KLIPPEL QC 系统

QC User Manual

QC 用户手册

Version 2.0 / 版本 2.0

By KLIPPEL GmbH
作者 KLIPPEL GmbH

Please note!

This Chinese user manual does not contain the latest version.
For the updated version please use the English QC User Manual!
The most current version is available

- **as online help (press F1) and**
- **as pdf file on the**
  <CDROM> / Manual / 2_QC User Manual.pdf or using
  QC-Start / Help / PDF Help

November 17, 2009

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Contents

Introduction

简介

How to use the manual

如何使用手册

The yellow pages in the printed manual give you the most important information for a quick start (See section *Getting Started*).

Installation

To install software and hardware follow the instructions at the beginning of chapter *Getting Started / Hardware Installation*.

First measurement

To check the hardware and software setup go to the section 'First Measurement' in the chapter *Getting Started / First Measurement*. There you will find a step-by-step instruction, that will lead you through your first measurement.

What to read as an operator?

As an operator you should read the section *Operator* in the chapter *User Modes*.

What to read as an engineer or a programmer?

As an engineer / programmer you should read the following chapters to get familiar with the measurement system (minimal reading):

1. Getting Started
2. Project Management
3. User Modes
4. Test Configuration

An engineer should also read the chapter *Hardware*.

A programmer should read additionally the *Programmers Guide* that comes as a separate manual (always available as online help file).

How to visualize data from the example database?

To visualize the data from the example database delivered with the software, or from any other database (from customers or suppliers) read section *Viewing results* in the chapter *Getting Started*.

More information

The Appendix comprises a Glossary and extended information about the measurement technology.

为快速入门，打印手册中的黄色页面为您提供了最有用的信息（请参阅章节 *开始* ）。

安装

要安装软件和硬件，请参照章节*开始/Hardware* Installation 中开始部分的介绍。

初次测量

要检查硬件和软件设置，请翻到章节 *开始/First* Measurement 中的“初次测量”小节。指南将引导您一步一步完成您的初次测量。

作为操作员应阅读什么？

作为操作员，您应该阅读章节 *用户模式/Operator* 。

作为工程师或者程序员应该阅读什么？

作为工程师或程序员，您应该阅读以下章节来熟悉本测量系统（必读）：

1. 开始
2. 项目管理
3. 用户模式
4. 测试配置

作为工程师也应阅读*硬件*。

作为程序员，您还应同时阅读另外单独的手册*“程序员指南”*（作为在线帮助文件，您可以随时阅读它）。

如何由例样数据产生可视化数据？

为了将软件自带的例样数据库或者其他数据库（来自客户或者供应商）可视化，请阅读章节*开始* 中的 *Viewing* results 。

更多信息

附录包含了词汇表和有关测量技术的扩展信息。

Concepts

概念

The KLIPPEL QC System is a comprehensive hardware and software solution dedicated to test electro acoustic transducers at the end of the production line. The robust hardware is designed for operation in production environments. It can be integrated in a fully automated line as well as operated manually. The following data can be measured and compared to pass/fail limits:

- Frequency response, absolute level
- Rub & Buzz (impulsive defect distortion)
- Harmonic distortion (THD and Harmonics)
- Statistic process control parameters (Cpk, Ppk)
- Thiele-Small parameters
- Impedance
- Polarity

The software has three access levels (operator, engineer, programmer). An intuitive user interface (translatable to different languages) and smart limit setting algorithms are implemented to shorten training and setup periods for operators and engineers.

The KLIPPEL QC System is highly flexible. Tests can be split into several subtests each with an individual stimulus. This allows shortest test cycles using most critical signals for testing at the physical limits. A scripting language SCILAB (similar to MATLAB®) can be used to change the user interface as well as to implement new measurement ideas easily (in programmable version only).

KLIPPEL's Meta-Hearing Technology provides most sensitive testing of Rub&Buzz defects by isolating the impulsive defect distortion from the regular distortion of motor and suspension. So devices can be tested up to maximal amplitudes where the defect symptoms are almost masked by the regular output.

KLIPPEL QC 系统提供了一个综合性的软硬件解决方案，它专用于在生产线末端测量电声换能器。鲁棒的硬件专门为工厂生产环境而设计，它既可以与全自动化的生产线整合，也同样适用于手工作业的生产线。系统可测量以下数据并将其与对应的通过/失败门限进行比较：

- 频率响应，绝对幅值
- 异音（瞬态缺陷失真）
- 谐波失真（THD 和谐波）
- 统计过程控制参数（Cpk, Ppk）
- T/S 参数
- 阻抗
- 极性

该软件含有 3 个访问级别（操作员、工程师和程序员）。直观的用户界面（可翻译成不同语言）和智能门限设定算法，缩短了操作员和工程师的培训周期和设置时间。

KLIPPEL QC 系统具有很高的灵活性。测试可分成若干子测试，每个子测试都带有独立的激励信号。该系统可用最短的测试周期，在物理极限处用最苛刻的信号来完成测试。采用一种脚本语言 SCILAB（类似于 MATLAB®）既可以方便地改变用户界面，也可以非常容易地实现新的测量想法（只适用于可编程版本） 。

剔除由驱动和悬吊系统所引起的常规失真可分离出瞬态失真，KLIPPEL 的超听力技术可针对异音失真进行最灵敏的测试。因而，该系统可在最大振幅点上进行测试，而在最大振幅点上失真症状几乎被正常的输出信号所掩盖。

System Requirements

系统要求

Additionally to the KLIPPEL Production Analyzer hardware and the KLIPPEL QC software the following items are required:

PC

PC

The PC should be used exclusively to control the QC System. Since QC measurements are time critical, any program running parallel to the QC software may disturb the measurements.

Attention: Anti-Virus, Anti-Spy tools and other background software may interfere with a stable operation of the QC software. Disable any background processes that are not necessary.

The PC should meet the following requirements:

- Pentium-IV with Hyper threading or equivalent
- Min. 1024 MB RAM, 2048 MB RAM recommended if long measurement times are required
- 300 MB free disk space (additional disk space for measurement data)
- PC monitor with minimum 1024x768 pixel screen resolution
- Operating system MS Windows XP (Win2000 not supported!)
- USB 1.1 interface
- Firewire (IEEE 1394) interface

对 KLPPEL 产品分析仪 硬件和 KLIPPEL QC 软件有以下要求：

计算机应只用于控制 QC 系统。因为 QC 测量对时间要求非常苛刻，所以任何与 QC 软件并行运行的程序都可能会干扰测量。

注意： 防病毒、反间谍工具和其他一些后台运行的软件都可能会妨碍 QC 软件的稳定运行。请关闭所有的不必要的后台处理程序。

PC 应满足以下要求：

- 带超线程或相当的 Pentium-IV
- 内存至少 1024MB。如需长时间测量，推荐 2048MB 内存
- 磁盘剩余空间至少 300MB （保存测量数据需要额外的磁盘空间）
- PC 显示器需要最低 1024x768 像素的屏幕分辨率
- MS Windows XP 操作系统（不支持 Win2000）
- USB 1.1 接口
- 火线接口（IEEE 1394）

PC User Accounts

PC 用户帐户

For installation Administrator rights are required.

For running the software restricted user accounts may be used under the following conditions:

- OS: XP Professional
- The user must be assigned to the *Power User Group* under Windows XP. Ask your system administrator, if you are not sure about your

windows account rights.

安装必需管理员权限.

在以下情况需要被授权的用户帐户来运行本软件：

- 操作系统：专业版的 XP 系统
- 在 Windows XP 下，用户必须被分配到 *职权用户组* 下，如果您不能确定您的 Windows 帐户权限，请咨询您的系统管理员。

Amplifier

功放

A conventional ac-coupled audio amplifier is required for driving the transducer.

Recommended properties:

- Professional amplifier with balanced input.
- No (or switched off) intelligent input protection such as muting or DSP protection.
- No (or switched off) power saving feature (switching off the amplifier for low input).
- No DC coupling.
- AC High-pass Filter Frequency should be at 10 Hz or lower (-3 dB).
- Digital Amplifiers (Class D-Type) may also be used.
- Amplifier should be able to provide the peak values of the electric current and voltage to the loudspeaker without limiting.

Note: Be aware that some Power Amplifier have a considerable DC offset. When testing low current, high impedance driver (telecommunication driver), this offset may degrade your measurement. Please measure the DC offset with no input signal using a standard DC-voltmeter and compare it with the required testing level. It should be less than 3% for normal testing.

需要一台传统的交流耦合音频功放来驱动扬声器。

推荐性能：

- 带平衡输入的专业功放
- 无（或关闭）智能输入保护，如静音或 DSP 保护
- 无（或关闭）省电功能（低输入时关闭功放）
- 无直流耦合
- 交流高通滤波器频率应该在 10Hz 或以下（-3 dB）
- 也可以使用数字 D 类功放
- 功放应该能够在不受限的情况下给扬声器提供峰值电流和电压

注意：请注意有些功放存在一定的直流偏置。当测试低电流、高阻抗发声器（电信发声器）时，这个偏置会降低测量精度。请在没有输入信号时，用标准直流电压表测量直流偏置，并与所要求的测试电平做比较。为达到正常测试的目的，直流偏置应小于测试电平的 3%。

Box Enclosure

消音箱

Loudspeaker drivers can be tested in closed cavities. This reduces the production noise at the test microphone and ensures reproducible acoustical conditions. Then reflections and damping are almost identical for all tests, which is difficult to guarantee in free air. A box enclosure must have a sufficient size depending on the device to be tested and the sound pressure limit of the microphone.

For more details, see section *Optimizing Performance / SPL Tests / Measurement Box*.

扬声器单体可在封闭腔体中测试，这可以降低测试传声器附近的噪声，并保证可再现的声学条件。这样，对所有测试来说在自由空间很难保证的反射和阻尼条件在封闭腔体内几乎完全相同。消音箱必须足够大以满足被测单体的测试要求及传声器声压的限制要求。

更多细节请参见章节 *优化性能/声压级（SPL）测试/ Measurement* Box 。

Production noise
产线噪声

The noise level occurring under production conditions can easily mask the symptoms generated by a defect DUT (Device under Test). In some cases the noise is such high that even the box enclosure and an additional isolated test cabin give not sufficient suppression. The KLIPPEL QC System can then be configured to recognize a corrupted measurement. With a second microphone the ambient sound pressure is measured and the noise at the location of the DUT predicted.

For more details, see section *Optimizing Performance / SPL Tests / Measurement Box*.

生产环境产生的噪声很容易掩盖由 DUT（被测件）的缺陷所产生的症兆。在某些场合下，即使是使用消音箱和另外的独立测试隔间也难以抑制工厂环境噪声。采用第 2 只传声器来测量环境声压，并预测出 DUT 位置处的噪声，因而，KLIPPEL 系统可适用于嘈杂环境的测量。

更多细节请参见章节 *优化性能/SPL 测试/Measurement* Box 。

Microphone
传声器

To achieve a high SNR the acoustical output should be measured in the near field of the DUT. Thus the measurement microphone must be able to measure the expected sound pressure levels without limiting.

The maximum SPL level for each microphone can be entered (during calibration) and a warning is generated, if this level is exceeded.

In section *Hardware / Accessories / Microphones* a list of the provided selection of measurement microphones are given as well as common requirements for third party microphones.

Hints how to calculate the expected maximum sound pressure levels in a box enclosure can be found in the chapter *Appendix / Maximal SPL*

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为获得高信噪比，必须在 DUT 的近场处测量声输出。因此，测量传声器必须保证不受限制地测量所期望的声压级。

您可以输入每一只传声器的最大声压级（在校准中），当声压级过载时系统则会给出警告。

在 *硬件/辅助设备/Microphones* 中给出了可选测量传声器的列表，以及对第三方传声器的一般要求。

“附录/ Maximal SPL

” 会告诉您如何计算在消音箱中所期望的最大声压级。

Getting Started

开始

What's new in Version 2.0?

