Loudness Standard Presets in FENNEK. When selecting a Preset here, all the parameters below will be updated to the values programmed in to that preset. If any edits are made to the following parameters such that they no longer match the original preset, the Preset Name shown here will be preceded with an asterisk (*).
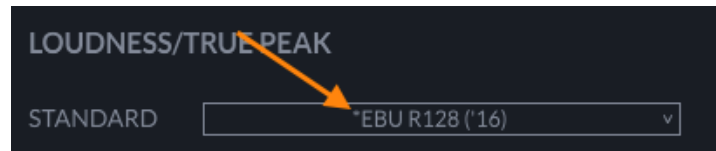

Figure 41: Example of a modified Loudness Standard Preset indicated with an asterisk

6.4.2 Loudness Colors Configuration

[L COLORS] is a slider with two value handles that allows you to set at which loudness the colors in the various loudness barmeters will change. You can therefore use these slides to define the location and width of the "sweet spot" where you want your measurements to fall within.
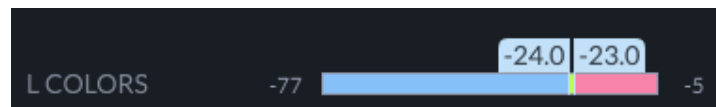

Figure 42: Example of [L Colors] configured for a 1dB sweet spot appearing in green

6.4.3 Integrated Loudness Warning Threshold

The [IL] slider sets the target and tolerance for the Integrated Loudness Measurement using 3 value handles. The center (second) of the three sets the target IL while the first and third handles specify the over and under tolerance levels.

Figure 43: The 3-value [IL] slider configured for -23.0 ±1.0 LUFS

For example, if the delivery specifications call for a target IL of -23.0 ±1.0 LUFS, you would:

- Set the center handle to **"-23"** (which is the loudness target)
- Set the first (left) handle to **"-24"** (which is -1.0 dB less than the target)

- Set the third (right) handle to **"-22"** (which is +1.0 dB more than the target).

The **"Integrated"** display on the Main View will turn red at the end of a measurement session if the Integrated Loudness Measurement lands outside (above or below) the ranges set here.

6.4.4 Dialog Integrated Loudness Warning Threshold

The **[Dia IL]** slider is similar to the **[IL]** slider, mentioned above, but sets the target and tolerance for the Dialog Integrated Loudness Measurement using 3 value handles. The center (second) of the three sets the target Dia IL while the first and third handles specify the over and under tolerance levels.
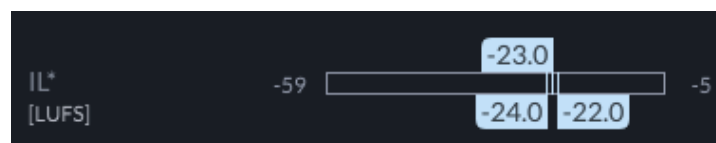
The **"Dialog Loudness"** display on the Main View will turn red at the end of a measurement session if the Dialog Integrated Loudness Measurement lands outside (above or below) the ranges set here.

6.4.5 Dialog Percentage Integrated Loudness Warning

The **[Dia %]** controls configure a special measurement warning based on the Dialog Percentage measured in the content combined with the Dialog Integrated Loudness.

When this warning is enabled with the small square to the left of the slider, the slider value will then determine the Dialog Percentage that must be reached in order for the Dialog Integrated Loudness to be preferred for the total Integration Loudness of the content. Here are two examples to help illustrate the mechanics of this warning while this slider is set to **"50%"**:

- The content being measured has lots of dialog, thus the Dialog Percentage **"Dia %"** measurement is "85%" (which is *over* the **"50%"** value set on this slider). As a result, when the measurement session is stopped, the display of the Dialog Integrated Loudness **"Dia IL"** in the Main View will turn red if its level exceeds the current Integrated Loudness Warning Threshold.

- The content being measured is mostly background audio and a soundtrack with minimal dialog. The measured Dialog Percentage **"Dia %"** ends up being rather low at "22%" (which is *under* the **"50%"** value set on this slider). As a result, the Dialog Integrated Loudness **"Dia IL"** in the Main View will not turn red at the end of the measurement session even if the measured value exceeds the current Integrated Loudness Warning Threshold.

6.4.6 Maximum Momentary Loudness Warning

The **[max. M]** controls configure the display warning that is shown on the Maximum Momentary Loudness **"max. M"** Display. When this warning is enabled by clicking the small box to the left of the slider, the Maximum Momentary

Loudness Display will turn red if the <u>Maximum Momentary Loudness</u> ever exceeds the value set on this slider.

6.4.7 Maximum Short Term Loudness Warning

The **[max. S]** controls configure the display warning that is shown on the Maximum Short Term Loudness **"max. S"** Display. When this warning is enabled by clicking the small box to the left of the slider, the Maximum Short Term Loudness Display will turn red if the <u>Maximum Short Term Loudness</u> ever exceeds the value set on this slider.

6.4.8 Loudness Range Warning

The **[LRA]** controls configure the display warning that is shown on the Loudness Range **"LRA"** Display. When this warning is enabled by clicking the small box to the left of the slider, the Loudness Range Display will turn red if the <u>Loudness Range Measurement</u> exceeds the amount set on this slider.

6.4.9 True Peak Barmeter Colors

Similar to the **[L COLORS]** control, above, which determines the thresholds for loudness meters, the **[TP COLORS]** slider has two handles on it for setting the levels where the <u>True Peak Barmeters</u> should change colors. You can set these levels as a way to help visually inform you when the True Peak level exceeds these levels, which is especially important if your chosen content standard doesn't allow any True Peaks beyond a specified limit.