2.0 版本新增加什么内容？

If you are updating from QC version 1.x, you may find here a short list and links of new features in the new software version:

1. Measure individual harmonics. Please see section *Test Configuration / Measures and Limits / Harmonics / THD*
2. Improved Ambient Noise detection considering the test box attenuation. Please see section *Test Configuration / Measures and Limits / Rub & Buzz / 注意：为了获得更多关于超听力技术和独立缺陷失真（IDD）的细节和背景信息，请查阅章节 附录/词汇表 /* 测量技术（理论） /异音 / Meta Hearing Technology。

注意：为了调整和优化异音检测，请查阅章节优化性能/SPL *Tests.*。

3. Ambient Noise
4. Manual Sine Sweep for subjective tests. Please see section *User Modes / Operator / Manual Sweep*
5. Synchronizing mulitple production lines. Please see section *Organizing Projects / QC-Start Tool / Synchronizing multiple QC Systems (Master Tests).*
6. Remote Configuration of QC systems from any network connected computer (no QC-hardware required, special license required). Please see section *Organizing Projects / Remote Configuration.*
7. Flexible extraction of large scale data. Please see section *Statistics / Offline Statistics / Extracting data for processing*

8. It is now possible to run the QC software and the R&D software (from version 202) on the same computer.

如果您是从 QC 1.X 版本上升级到 2.0 的，您会在新的软件版本中发现以下新特征：

1. 测量单独谐波。请参见章节 *测试配置/测量和门限/Harmonics / THD* 。
2. 改进过的环境噪声检测考虑了测试箱体对声音的衰减。请参见章节 *测试配置/测量和门限/异音 /注意：为了获得更多关于超听力技术和独立缺陷失真（IDD）的细节和背景信息，请查阅章节* 附录/词汇表 / 测量技术（理论） /异音 / Meta Hearing Technology。

注意：为了调整和优化异音检测，请查阅章节优化性能/SPL *Tests.*。

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3. Ambient Noise 。
4. 为主观测试的手动设置正弦扫频。请参见章节 *用户模式/操作员/ Manual* Sweep 。
5. 使多条生产线同步测试。请参见章节 *组织工程/QC 开始工具/ Synchronizing* multiple QC Systems (Master Tests)。
6. 通过每一台连接到网络的计算机来远程配置 QC 系统（不需要 QC 硬件，只需要特殊的授权）。请参见章节 *组织工程/ Remote* Configuration 。
7. 灵活提取大规模的数据。请参见章节 *统计/离线统计/ Extracting* data for processing。
8. 在同一台计算机上运行 QC 软件和 R&D 软件现在变成可能了（从 2.0 版本开始）。

Hardware Installation

硬件安装

Attention: Do **not** connect USB and Firewire cables between PC and QC System yet.
These cables must be connected during the software setup (see next section)。

注意：先暂时 **不要** 用 USB 线和火线连接 PC 和 QC 系统。
这些线必须在安装软件的过程中连接 （参见下一章节）。

Parts of the system

系统部件

Please check the delivered parts. The system should contain (number of some items may depend on options):

Nr	Description	
1	Production Analyzer Power Supply,	
2	Cable for Power Supply 	
3	XLR-Cable	
4	Amplifier-Cable (for various amplifier output configurations there are 2 spare speakon plugs, see section on Amplifier below)	
5	Extra Speakon Cable Connector	
6,7	BNC-Cable (number depends on order)	
8,9	Measurement Microphones (number depends on order)	
10	Speaker-Cable	

11	USB-Cable	
12	Firewire-Cable	
13	USB-Dongle	

请核对交货清单，系统应该包括以下部件（有些部件取决于用户的选购）：

序号	**描述**	
1 **2**	产品分析仪电源 电源线 	
3	XLR 电缆	
4 **5**	功放电缆 （针对不同的功放输出配置，准备了两个备用的卡侬插头，参见下面有关功放的章节） 外加卡侬电缆连接插头	
6,7	BNC-电缆（数量取决于订单）	
8,9	测量传声器（数量取决于订单）	

10	扬声器电缆	
11	USB 电缆	
12	火线电缆	
13	USB 解密器（电子狗）	

Connecting the system

连接系统

Wire the KLIPPEL Production Analyzer according to the schematics below. The accessories shown in the wiring diagram are described in the chapter *Hardware / Accessories* (foot switch, temperature sensor).

Front side:

Rear side:

1. Connect the Cable for Power Supply (2) to Production Analyzer Power Supply (1)
2. Connect the Production Analyzer Power Supply (1) to KLIPPEL Production Analyzer (**A** - connector POWER)
3. Connect the XLR-Cable (3) between KLIPPEL Production Analyzer (**B** – connector OUT 1) and Power Amplifier input (not shown).
4. Connect one side of the BNC-Cable (6,7) to Microphone (8,9) and the other side to KLIPPEL Production Analyzer (**D, E** – connectors MIC 1, MIC 2)

In the standard configuration the Mic 1 should be located in the near field of the driver under test. It is recommended to put the Mic 1 in a box to attenuate the production noise.
Mic2 should be mounted in free air (not in the box) in about 1m distance. This microphone is used to monitor the ambient noise. Note: This microphone is not required in the QC Basic version.

请根据下图连接 KLIPPEL 产品分析仪。连接图中的相关附件（脚踏式开关，温度传感器）将在 *硬件 / Accessories* 中介绍。

正面：

（图略）

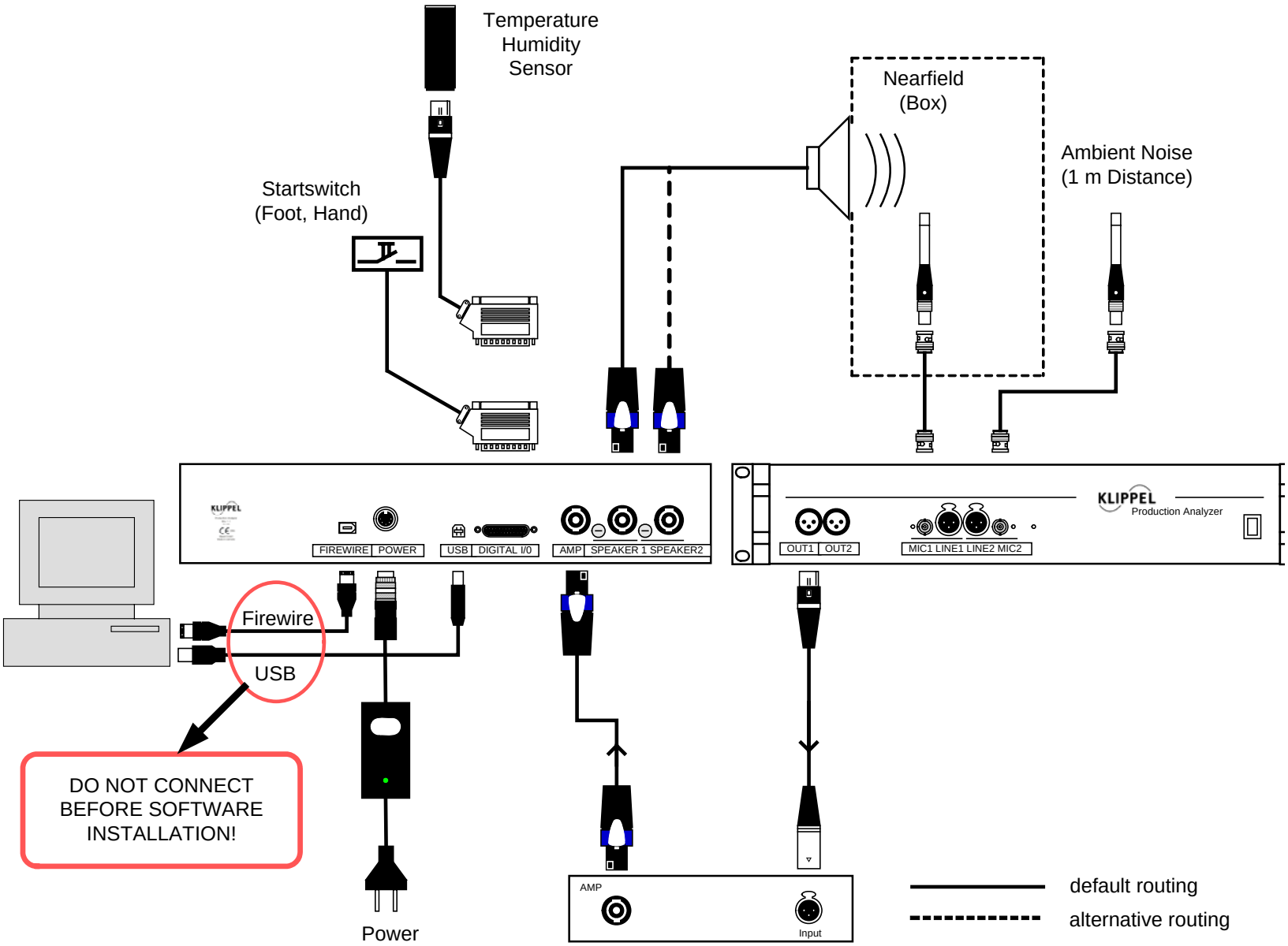
背面：

（图略）

1. 把电源线（2）接到产品分析仪电源（1）上。
2. 把产品分析仪电源（1）接到 KLIPPEL 产品分析仪电源插头（A）。
3. 用 XLR 电缆（3）将 KLIPPEL 分析仪输出 1 插头（**B**）和功放输入（未在图中显示）连接起来。
4. 将 BNC 接线（6，7）的一端接传声器（8，9），另一端接 KLIPPEL 产品分析仪 MIC1 或 MIC2 插头（**D 或 E**）。

在标准配置中，MIC1 应放置在 DUT 的近场区域。建议把 MIC1 放在一个箱体中以降低产线噪声。

MIC2 应固定在约 1 米外的自由空间中（不要放在箱体内）。这个传声器是用来监测周围噪声的。注意：该传声器在 QC 基本版中是不需要的。


Temperature
Humidity
Sensor
Startswitch
(Foot, Hand)
Nearfield
(Box)
Ambient Noise
(1 m Distance)
FIREWIRE
POWER
USB
DIGITAL I/0
AMP
SPEAKER 1
SPEAKER2
OUT1
OUT2
MIC1
LINE1
LINE2
MIC2
KLIPPEL
Production Analyzer
Firewire
USB
DO NOT CONNECT
BEFORE SOFTWARE
INSTALLATION!
Power
AMP
Input
default routing
alternative routing

How to connect the loudspeaker?

怎样连接扬声器

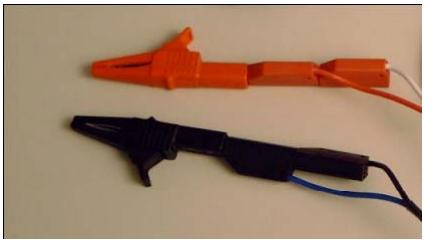
Connect the Speaker-Cable (**10**) to KLIPPEL Production Analyzer (**F**-connector SPEAKER 1 as default).

Although Klippel delivers clamps for connecting the driver, they are not suited for daily QC work.

It is strongly recommended to make dedicated adaptors to the connection schemes of the particular driver.

The Klippel QC system provides a 4 wire (Kelvin configuration) speaker connection. Using the delivered clamps the 4 wires are connected just before the clamps, so even long cables are no problem.

When making your own clamping, you may use the 4 wires to establish a Kelvin Configuration (with Force and Sense wires) directly up to the speaker terminals. For details, please refer to the *A3-Cables* specification and the *Cable Production Guide.pdf* (included in written manual).



The speaker cables may be extended by standard Speakon-Speakon cables with all 4 wires connected in a 1:1 configuration (use at least 1.5mm² wires).

Extension cables are available from Klippel as optional parts.

把扬声器电缆（10）连接到 KLIPPEL 产品分析仪 SPEAKER 1 插头（F，默认连接）。

虽然 Klippel 提供的夹子是用来连接发声器，但是它们并不适合日常的 QC 工作。

强烈推荐使用专门的转接器来连接特定的扬声器。

Klippel QC 系统提供了一种 4 芯线扬声器连接（开尔文结构）。使用所提供的夹子通过 4 芯线连接系统，这样即使电缆线比较长也不会有问题。

当使用您自配的夹子，您需要使用 4 芯接线直接连接扬声器终端来建立一个开尔文结构（包括 Force 线和 Sense 线）。更多细节请查阅 A3-接线说明书和电缆产品指南（*Cable Production Guide.pdf*）（包含在手册中）。

（图略）

通过用 4 根 1:1 结构的卡侬-卡侬电缆（使用线径至少为 1.5 mm²的接线），您可以延长扬声器电缆长度。

作为可选部分，您可以从 Klippel 得到延长线。

How to connect my power amplifier?

怎样连接功放

There are different wiring schemes required for the power amplifier connection depending on the amplifier you are using.

Please select the amplifier type from the list below and connect the amplifier according to the specific chapter below.

- Stereo Amplifier with Stereo Speakon Connectors , proceed with section *Stereo-Speakon Output Amplifier* below.
  All Amplifiers distributed by Klippel are conform to this setup!
- Stereo Amplifier with 2 Mono Speakon Connectors, proceed with section *Stereo Amplifier with 2 Mono Speakon Connectors* below.

- Stereo Amplifier with Cable Terminals, proceed with section *Stereo Amplifier with Cable Terminals* below.
- Mono Amplifier with Cable Terminals, proceed with section *Mono Amplifier with Cable Terminals* below.

NOTE: We strongly recommend to use professional power amplifiers with balanced audio input only. Only this kind of amplifier is described below. If your application require a different type of amplifier, please contact Klippel for details. In the following sections, it is assumed, that the amplifier input is an XLR connector.

针对您使用的功放，有不同的功放线路连接方法。

请从下面的列表中选择功放类型，并且依照后续专门章节来连接功放：

- 具有 立体声卡侬接头 的立体声功放，连接方法请参见下节 *Stereo-Speakon* Output Amplifier 。
  由 Klippel 提供的所有功放遵循这一安装！
- 具有 2 个单声道卡侬插头 的立体声功放，连接方法请参见下节 *Stereo* Amplifier with 2 Mono Speakon Connectors。
- 具有电缆接线端口的立体声功放，连接方法请参见下节 *Stereo* Amplifier with Cable Terminals 。
- 具有电缆接线端口的单声道功放，连接方法请参见下节 *Mono* Amplifier with Cable Terminals 。

注：我们强烈建议您使用只有音频平衡输入的专业功放。下面仅讨论此类功放。如果您的应用需要另外的功放，请与 Klippel 公司联系相关细节。在以下章节中，我们默认功放输入为 XLR 连接插头。

Stereo-Speakon Output Amplifier

立体声卡侬输出功放

- Connect the Amplifier Input to OUT1 (**B**) of KLIPPEL Production Analyzer with the XLR-Cable (**3**).
- If you have an Amplifier distributed by Klippel, the settings are already done. You don't need to adjust anything.
  Just connect the Amplifier Cable (**4**) to the Output 1 of the power amplifier and to the KLIPPEL Production Analyzer Amplifier input (**C**).
  Please proceed with the section *Software Installation*.

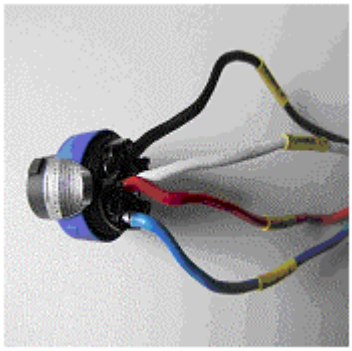
- In all other cases:
  Connect both inputs of the Stereo Amplifier in parallel. This could either be done by a switch at the Amplifier or by a patch cable. This depends on the particular Amplifier you are using, please check the Amplifier manual.
- Check in the Amplifier manual, that the Speakon Output of the Amplifier as assigned as following:

Cable Terminal output at Amplifier	Signal
Speakon Output: 1+	Hot (+) Ch. 1
Speakon Output: 1-	Cold (-) Ch. 1
Speakon Output: 2+	Hot (+) Ch. 2
Speakon Output: 2-	Cold (-) Ch. 2

- Mount one Speakon Cable Connector (**5**) to the Amplifier Cable (**4**):

Cable Terminal output at Amplifier	Connect to: (see Label at Amplifier Cable)
Speakon Output: 1+	Speaker 1+
Speakon Output: 1-	Speaker 1-
Speakon Output: 2+	Speaker 2+
Speakon Output: 2-	Speaker 2-

After Mounting it should look like this:



- Connect the Amplifier Cable (**4**) to the Stereo Output of the power amplifier and to the KLIPPEL Production Analyzer Amplifier input (**C**).
- Please proceed with the section *Software Installation*.

- 用 XLR 电缆（3）将功放输入连到在 KLIPPEL 产品分析仪的输出 OUT1（B）。
- 如果您有一台 Klippel 提供的功放，设置已在出厂时完成，您无需再做任何调整。
  只需将功放电缆（4）一头连接到功放的输出 1，另一头连接到 KLIPPEL 产品分析仪的输入（C）。
  请参阅章节 *Software* Installation 继续下面的操作。
- 在其他情况下：
  根据您所使用的功放，您可以通过功放的开关，或用一条修补电缆来并联立体声功放的两个输入，详情请参阅您的功放手册。
- 请核对功放手册，功放卡侬输出应按下表分配：

功放电缆末端输出	信号
卡侬输出 1：1+	通道 1 正 （+）
卡侬输出 1：1-	通道 1 负 （-）
卡侬输出 2：2+	通道 2 正 （+）
卡侬输出 2：2-	通道 2 负 （-）

- 在功放电缆（4）上连接一个卡侬电缆连接插头（5）

功放电缆末端输出	连接到（参见功放电缆上的标签）：
卡侬输出: 1+	Speaker 1+
卡侬输出: 1-	Speaker 1-
卡侬输出: 2+	Speaker 2+
卡侬输出: 2-	Speaker 2-

安装后应该像这样：

（图略）

- 用功放电缆（4）将功放的立体声输出和 KLIPPEL 产品分析仪的功放输入（C）连接起来。
- 请参阅章节“软件安装” 继续下面的操作。

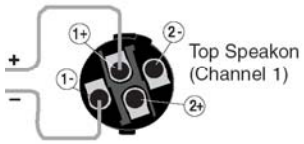
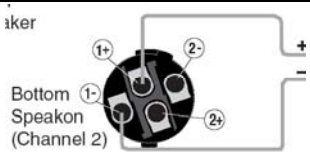
Stereo Amplifier with 2 Mono Speakon Connectors

带两个单声道卡侬插头的立体声功放

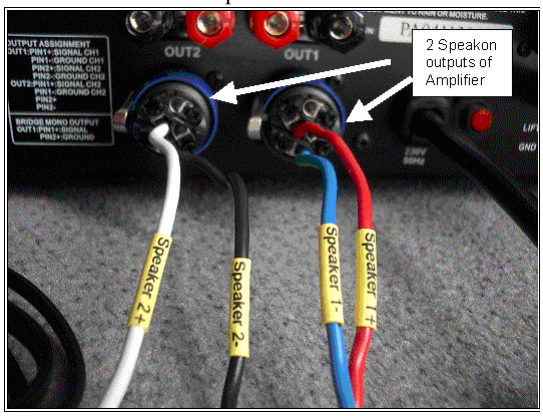
- Connect the Amplifier Input to OUT1 of Production Analyzer with XLR-Cable (**3**).
- Connect both inputs of the Stereo Amplifier in parallel. This could either be done by a switch at the amplifier or by a patch cable. This depends on the particular amplifier you are using, please check the amplifier manual.
- Check in the Amplifier Manual, that the Speakon Outputs of the Amplifier as assigned as following:

Cable Terminal output at Amplifier	**Signal**
Speakon Output 1: 1+	Hot (+) Channel 1
Speakon Output 1: 1-	Cold (-) Channel 1
Speakon Output 2: 1+	Hot (+) Channel 2
Speakon Output 2: 1-	Cold (-) Channel 2

- Mount two Speakon Cable Connector (**5**) to the Amplifier Cable (**4**). You will get an Y-cable with 3 Speakon connectors.

Cable Terminal output at Amplifier	**Connect to: (see Label at Amplifier Cable)**
	
Speakon Output: 1+	Speaker 1+
Speakon Output: 1-	Speaker 1-
	
Speakon Output: 2+	Speaker 2+
Speakon Output: 2-	Speaker 2-

After Mounting it should look like this:

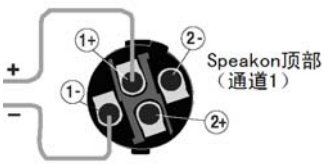
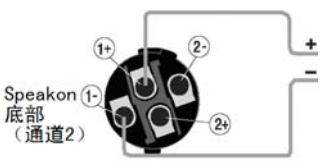
The Cable:	The Connection to Amplifier:
	

- Connect the prepared Amplifier Cable (**4**) to the two outputs of the power amplifier and to the KLIPPEL Production Analyzer Amplifier input (**C**).
- Please proceed with the section *Software Installation*.

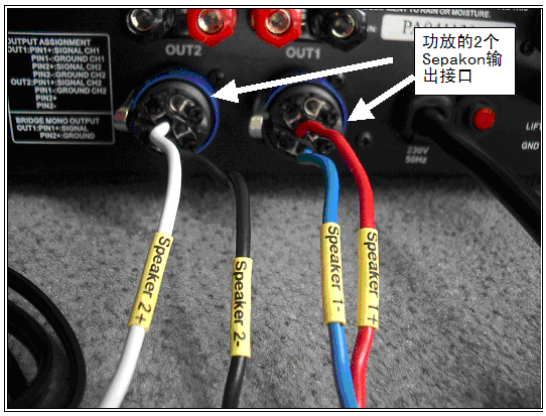
- 用 XLR 电缆（3）将功放输入连接到产品分析仪 OUT1。
- 根据您所使用的功放，您可以通过功放的开关，或用一条修补电缆来并联立体声功放的两个输入，详情请参阅您的功放手册。
- 请核对功放手册，功放卡侬输出应按下表分配：

功放电缆末端输出	**信号**
卡侬输出 1： 1+	通道 1 正 （+）
卡侬输出 1： 1-	通道 1 负 （-）
卡侬输出 2： 2+	通道 2 正 （+）
卡侬输出 2： 2-	通道 2 负 （-）

- 在功放电缆（4）上连接两个 Speakon 电缆连接插头（5），您将得到一个有 3 个卡侬插头的 Y 字形电缆。

功放电缆末端输出	**连接到（参见功放电缆上的标签）：**
	
卡侬输出: 1+	Speaker 1+
卡侬输出: 1-	Speaker 1-
	
卡侬输出: 2+	Speaker 2+
卡侬输出: 2-	Speaker 2-

安装后应该像这样：

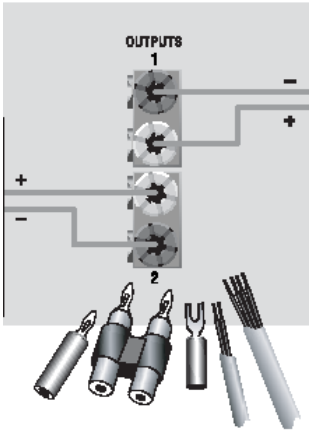
电缆：	功放的连接：
	

- 用准备好的功放电缆（4）将功放的两路输出与 KLIPPEL 产品分析仪的功放输入（C）连接起来。
- 请参阅章节“软件安装” 继续下面的操作。

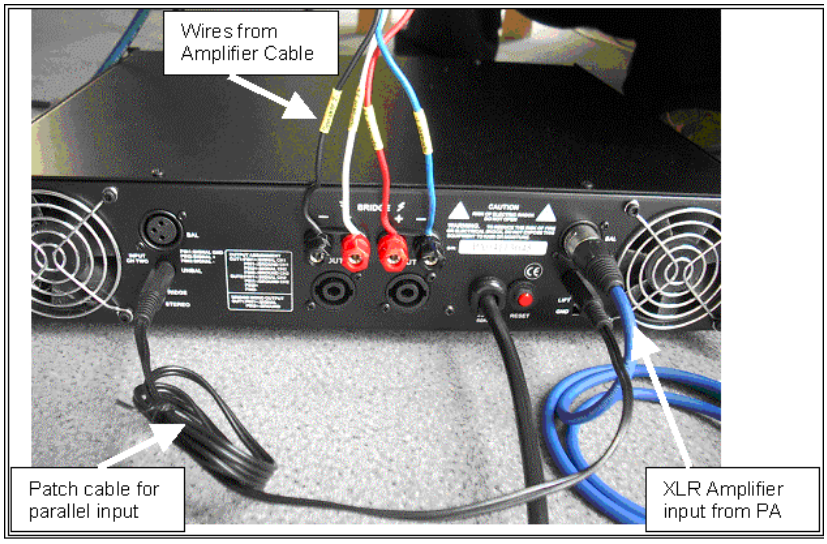
Stereo Amplifier with Cable Terminals

带电缆接头的立体声功放

- Connect the Amplifier Input to OUT1 of Production Analyzer with XLR-Cable (3).
- Connect both inputs of the Stereo Amplifier in parallel. This could either be done by a switch at the amplifier or by a patch cable. This depends on the particular amplifier you are using, please check the amplifier manual.
- Use Amplifier-Cable (4) with crimped ferrules (open wires).
- Connect wire labelled Speaker 1+ to Amplifier OUT1 HOT (+)
  Connect wire labelled Speaker 1- to Amplifier OUT1 COLD (-)
  Connect wire labelled Speaker 2+ to Amplifier OUT2 HOT (+)
  Connect wire labelled Speaker 2- to Amplifier OUT2 COLD (-)

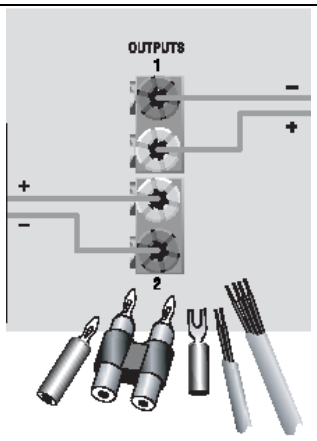
Cable Terminal output at Amplifier	**Connect to: (see Label at Amplifier Cable)**
	
Terminal Output: 1+ (red, hot)	Speaker 1+
Terminal Output: 1- (black, cold)	Speaker 1-
Terminal Output: 2+ (red, hot)	Speaker 2+
Terminal Output: 2- (black, cold)	Speaker 2-

After Connecting it should look like this:



- Connect the other end of the Amplifier Cable (4) to the KLIPPEL Production Analyzer Amplifier input (C).
- Please proceed with the section Software Installation.