Figure 44: True Peak Barmeter Colors configuration

6.4.10 Maximum True Peak Level Warning

The **[max. TP]** slider sets a level at which, when exceeded, the **<u>[TP-OVER] indicator</u>** and <u>Maximum True Peak **"max. TP"**</u> will turn red. This can be especially important if your chosen content standard doesn't allow any True Peaks beyond a specified limit.

6.4.11 Reset To Default Button

The **[RESET TO DEFAULT]** button, when clicked, will revert all of the above sliders and controls to the values programmed into the selected <u>Loudness Standard Preset</u>.

6.5 History Section

This section contains controls governing the History View. It currently consists of a single **[OVERVIEW]** menu which selects the measurement value that is shown in the small Overview Window at the bottom of the History View. The options are:

- **"Short Term"** for visualizing the Short Term Loudness Measurement
- **"Momentary"** for visualizing the Momentary Loudness Measurement

7 Technical Specifications

Operating Systems*	• macOS 11, 12 & 13 • Windows 10 & 11
CPU Architecture	• macOS: 64-bit Intel and ARM (M1) • Windows: 32-bit and 64-bit Intel
Audio Formats	• 1-10 channels (I/O) • 32kHz - 192kHz sample rate
Plug-in Formats	• VST2 • VST3 • AU (macOS only) • AAX
Audio Latency	• None

***NOTE:** It is possible that FENNEK will work on Windows and macOS operating systems older than those listed here. Therefore, the product installer does not block installation based on OS version. Nevertheless, zplane does not make any guarantees about performance, compatibility, or stability of this product on these old operating systems now or in the future. If you currently use an unsupported operating system, it is strongly recommended that you try running the demo version of FENNEK to ensure compatibility and performance before purchase.

8 References

The FENNEK Presets are based on the following loudness standards and content submission specifications:

Preset Name [References]	Loudness (IL or Dia. IL)	True Peak (TPmax)	Gate Threshold
ITU-R BS.1770-4 [1]	−24 ±1.0 LUFS	0 dBTP	-10 dB
EBU R128 ('11) [1]	−23 ±1.0 LUFS	−1 ±0.3 dBTP	-10 dB
EBU R128 ('14)	−23 ±0.5 LUFS	−1 ±0.3 dBTP	-10 dB
EBU R128 ('16) Short-Content	−23 ±0.5 LUFS	−1 ±0.3 dBTP	-10 dB
EBU R128 ('20) [1] [2]	−23 ±1.0 LUFS	−1 ±0.3 dBTP	-10 dB
EBU R128 ('20) Short-Content [1]	−23 ±0.2 LUFS	−1 ±0.3 dBTP	-10 dB
ATSC A-85 ('13) [1]	−24 ±2.0 LKFS	-2 dBTP	-10 dB
ARIB TR-B32 ('13) [1] [2]	−24 LKFS	−1 dBTP	-10 dB
AGCOM 219/09/CSP [1] [2]	−24 LUFS	-2 dBTP	-8 dB
FreeTV OP-59 ('13)	−24 ±1.0 LKFS	-2 dBTP	-10 dB
Amazon Music [1]	-14 dB LUFS	-2 dBFS	-10 dB
Amazon Alexa [1]	-14 dB LUFS	-2 dBFS	-10 dB
Apple Music [1] [2]	−16 ±1.0 LUFS	−1 dBTP	-10 dB
Apple Podcast [1]	-16 ±1.0 LKFS	-1 dBFS	-10 dB
Deezer Online Streaming [1]	−15 LUFS	−1 dBTP	-10 dB
Spotify Loud [1]	−11 LUFS	−2 dBTP	-10 dB
Spotify Normal [1]	−14 LUFS	−1 dBTP	-10 dB
Tidal [1]	−14 LUFS	−1 dBTP	-10 dB
YouTube [1]	−14 LUFS	−1 dBTP	-10 dB
Sony ASWG-R001 Home [1]	-24 ±2.0 LKFS	-1 dBTP	-10 dB
Sony ASWG-R001 Portable [1]	-18 ±2.0 LKFS	-1 dBTP	-10 dB
HBO [1] [2]	−27 ±2.0 LKFS	−2 dBTP	-10 dB
Disney [1] [2]	−27 ±2.0 LKFS	−2 dBTP	-10 dB
Starz [1] [2]	−27 ±2.0 LKFS	−2 dBTP	-10 dB
US TV Broadcast [1] [2]	−24 ±2.0 LKFS	−2 dBTP	-10 dB
Canada TV Broadcast [1] [2]	−24 ±2.0 LKFS	−2 dBTP	-10 dB
Puerto Rico TV Broadcast [1][2]	−24 ±2.0 LKFS	−2 dBTP	-10 dB
Dialog LKFS	−27 ±2.0 LKFS	−2 dBTP	-10 dB
Netflix	−27 ±2.0 LKFS	−2 dBTP	-10 dB

9 Feedback & Support

Our website products.zplane.de always provides the latest information and news about our products. Any issues you encounter may either be addressed in the FAQ section of the appropriate product or reported directly to us via post or email. Before contacting us directly, please ensure you are using the latest version of the product. Please also make sure that your issue is not covered in the manual, the forum, the FAQ or elsewhere on our website.

If you cannot find answers using the methods above and need to contact us directly, please provide the following details to enable us to help you as fast as possible:

- Your registration information (such as the name of your User Account or your login e-mail)

- Your system specifications (hardware, operating system, host software)

- The exact version number of the plugin (see the "About" box by clicking on Help [?] button located at the bottom-right of the FENNEK interface)

- Include a detailed description of your problem with a step-by-step description of what led up to it so we can try to reproduce the issue

Please use the following contact methods:

✎ : zplane.development GmbH & Co. KG
Grunewaldstr. 83
D-10823 Berlin
Germany

∅ : products.zplane.de/support

@ : support@zplane.de