- 用 XLR 电缆（3）将功放输入连接到产品分析仪 OUT1。
- 根据您所使用的功放，您可以通过功放的开关，或用一条修补电缆来并联立体声功放的两个输入，详情请参阅您的功放手册。
- 使用带金属片接头 （或去胶皮的线）的功放电缆（4）。
- 将标有 Speaker 1+的导线接到“功放输出 1 正 （+）”。
  将标有 Speaker 1-的导线接到“功放输出 1 负 （-）”。
  将标有 Speaker 2+的导线接到“功放输出 2 正 （+）”。
  将标有 Speaker 2-的导线接到“功放输出 2 负（-）”。

功放电缆末端输出	连接到（参见功放电缆上的标签）：
	
末端输出： 1+（红，正）	Speaker 1+
末端输出：1- （黑， 负）	Speaker 1-
末端输出：2+（红，正）	Speaker 2+
末端输出：2- （黑， 负）	Speaker 2-

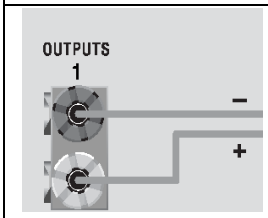
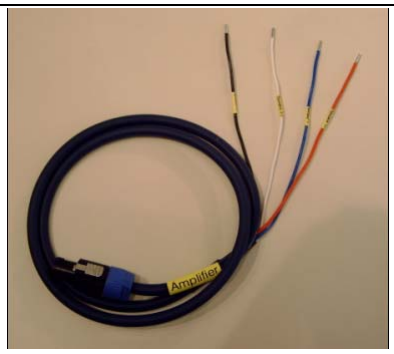
连接后应该像这样：
（图略）

- 将功放电缆（4）的另一端连接到 KLIPPEL 产品分析仪的功放输入（C）。
- 请参阅章节 *Software* Installation 继续下面的操作。

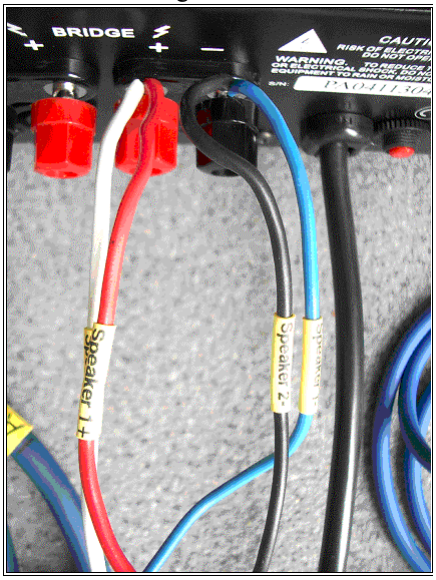
Mono Amplifier with Cable Terminals

带电缆接头的单声道功放

- Connect the Amplifier Input to OUT1 of Production Analyzer with XLR-Cable (3).
- Use Amplifier-Cable (4) with crimped ferrules (open wires).
- Connect wire labelled Speaker 1+ and Speaker 2+ to Amplifier HOT (+) output.
- Connect wire labelled Speaker 1- and Speaker 2- wire to Amplifier COLD (-) output.

Cable Terminal output at Amplifier	**Connect to: (see Label at Amplifier Cable)**
	
Terminal Output: 1+ (red, hot)	Speaker 1+ and Speaker 2+
Terminal Output: 1- (black, cold)	Speaker 1- and Speaker 2-

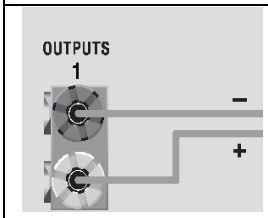
After Connecting it should look like this:



- Connect the other end of the Amplifier Cable (4) to the KLIPPEL Production Analyzer Amplifier input (C).
- Please proceed with the section *Software Installation*.

- 用 XLR 电缆（3）将功放输入与产品分析仪的 OUT1 连接。
- 使用带金属片接头 (或去胶皮的导线)的功放电缆（4）。
- 将标有 Speaker 1+ 和 Speaker 2+的线连接到功放正（+）输出。

- 将标有 Speaker 1- 和 Speaker 2-的线连接到功放负（-）输出。

功放电缆末端输出	连接到（参见功放电缆上的标签）：
	
末端输出： 1+（红，正）	Speaker 1+ 和 Speaker 2+
末端输出：1- （黑， 负）	Speaker 1- 和 Speaker 2-

连接后应该像这样：
（图略）

- 将功放电缆（4）的另一端连接到 KLIPPEL 产品分析仪的功放输入（C）。
- 请参阅章节 *Software* Installation 继续下面的操作。

Software Installation

软件安装

The installation program leads you step by step through the software installation process.

Before you begin

安装须知

Make sure you are not running other programs on your computer, especially previous versions of dB-Lab.

Important information for users of the KLIPPEL R&D System:
Different Software versions of the Klippel Measurement System can now be installed and removed as individual packages. So the installation of the Klippel QC system as well as one or more R&D installations can be installed and used on one PC. However, it is not possible to use them in parallel. See the dB-Lab manual for details.

If you have already connected the PC to the USB or Firewire port of the KLIPPEL Production Analyzer, disconnect the cables. The installation program will ask to connect the cables during the installation process.

Important Information for Windows XP:
You need administrator privileges to install the software.
The QC setup needs to modify entries in the local system registry.
If you don't have administrative privileges, ask your System Administrator for help.

安装程序将一步一步带领您完成软件安装过程。
确认您的计算机当前没有运行其他程序，尤其是 dB-Lab 的先前版本。

针对 KLIPPEL R&D System 客户的重要信息：

现在可以把 Klippel 测量系统的不同软件版本以单独的程序包安装和卸载。因而，可以在一台 PC 上同时安装和使用 Klippel QC 系统和一个或者更多个 R&D 系统。然而，它们不可以并行使用。更多细节请参见 dB-Lab 手册。

如果您已将 PC 和 KLIPPEL 产品分析仪 的 USB 或火线端口连接，请断开连接。安装程序将在安装过程中要求您连接。

针对 Windows XP 用户的重要信息:
您需要管理员给予权限来安装本软件。
QC 安装需要在本地系统注册表中修改条款。
如果您没有管理权限，请找系统管理员寻求帮助。

Installation

安装

1. Insert the Klippel Analyzer CD into your CD-ROM drive.
2. If the setup does not start automatically, choose Run… from the Start menu, enter D:\setup (where D: is the letter of your CD-ROM drive) in the dialog box, and click OK.
3. Follow the on-screen instructions.
4. During the installation you must calibrate the system. If you need more information for these steps, please refer to section *Hardware / Calibration / Check of Accuracy.*

1. 将 KLIPPEL 分析仪 CD 放入 CD-ROM 驱动器。
2. 如果安装程序没有自动运行，从开始菜单中选择 Run（运行），在对话框中输入 D:\setup（这里 D:是 CD-ROM 驱动器所在盘符）， 然后点击 OK。
3. 按照屏幕上的指示说明进行安装。
4. 在安装过程中必须要校正系统。如果您需要这些步骤的更详细的说明，请参见章节 *硬件/ Calibration* / Check of Accuracy。

Viewing results

查看结果

The QC example database
C:\Documents and Settings\All Users
Application Data\Klippel\QC\Examples\QC Examples.kdb
as well as any other database with measurement data created by the QC system can be viewed with the KLIPPEL dB-Lab software. This section describes how to view data with dB-Lab.

Note: For further information see also the separate dB-Lab manual. It is part of the online help (Press F1, while in dB-Lab).

QC 例样数据库
C:\Documents and Settings\All Users
Application Data\Klippel\QC\Examples\QC Examples.kdb
以及其他由 QC 系统创建的带测量数据的数据库均可使用 KLIPPEL dB Lab 软件来查看。本小节将介绍如何借助 dB-Lab 来查看数据。

注：更多详细信息也可参见单独的 dB-Lab 手册，它是在线帮助的一部分（在使用 dB-Lab 时，按 F1 键）。

Requirements

要求

With the QC software installation dB-Lab is already installed on your computer. To view a database on a computer with no QC system installed, you may download a free viewer version of dB-Lab from the website *www.klippel.de* .

在安装完 QC 软件之后，dB-Lab 也随之安装完毕。如需在一台没有安装 QC 系统的计算机上查看数据，您可到 *www.klippel.de* 网站下载一个免费的浏览版本。

What is a database?

什么是数据库？

Common to all Klippel Measurement Software is the concept to store all information of a test in one single (binary) file. This file is based on a database structure and contains the test setup, reference measurements, limits, results and so on. When copying the database, all information is transferred, there is no need to group or pack multiple files. Another benefit is the synchronization of setup and results by design, which always allows to investigate the setup for any result.

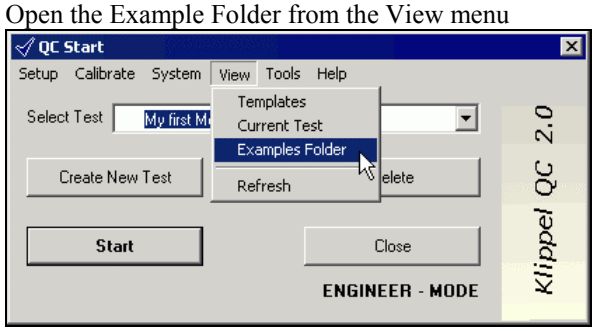
对于所有 Klippel 测量软件而言，一次测试的所有信息都被保存一个单独的（二进制）文件中。这个文件基于一个数据库结构并且包含了测试设置、参考测量、门限、结果等。当复制这个数据库，您就得到了所有的信息，不需要聚集或打包多个文件。另外的一个好处是通过设计使得设置和结果相同步，它允许查看任何结果的设置。

Viewing the Example database

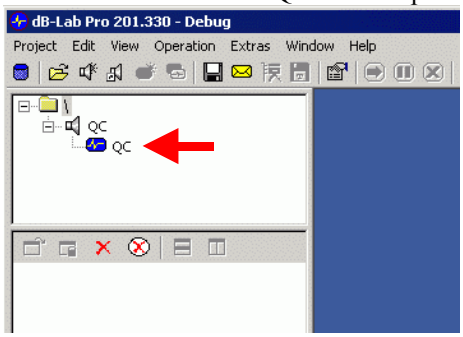
查看例样数据库

An easy way to open the Example database is:

1. Launch QC-Start (Engineer mode)
2. Open the Example Folder from the View menu



3. Double click on the QC Example.kdb file.
4. Select the root folder entry (\ on top of the list) and press OK, if *Open Project* dialog opens.
5. Double click on the blue QC icon to open the default windows.



6. Proceed with section *The Desktop* below for exploring data.

一个简单开启例样数据的方法：

1. 启动 QC 开始（工程师模式）。
2. 从视图菜单中打开例样文件夹。

（图略）

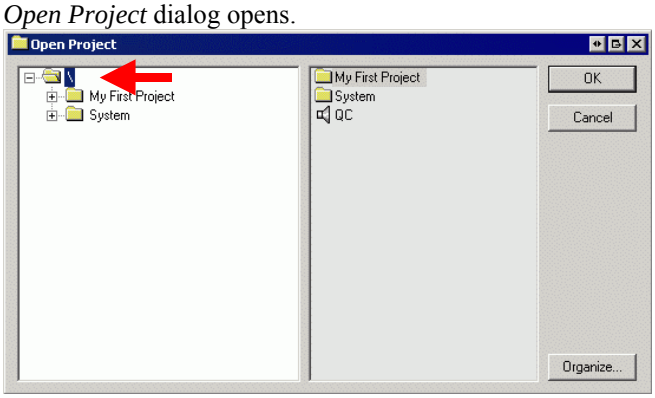
3. 双击 QC **Example.kdb** 文件。
4. 如果 *打开项目* 对话框开启，选择根文件夹入口（\ 在列表的最上方），按 **OK** 键。
5. 双击蓝色QC图标，打开默认窗口。
   （图略）
6. 要查看数据，请继续参阅以下章节 *The* Desktop。

How to open a database?

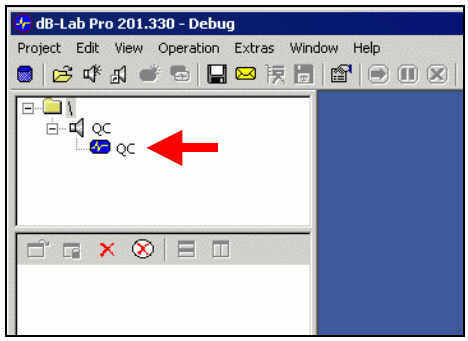
怎样开启数据库？

A dB-Lab database has the filename extension *kdb*. The simplest way to open a database is to double-click the database file in the windows explorer. dB-Lab will start and open the database automatically.

1. Select the root folder entry (\ on top of the list) and press OK, if *Open Project* dialog opens.



2. Double click on the blue icon (labeled QC) to open the default windows



3. Select other result windows from the Result Window List (see section *The Desktop* below), if required.
   You may export, print or change graphs.

dB-Lab 数据库的文件扩展名是 kdb。最简单开启数据库的方法就是在 Windows 资源管理器下双击数据库文件。这时 dB-Lab 将会自动运行并开启数据库。

1. 如果 *打开项目* 对话框开启，选择根文件夹入口（\ 在列表的最上方），按 **OK** 键。

（图略）

2. 双击蓝色图标（标有 QC），来打开默认窗口。

（图略）

3. 如有需要，从结果窗口列表中选择其他所需的结果窗口（参见下文 *The* Desktop ）。
   您可以导出、打印或更改图形。

How data is organized?

数据是如何组建的？

The database is organized like a file system. As in Windows, you have Folders, Files, and shortcuts. The "files" are objects that represent the tested driver. When you open a driver, you will see operations that have been or can be applied to them, and view the results of these operations.

QC databases consist of one operation only by default (QC/QC).

Elements	Definition
Folder (default: root)	Like a folder in the Windows file system a folder can contain files (objects), other (sub) folders, and shortcuts to other folders or objects. In dB-Lab Pro, they are used for project management. (not available in dB-Lab lite)
Objects (default: QC)	Represents the device under test
Operation (default: QC)	The term operation stands for any kind of measurement or calibration to produce or display data. The operation is applied to a given object and produces results as an output.
Result	The result is the output of an operation usually in numerical or graphical form. Besides display, the information can be exported to a report, the clipboard, or a file.

数据库像是一个文件系统。正如在 Windows 系统，您有文件夹、文件和快捷方式。“文件”是代表被测发声器的对象，当您打开一个文件，您可以查看它可运行的项目以及这些运行的结果。

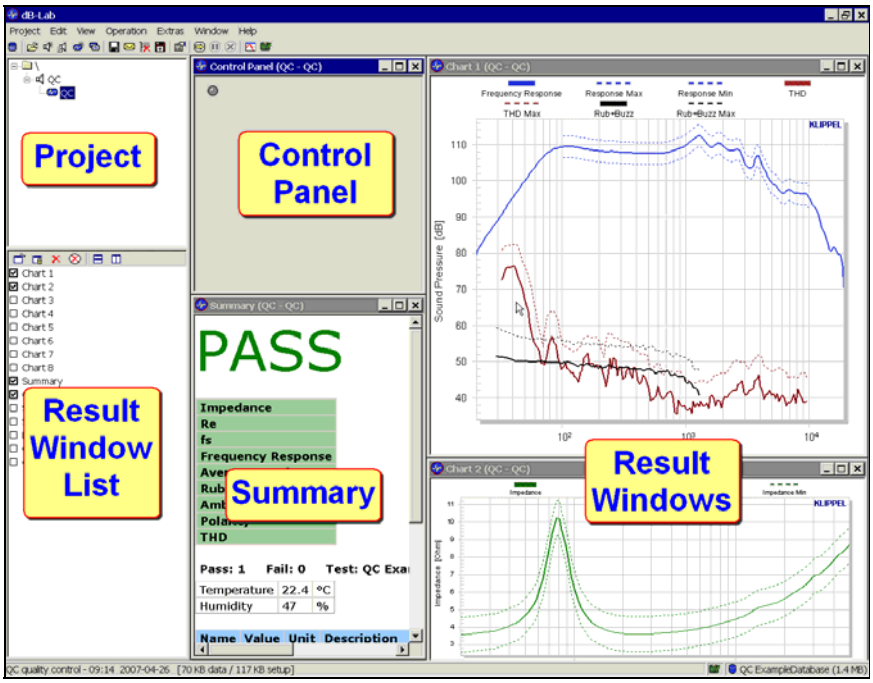
QC 数据库在默认情况下仅包含一个操作（QC/QC）。

元素	定义
文件夹 （默认：根）	就像 Windows 文件系统的文件夹一样，文件夹里面包含文件（对象）、其它（子）文件夹以及可以转到其它文件夹或文件的快捷方式。在 dB-Lab 专业版，它们用作项目管理。 （对 dB-Lab 普通版不适用）
对象 （默认：QC）	代表被测件。
操作 （默认：QC）	专业术语操作代表所有将产生或显示数据的测量或校正。操作针对于一个给定的对象，并产生作为输出的结果。
结果	结果是操作的输出，通常以数字或图形形式给出。除显示以外，信息还可以输出到一份报告、剪贴板或一个文件中。

The Desktop

桌面

The Desktop consists of the following elements (double-click the **QC** operation to open default result windows):



The **Project** pane displays a QC object with its operations. With the **Result Window List** you can manage the results (charts or tables) that are displayed in the **Result Window** area.

Note: A QC database normally contains only one driver object (QC) with one operation (QC). **Do not change the names 'QC'!**

桌面包含了以下元素（双击 QC 操作，打开默认结果窗口）：

（图略）

项目 板块显示了一个带操作的 QC 对象，通过 **结果窗口列表**，您可以管理这些结果（曲线或表格），这些结果显示在 **结果窗口** 区域。

注：一个 QC 数据包通常只包含一个单体对象（QC）（仅带一个操作（QC））。**请不要改变这些"QC"名字！**

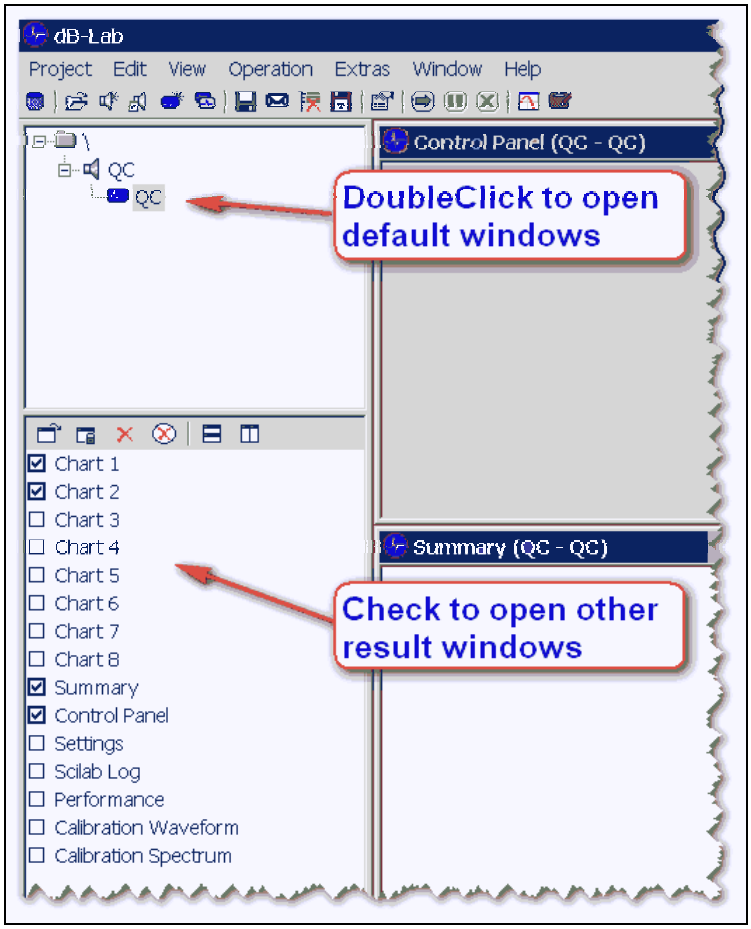
Viewing data

查看数据

The **Result Windows** show the measured curves (Frequency Response, THD, Rub&Buzz, Impedance) as solid lines. The corresponding maximal and minimal limits to each curve, that describe the allowed deviations of a good loudspeaker, are displayed as dotted curves.

1. Double-click the blue QC operation icon to open the default Result Windows

2. Check the related check box in the result windows list to open further windows.



The following windows can be displayed:

Result window	Content
Chart 1	Frequency response and all active distortion measures (THD, Rub & Buzz).
Chart 2	Impedance
Chart 3	Harmonic Distortion (single orders, THD)
Chart 4	Rub & Buzz crest factor, IDD performance measure
Chart 5	Phase
Chart 6	Spectra of voltage, current (impedance task)
Chart 7, 8	Not used
Summary	Output window for Pass / Fail information and details
Control Panel	Control elements for start/stop measurement (active in user mode only)
Settings	List of all test settings for reference when viewing
Scilab Log	Output of Scilab routines for debugging or logging. Intended use for programmable version only.
Performance	Time Analysis of the test.
Calibration Waveform	Result of internal synchronization and amplifier self test. For trouble shooting only.
Calibration Spectrum	Result of internal synchronization and amplifier self test. For trouble shooting only.

The **Summary Window** displays the test result (PASS/FAIL) and measured parameters like resonance frequency fs or DC resistance Re. In case of a

FAIL test result the parameter that hurts a limit is displayed red in the table below PASS/FAIL.

The **Control Panel** is deactivated since no user is logged in to the QC System. The panel contains control buttons (e.g. to start tests or to log out), if a user is logged in.

结果窗口 用实线显示被测得的曲线（频率响应、THD、异音、阻抗)。与之相对应，用虚线表示相对于每条曲线的最大门限值和最小值门限值，它们代表了一只好的扬声器所允许的误差。

1. 双击蓝色 QC 操作图标打开默认结果窗口。
2. 选择结果窗口列表中的相关项目（打勾）以打开下一级窗口。

（图略）

屏幕将显示以下窗口：

结果窗口	内容
曲线 1	频率响应和所有激活的失真测量 （THD 、 异音）。
曲线 2	阻抗
曲线 3	谐波失真（单个阶次，THD）
曲线 4	异音峰值因子，IDD 性能测量
曲线 5	相位
曲线 6,7,8	未使用
综述	输出窗口。显示通过/不合格信息和相关细节
控制面板	控制开始/停止测量元素（只在用户模式下有用）
设定	所有测试设置列表，为查看作参考
Scilab 日志	运行调试或登录用的 Scilab 子程式的输出。仅用于可编程版本。
性能	测试的时间分析
校正波形	内部同步和功放自我测试的结果。仅用于故障排除。
校正频谱	内部同步和功放自我测试的结果。仅用于故障排除。

摘要窗口 显示测试结果（通过/不合格）和所测量得到的参数，如谐振频率 fs 或直流阻抗 Re。当测试结果为不合格时，超过门限的各个参数将以红色字体显示在通过/不合格下面的表格中。

当没有用户登录 QC 系统时，**控制面板** 处于非激活状态；如果有用户登录，则控制面板显示控制按键（如开始测量、注销）。

Reports

报告

The dB-Lab Pro (part of the QC system) allows creating customizable HTML reports that contain the measured data. To learn more about the report tool, please refer to the dB-Lab manual.

dB-Lab 专业版（QC 系统的一部分）可允许创建包含测量数据的客户定制的 HTML 报告。需了解更多有关报告工具的信息，请参见 dB-Lab 手册。

First Measurement

初次测量

This section gives a step-by-step instruction how to setup the QC system for first time usage and how to perform the first measurement. It is

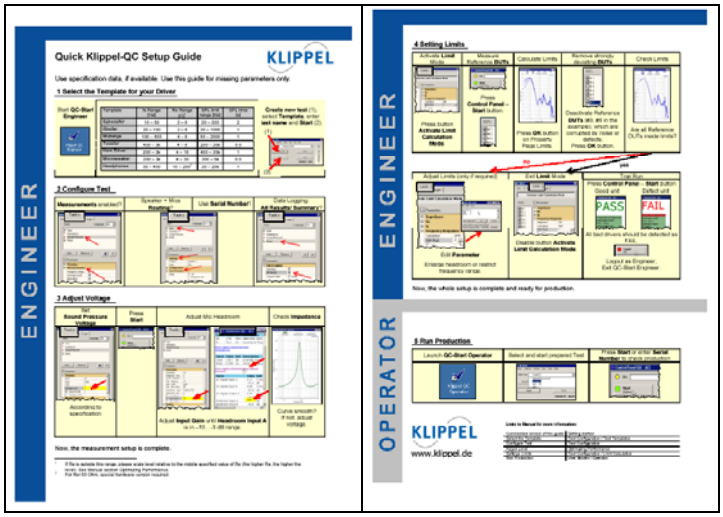
recommended to work through this section in order to check for a correct hardware and software setup.

本章将告诉您第一次使用 QC 系统时，如何一步一步设置系统并进行初次测试。建议您完成整个过程，以便核实是否正确安装好硬件和软件。

Quick Setup Guide

快速设置指南

There is a very concentrated instruction guide available that summarizes the usage of the Klippel QC System on two pages.



This guide is intended to be placed near the QC system for reference and for new users.

The next chapters describe all steps of this Quick Setup Guide in greater detail for a better understanding.

我们提供了一个 2 页纸的精简的操作指导，它概括了 Klippel QC 系统的使用方法。

（图略）

建议将该指南放在 QC 系统旁边，以便随时参考和新用户使用。

为了更好地理解，下面章节将更详细地描述快速设置指导的所有步骤。

Create a Test

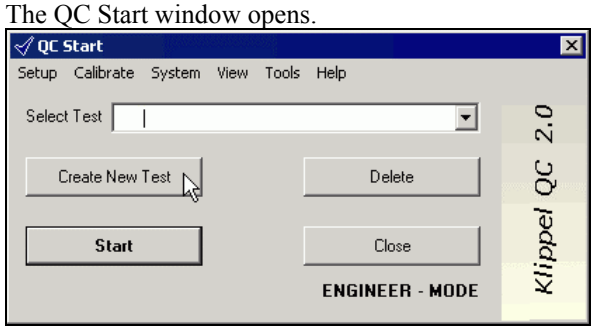
创建一个测试

1. Please follow the steps below. Start the QC-Start Tool in the engineer mode. Use the desktop icon

   or choose **Start/Programs/Klippel Analyzer/QC/QC-Engineer** from the Windows Start menu.

The QC Start window opens.



The drop down list *Select Test* contains tests, that are already set up for the production line.
No test is prepared yet so we have to create one.

2. Press button **Create New Test.**

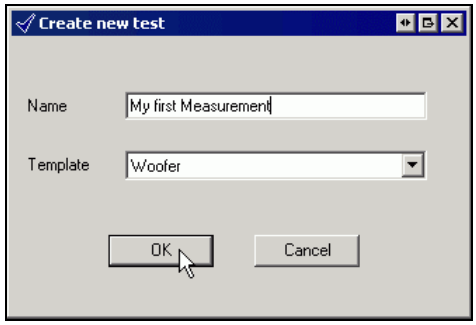
   Select a template according to the driver you want to test:

Template	fs range [Hz]	Re range [Ω][1]	SPL limit range [Hz]	SPL time [s]
Subwoofer	10 – 50	2 – 8	20 – 200	2
Woofer	20 – 150	2 – 8	20 – 1000	1
Midrange	100 – 500	4 – 8	50 – 2000	1
Tweeter	400 – 3k	4 – 8	200 – 20k	0.5
Horn Driver	200 – 2k	4 – 16	400 – 20k	1
Microspeaker	200 – 2k	4 – 30	200 – 5k	0.5
Headphones	30 – 400	10 – 200[2]	20 – 20k	1

3. In this example a woofer shall be tested.
   Select the template according to your particular test object.

   Note: For basic version users, you must select the fast version of the templates (with keyword fast in the template name). The standard template not supported in Basic version.

   Type in a test name ‘My first measurement’.

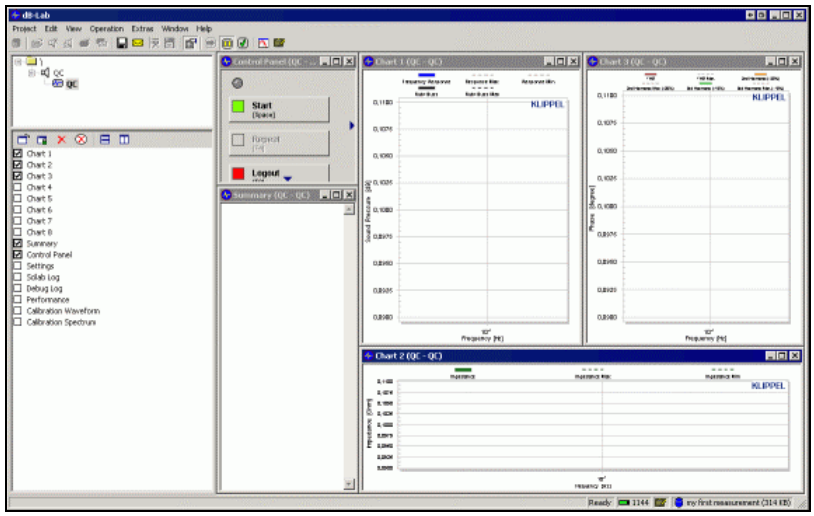


4. Press the **OK** button.

1 If Re is outside this range, please scale level relative to the middle specified value of Re (the higher Re, the higher the level). See Manual section Optimizing Performance.

2 For Re>30 Ohm, special hardware version required.

5. Press the **Start** button. The main program dB-Lab will open and a login dialog may appear (depending on your QC-system user administration). If required, log in in the engineer level.



1. 请遵照下列步骤。在工程师模式下开启 QC 开始工具。可使用桌面图标

   （图略）

   或者从 Windows 开始菜单选择： **Start/Programs/Klippel Analyzer/QC/QC-Engineer**

   QC 开始窗口打开：

   （图略）

   下拉式清单 *选择测试* 包含了为生产线准备的各种测试。

   由于还没有一个准备好的测试，因此我们需要创建一个测试。

2. 按 **创建新测试** 按键。

   依据你所要测量的发声器选择对应的模板：

模板	**fs 范围[Hz]**	**Re 范围 [Ω][3]**	**SPL 门限范围 [Hz]**	**SPL 时间[s]**
超低音扬声器	10 – 50	2 – 8	20 – 200	2
低音扬声器	20 – 150	2 – 8	20 – 1000	1
中音扬声器	100 – 500	4 – 8	50 – 2000	1
高音扬声器	400 – 3k	4 – 8	200 – 20k	0.5
号筒式扬声器	200 – 2k	4 – 16	400 – 20k	1
微型扬声器	200 – 2k	4 – 30	200 – 5k	0.5
头戴式耳机	30 – 400	10 – 200[4]	20 – 20k	1

1。如果 Re 在此范围之外，请按照 Re 值达到额定的中值调整测试电压（电阻越高，测试电压越高）。参见手册中章节 **优化性能** 。

2 当 Re 〉30 Ohm，需要使用特殊的硬件版本。.

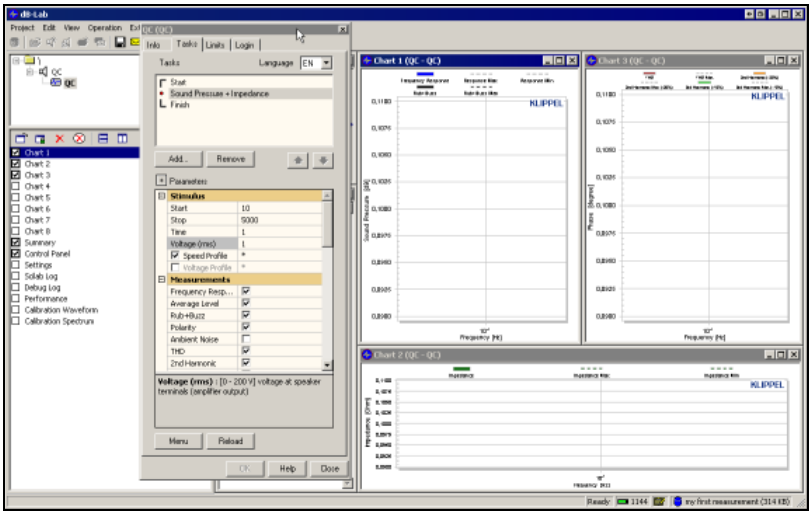
3. 在这个例子中，您将测试一个低音扬声器。
   根据您的这一特定测试对象选择对应的模板。

   注意：对于基本版的用户，您必须选择模板中的最快版本（在模板名字中用关键字快速）。基本版不支持标准模板。

   输入一个测试名“我的第一次测量”。
   （图略）
4. 按 **OK** 按键。
5. 按 **开始** 按键，dB-Lab 主程序将打开，出现用户登录对话框（取决于您的 QC 系统用户管理）。如果需要，请以工程师级别登录。
   （图略）

Configure Test
配置测试

After logging in the main screen is visible and a property page is opened up.



Note, that the Property Page in the foreground may hide the desktop partially. Just move the property page according to your needs with the mouse as indicatad.

Warning:
Don’t change the operation name "QC" in the project pane (top left) or on the Property Page "Info". The name must stay as "QC" for proper operation. The name of the test is used as database name (right bottom corner of the dB-Lab frame) for fast identification.

登录后出现主界面并有一个属性页面在其上面。
（图略）
注意：在前景的属性页面可能有一部分遮挡了桌面。您可根据您的需要用鼠标移动属性页面到您所指定的位置。

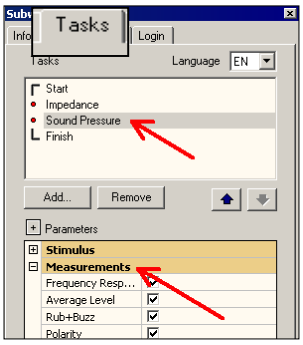
警告：
请不要改变左上端项目板块属性页面中“信息”中的 QC 操作名。为确保正确操作，必须保持“QC”操作名。为了快速识别起见，测试的名字被用作数据包的名字（在 dB-Lab 画面的最底部角上）。

Follow the steps to configure the test according to your needs:

Enable Measurements
开启测量

Check, if all measurement options are enabled that are required to be tested.

1. Select the page *Tasks* of the Property Page.
2. Select *Impedance* from the *Tasks* List (Top list of the Page).
3. Select section *Measurements* in the *Parameters* list (bottom list).



   En- / Disable the measurements you need.
4. Repeat this step for all tasks in the task list.

根据您的需要，请按以下步骤来配置您的测试：
请检查是否所有的测试必须的测量选项都可用。

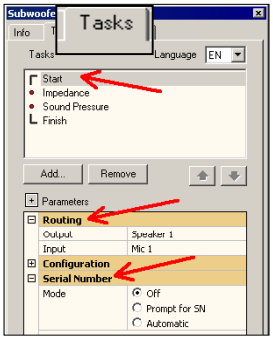
1. 选择属性页面中的 *任务* 页面。
2. 从 *任务* 列表（页面顶部列表）中选择 *阻抗* 。
3. 在 *参数* 列表（底部列表）中选择 *测量* 项目。
   （图略）

   开启/关闭您需要测量的项目。
4. 在任务列表中对所有的任务重复这一操作。

Set Routing and Serial Number Handling
设置线路和序列号处理

Set the hardware routing of the microphones and of the speaker channels and allow Serial Number prompt / barcode input according to your needs:

1. For both settings, open the page *Tasks* of the Property Page.
2. Select *Start* from the *Tasks* List (Top list of the Page).
3. Set the *routing* in the accordingly labeled section.
4. Set up *serial number* handling in the section *Serial Number*.
   You may use the barcode reader when configured as keyboard input device. See also section *Hardware / Accessories* for more details.



设置传声器的线路和扬声器通道，根据您的需要允许输入序列号字符或条形码输入：

1. 对两个设置，均须打开属性页面中的 *任务* 页面。
2. 从 *任务* 列表（页面顶端列表）中选择 *开始* 。
3. 在相应的标签区域中设置 *线路* 。
4. 在 *序列号* 区域中设置序列号处理。

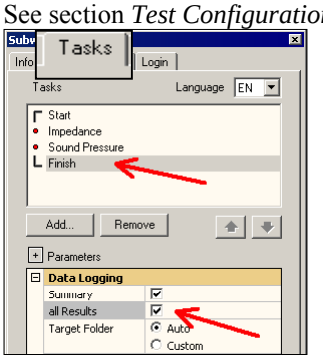
当作为键盘输入设备安装时，您可能使用条码读码器。更多细节请参见 *硬件/辅助设备* 。
（图略）

Set up result logging

设置结果记录

Set the options regarding data and result export / logging.

1. Open the page *Tasks* of the Property Page.
2. Select *Finish* from the *Tasks* List (Top list of the Page).
3. Set the export options in the section *Data Logging*.
4. See section *Test Configuration / Serial Number Handling* for details.



设置关于数据和结果导出和记录的选项。

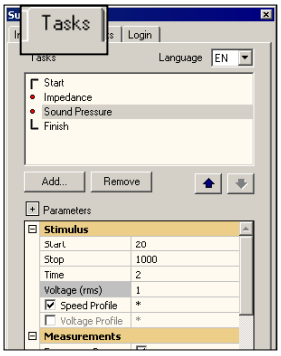
1. 打开属性页面中的 *任务* 页面。
2. 从 *任务* 列表（页面顶端列表）中选择 *完成* 。
3. 在 *数据记录* 区域中设置导出选项。
4. 更多细节参见章节 *测试配置/ Serial* Number Handling 。
（图略）

Adjust SPL Voltage and Frequency Range

调节SPL 电压和频率范围

These two parameters are most important for the SPL setup.
Check or adjust them carefully.

1. Open the page *Tasks* of the Property Page.
2. Select *Sound Pressure* from the *Tasks* List (Top list of the Page).
3. Set the Start and Stop frequencies.
4. Set the voltage of the test.
   Note, that this voltage is the terminal rms voltage of the driver.



SPL 电压和频率范围这两个参数对于 SPL 设置是最重要的。
检查并细心地调节这两个参数。

1. 打开属性页面中的 *任务* 页面。
2. 从 *任务* 列表（页面顶端列表）中选择 *声压* 。
3. 设置起始和终止频率。
4. 设置测试电压。

注意，这个电压是发声器末端有效值电压。
（图略）

Adjust the Microphone Headroom

调节传声器的动态余量

For Rub&Buzz testing it is strongly recommended to optimize the dynamic range of the input channel. This can easily be done by amplifying the input signal to fully exploiting the input range. Thus the best resolution is availbale for the reliable detection of even smallest defects and artefacts.

1. Press the *Start* button of the *Control Panel.*

2. Open / Select the Summary Window
3. Expand the HTML link *Show signal characteristics (sound pressure).* A table will be shown with the signal properties of the recorded signals. Look for the value in the line *Headroom Input A.*
4. This value should be between –10 and –3 dB (0dB corresponds to a full scale input).
   If not in this range, adjust the parameter *Input Gain 1* by the following rule:

   Add abs(*Headroom Input A* + 6dB) to *Input Gain 1* parameter.

   Or use the following table:

Headroom Input A	Add to Input Gain 1
0 dB (marked red) → overloaded input	Reduce Input Gain by 20dB!
-6	0 (Ok)
-20	14
-30	24
-40	34

Note: If the input headroom is below 30dB, it is strongly recommended to use a more sensitive microphone (for headphone and micropseaker testing). There are several options available.
See also section *Hardware / Accessories / Microphones*.

For more details, see section *Optimizing Performance / SPL Tests / Optimal Signal Noise Ratio (SNR).*

对于 Rub&Buzz（异音）测试，强烈推荐优化输入通道的动态范围。简单地通过放大输入信号至满量程即可达此目的。从而可以获得最可靠的检测所需要的最佳分辨率，它可以检测出最小的瑕疵和不良品。

1. 在 *控制面板* 上按 *开始* 按键。
   （图略）
2. 打开/选择摘要窗口。
3. 扩展 HTML 链接 *显示信号特性（声压）*。显示一张带有记录信号属性的表格。在 *动态余量输入 A* 中查找其数值。
4. 该数值应该在-10 和-3dB 之间（0dB 对应一个满量程输入）。
   假如不在此范围内，请按下列规则调整参数 *输入增益 1* 。
   加 绝对值（*动态余量输入 A*+6dB）到 *输入增益 1* 。
   或者使用下表：

动态余量输入 A	增加输入增益 1
0 dB（变红色）→输入过载	减小输入增益 20dB!
-6	0 (Ok)
-20	14
-30	24
-40	34

注：假如输入动态余量低于 30dB，我们强烈建议您使用一只更加灵敏的传声器（用于耳机和微型扬声器测试）。
这里有几个可供选择。
也请参见章节 *硬件/配件/Microphones*。

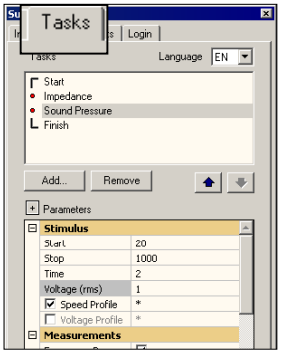
更详细细节请参见章节 *优化性能/SPL 测试/ Optimal Signal Noise Ratio (SNR)*。

Adjust Impedance Voltage and Frequency Range

调节阻抗电压和频率范围

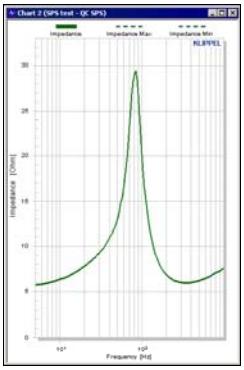
These two parameters are most important for the impedance setup. Check or adjust them carefully.

1. Open the page *Tasks* of the Property Page.
2. Select *Impedance* from the *Tasks* List (Top list of the Page).
3. Set the Start and Stop frequencies.
4. Set the voltage of the test.
   Note, that this voltage is the terminal rms voltage of the driver.



5. Press the *Start* button of the *Control Panel.*

6. Open Result Chart 2. Check the impedance curve smoothness.



If the curve is noisy, please refer to section *Optimizing Performance / Impedance / How to find optimal excitation level and time* for further adjustment and optimization.

When finishing this step, the complete measurement parameters are adjusted correctly.

电压和频率 这两个参数对于阻抗设置是最重要的。
请小心地检查和调节两者。

1. 打开属性页面中的 *任务* 。
2. 从 *任务* 列表（页面顶端的列表）中选择 *阻抗* 。
3. 设置起始和终止频率。
4. 设置测试的电压。
   注意，这个电压是发声器末端有效值电压。
   （图略）
5. 按 *控制面板* 上的 开始 *按键*。
   （图略）
6. 打开结果曲线 2，检查阻抗曲线的平滑度。
   （图略）
   如果阻抗曲线有毛刺，请查阅章节 *优化性能/阻抗/怎样找到最佳的激励电平和时间* 以取得进一步调整和优化。

当完成这一步骤，整个测量参数就正确调整好了。

Limit Setting

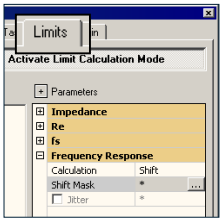
门限设置

Once the measurement parameter setup is finished, the limits can be set. The following sections describe the limit calculation based on measured reference DUTs. This is the easiest way to get consistent and reliable limits.

一旦完成测量参数的设置，可以开始设置门限了。
以下章节将描述基于多个被测的参考 DUT 生成门限的方法。这是获得一致和可靠门限的最简单方法。

Measure Reference DUTs

测量参考 DUT

1. Open the page *Tasks* of the Property Page.
   Press the button *Activate Limit Calculation Mode*.
   

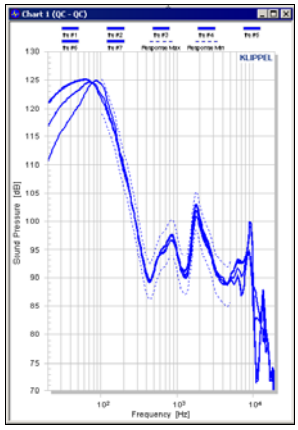
2. Press Control Panel – Start button.
   

   The Reference Units (DUTs) are measure now.

Note: In the Basic version only one Reference DUT is supported. Please skip the following steps referening to multiple reference DUTs.

3. Press the **OK** button on the Property Page *Limits* to calculate the limits.
4. The results of all reference DUTs are shown in the result chart as well as the calculated limits. The example shows the fundamental

SPL curves of the reference DUTs.



1. 打开属性页面中的 *任务* 。
   按 *激活门限计算模式* 按键。
   （图略）
2. 按控制面板上的 *开始* 按键。
   （图略）
   现在开始测试参考单元（DUT）。

注意：在基本版中只支持一个参考 DUT。请跳过下面的几个步骤，它们是用于多个参考 DUT 的测量。

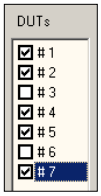
---

3. 按属性页面 *门限* 中的 **OK** 键来计算门限。
4. 所有参考 DUT 的结果和计算得到的门限都显示在结果曲线中。下面的例子给出的是多个参考 DUT 的基频 SPL 曲线。
   （图略）

Remove strongly deviating DUTs

剔除偏差很大的 DUTs

When measuring multiple Reference DUTs, it might happen that the tests are corrupted by Ambient Noise or that other failures cause invalid results. In this case simply disable the invalid reference tests from the DUT list:



You may label the reference DUTs with an entered serial number string to separate multiple *Golden Units*. For more information, refer to section *Test Configuration /*

Reference Units.
Press the **OK** button on the Property Page *Limits* to recalculate the limits.

当测量多个参考 DUT 时，有时会发生测试被环境噪声干扰或者其他故障导致产生无效结果。在此情况下，可简单地从 DUT 清单中关闭无效的测试：
（图略）

为区分多个 *黄金单元*，您可以用一个输入序列号标记参考 DUT。更多信息请参考章节 *测试配置/*

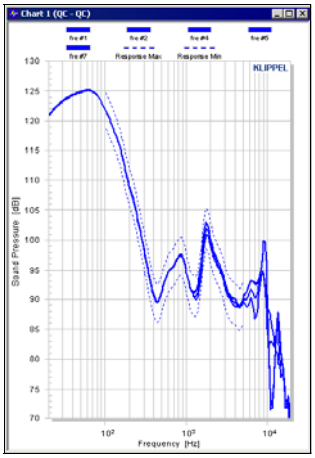
Reference Units 。
按属性页面中的 *门限* 中的 **OK** 键来计算门限。

Check and Adjust Limits

检查和调整门限

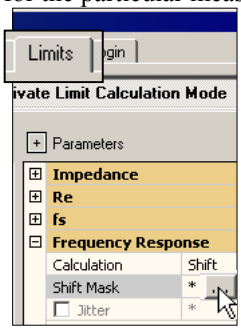
Now, the results of all reference DUTs are shown in the result chart as well as the calculated limits. The example shows the fundamental SPL curves of the reference DUTs.

After removing the strongly deviating DUTs, the example reference DUTs are all within the tolerance range of the SPL measure.

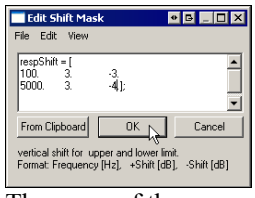


However, it could be required to modify the default limits:

1. Make sure the Limit Mode is activated. The Button *Activate Limit Calculation Mode* must be pressed on the Property Page *Limits*.
2. Select from the *Parameters* List the measure, for that the limit settings shall be changed. To each measure an own section is assigned.
3. Press the (+) sign left of the section to expand all settings applicable for the particular measure.



Modify the parameters. Note, that for some parameters a new window for entering the values (matrices) must be opened as indicitad above:



The name of the parameter may be ommited. Just enter the numbers, separate values by a *Space* and lines by *Enter*.

See section *Optimizing Performance* for more information on the settings.

4. Exit the Limit Mode.
   Release the button *Activate Limit Calculation Mode.*

现在，所有参考 DUT 的结果和计算得到的门限都显示在结果曲线中。下面的例子给出的是参考 DUT 的基频 SPL 曲线。

剔除偏差很大的 DUT 后，例子中的所有参考 DUT 的 SPL 曲线均在测量允许范围内。
（图略）
然而，有必要修改缺省门限：

1. 确保门限模式被激活。在属性页面 *门限* 中按下 *激活门限计算模式* 按键。
2. 在 *参数* 列表中选择要测量的参数，这样门限设置应该要改变，要为每一个测量分配一个特有的区域。
3. 按区域左边（+）号展开针对这一特殊测量可用的所有设置。
   （图略）
   修改参数。注意，如上图所示，对于某些参数您必须打开一个新的窗口来输入数值（数列）。
   （图略）
   参数的名字可以省略。只要输入数字，用空格键来分隔数值，用回车键来换行。

   更多有关设置的信息请参见章节 *优化性能* 。

4. 退出门限模式。
   释放 *激活门限计算模式* 键。

Trial Run
试运行

It is good practise to check the measurement and limit setting on a selection of DUTs. Make sure that all defect drivers are detected accordingly.

Note: If the test fails, check the measure that failed from the list in the summary result window (red marked items). It may be required to widen up the limits or to restrict the frequency range of these limits. More details you may find in the section *Test Configuration / Limit Calculation*.

After the successful Trial Run the system is configured correctly and the test may be used in the Production Mode.

在多个 DUT 中选出一个良品作为检查测量结果和门限设置的标准的做法是个好习惯。请确保所有有缺陷的发声器被相应地检测出来。

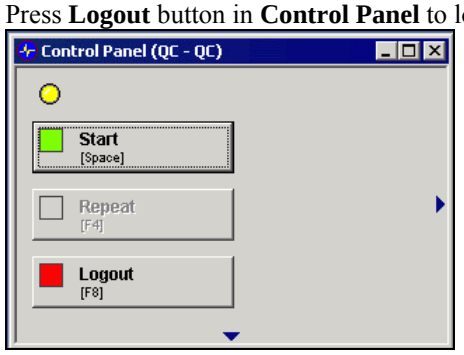
注意：如果测试不合格，请检查在综述结果窗口中表明失败的测试（用红色标识的条目）。也许您需要放宽门限，或缩小这些门限所对应的频率范围。更详细的信息请您参见 *测试配置/ Limit* Calculation 。

在一次成功的试运行之后，QC 系统已完成正确配置，测试可在生产模式下使用。

Logout
注销

To log out and shut down the QC system proceed as following:

1. Press **Logout** button in **Control Panel** to log out.



2. When the dB-Lab software is not automatically closed, open the **Project** menu and choose **Exit** to shut down the QC system or press {ALT-F4}.

Note: The QC system can be set up to close dB-Lab automatically after logging out. For details, see section *Organizing Projects / QC Start Configuration*.

请参照下列步骤注销并关闭 QC 系统：

1. 请按 *控制面板* 中的 *注销* 按键注销。
   （图略）
2. 当 dB-Lab 软件未自动关闭时，请打开 *项目* 菜单，选择 *退出* 或按 Alt+F4 键关闭 QC 系统。

注意： QC 系统可被设置为在注销后自动关闭 dB-Lab。更多细节请参见 *组织工程 / QC* Start Configuration 。

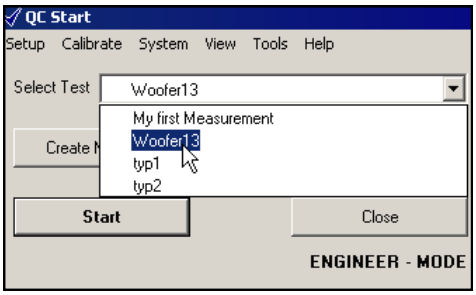
Run Production

运行产品

While the set-up of the system needs some background information about the driver (DUT) and the Klippel QC system, the Production Mode is intuitive and minimalistic.

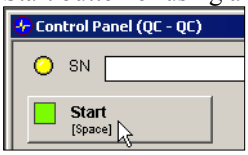
1. Simply double click on the icon Klippel QC Operator.

2. Select a prepared Test from the QC-Start *Select Test* – list.
   All tests configured according to the above sections are listed and are ready for production.
   Select for example the prepared test "My first Measurement".



3. Press the Start Button.
   dB-Lab will be opened and a login dialog may appear (depending on your QC-system user administration). If required, log in in the operator level with login and password.

4. Start testing simply by entering a serial number or pressing the Start button or using an external foot switch.



5. After testing logout from dB-Lab and close QC-Start.

For more information on the Operators point of veiw, please refer to section *User Modes / Operator*.

在进行系统设置时需要一些有关发声器（DUT）和 Klippel QC 系统的背景信息，生产线模式的设置是最直观，并且设置参数是最少的。

1. 简单地双击 Klippel QC 操作员图标。
   （图略）
2. 从 QC 开始界面中的 *选择测试* 列表中选择一个已配置好的测试。
   对应于以上章节的所有测试的配置都已经设置好，可以直接运用于生产线的测试。
   选择“我的第一次测量”这个配置好的测试作为例子。
   （图略）
3. 按开始按键。
   dB-Lab 被打开，弹出登录对话框（取决于您的 QC 系统用户管理方式）。如果需要，请用登录名和用户密码登录 QC 系统的操作员模式。
4. 输入序列号或按开始按键，或者使用外部的脚踏板开关就可以简单地开始测试。
   （图略）
5. 测试完成后，退出 dB-Lab，并关闭 QC 开始。

要了解更多关于操作员模式的信息，请参阅章节 *用户模式/ Operator*。

Before use in production

生产应用须知

Before using the QC system in the production process we strongly recommend to do an 8-hour performance test of the system in the production environment by means of the QC Performance Test tool.

Due to stability requirements of a production environment, and the flexibility and fast operation of the Klippel QC System, the PC needs a sufficient performance to run the software. The QC Performance Test tool helps to evaluate whether a PC can run an uninterrupted QC Test, and can give some troubleshooting hints.

Note: Do not use the PC for other purposes during the test. Depending on the hardware configuration, the PC may appear unresponsive for minutes. You can click **STOP** anytime to cancel the test, but cleanup may still take a while.

---

1. Install the QC System in the production environment.
2. Open the QC-Start Tool in the engineer mode (choose **Start/Programs/Klippel Analyzer/QC Start (Engineer)**)
3. Choose **QC Performance Test** from the **System** menu.

The QC Performance Test tool is started.

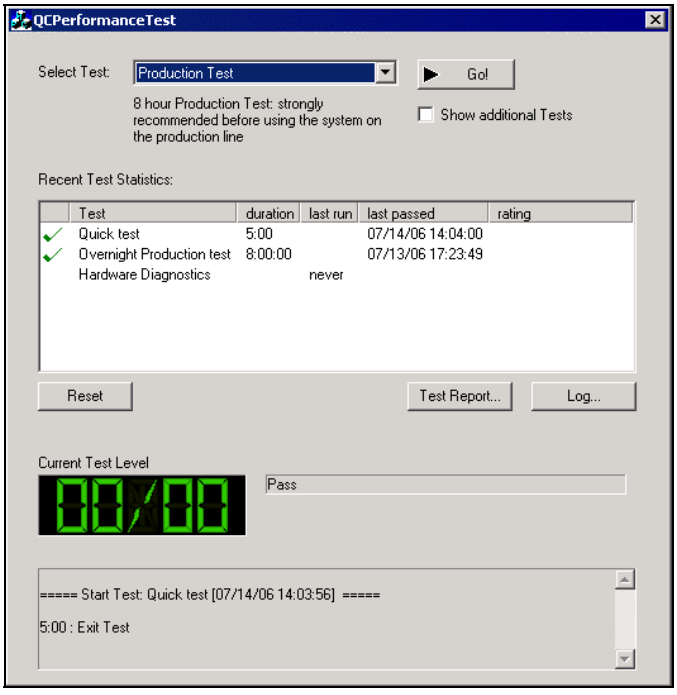
4. Select **Production Test** in the **Select Test** box.
5. Press button **Go.**

While the test is running the LED-style indicator shows the errors that occurred during the test. For a good system, no error should occur.

There are two types of errors shown: "Sync error" and "BCO error". Normally, hardware problems cause only "BCO errors", while performance problems cause both types of errors.

Click **Report** to show a report of the last test or test sequence. For a longer history, click **Log…** to show the log file.

If errors occur during the test, see chapter troubleshooting how to identify them and fix the problem.



在将 QC 系统用于生产过程之前，我们强烈建议您借助 QC 性能测试工具，在产线环境下对系统进行 8 小时的性能测试。

由于产线环境下 QC 系统的稳定性、可靠性和快速作业的要求，建议采用性能足够好的 PC 机来运行软件。QC 性能测试工具可以帮助您评估您的 PC 机是否可以进行连续的 QC 测试，并给出一些排除故障的建议。

注意：在测试过程中，请不要用这台计算机做其他事情。根据硬件的配置，计算机可能会出现数分钟程序无响应状态。您可随时点击 **停止** 来取消这个测试，但重启也依然需要一段时间。

1. 在生产环境中安装 QC 系统。
2. 在工程师模式打开 QC 开始工具。

   （选择 **Start/Programs/Klippel Analyzer/QC Start (Engineer)**）
3. 从系统菜单中选择 **QC 性能测试** 。

   开始运行 QC 性能测试工具。
4. 在 **选择测试** 栏中选择 **产线测试** 。
5. 按 **Go** 按键。

在测试运行过程中，LED 指示灯将会显示测试运行过程所产生的错误。对于一个好的系统来说，应该不会有错误产生。

系统会有 2 种错误形式：“Sync 错误”和“BCO 错误”。一般来说，硬件问题只会导致“BCO 错误”，而性能问题则会导致 2 种错误。

点击 **报告** 可查看到上一次测试报告或测试序列。要想查看更多的历史记录，点击 **Log...**，以查看日志 文件。

如果在测试中出现错误，请参见章节故障诊断， 以鉴别问题所在并加以解决。

（图略）

How to go on (working with the manual)

如何继续使用本手册

Once the KLIPPEL QC System is installed and checked, you should make yourself familiar with the system.

As an **Operator** you should now read chapter *User Modes / Operator.*

As an **Engineer** you should read the chapter *Organizing Projects.*

If you need more information about the user interface, you should read the chapter *User Modes.*

If you need information how to setup a measurement, you should read the chapter *Test Configuration*

It is strongly recommended to read the contents of the manual carefully. This way you'll have at least the headlines in mind, when using the system.

一旦安装并检测了 KLIPPEL QC 系统， 您应尽可能地熟悉该系统。

作为**操作员**，您应该阅读 *用户模式* 中的 *Operator* 。

作为**工程师**，你应该阅读 *组建项目* 。

如果你需要获得更多的关于用户界面信息，请应该阅读 *用户模式* 。

如果你需要了解如何进行测量设置，请应该阅读 *测试配置* 。

我们强烈建议你仔细的阅读本手册的内容。这样，当您使用本系统时，您的脑海至少会有一些概念和线条。

Organizing Projects

组织工程

Overview

概要

The QC-Start tool is the central interface to start and create tests, to access calibration procedures and to determine if and how the QC System is started after a Windows restart. This chapter describes how to use the QC-Start tool as an engineer and how to work with templates.

The section *QC-Start INI File* shows how to change default storage locations and how to modify the behavior of the QC-Start tool.

The section *dB-Lab* explains the differences between the usages of dB-Lab in the QC System compared to the KLIPPEL R&D measurement system. This is for people who already use the KLIPPEL R&D system and want to operate the QC system now.

QC 启动工具是 QC 系统软件的中心界面，该界面包括开始和创建测试、进入校准程序以及决定当 Windows 操作系统重新启动后 QC 系统是否需要开始和如何开始。本章描述作为工程师应如何使用 QC 启动工具和如何使用模板。

QC 启动 INT 文件 小节告诉您如何改变默认的存储位置和如何修改 QC 启动工具的运行状态。

dB-Lab 小节阐明了在 QC 系统中使用 dB-Lab 与 KLIPPEL R&D 测量系统的差别。这是针对已经使用了 KLIPPEL R&D 系统而现在要操作 QC 系统的人而做的。

QC-Start Tool

QC 启动工具

Start up

开始

The QC-Start tool can be started in two different modes:

1. In the Operator Mode it is used to select and start a certain test setup.
2. In the Engineer Mode it can be used additionally to
   - create / delete a test setup
   - start the system calibration
   - managing Master Tests
   - managing access rights of operator

Both operating modes of the QC can be easily started using the icons

on the desktop or using the **Start** menu items:

- **Start/Programs/Klippel Analyzer/QC Engineer**
- **Start/Programs/Klippel Analyzer/QC Operator**

可以在两种不同模式下开启 QC 启动工具：

1. 在操作员模式下，QC 启动工具可用于选择和启动某个特定的测试设置。
2. 在工程师模式下，QC 启动工具可以同时用于：
   -创建/删除一个测试设置
   -启动系统校准
   -管理主测试
   -管理操作员的进入权限

使用桌面上的图标

（图略）

或者 **开始** 菜单中的下列项目可简单地开启两种 QC 操作模式：

- **开始/程序/Klipel 分析仪/QC 工程师。**
- **开始/程序/Klipel 分析仪/QC 操作员。**

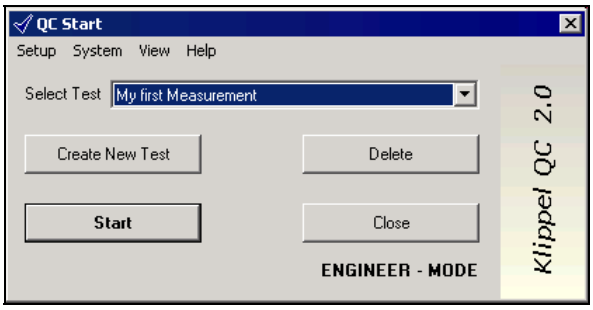
Create / Open a Test Setup

创建/开启一个测试设置

The QC-Start should be used to open, create, delete or start a test. Any test should be created from a template.

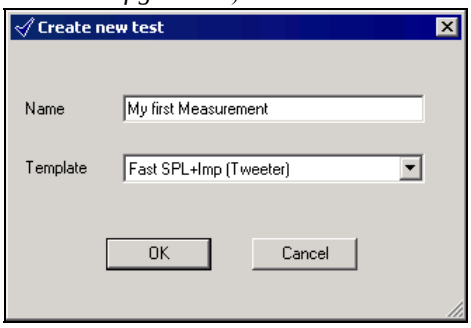
Open an existing test setup

1. Open the QC-Start Tool in the engineer mode (choose **Start/Programs/Klippel Analyzer/QC-Engineer**)
2. Select a test from the drop-down box **Select Test**.
3. Press **Start** button and log in as ‘Engineer’



Create a new test

1. Open the QC-Start Tool in the engineer mode (choose **Start/Programs/Klippel Analyzer/QC-Engineer**).
2. Press button **Create New Test**.
3. Select a template from the drop-down box **Template**.
4. Type in a unique name for the test.
5. Press **OK** button.
6. Press **Start** button and log in as 'Engineer'.
7. Set up test tasks, generator and limits (see chapter *Test Configuration*)



可以用 QC 启动工具用来打开、创建、删除或者开始一个测试，任何一个测试应该由一个模板来创建。

打开一个存在的测试设置

1. 在工程师的模式下打开 QC 启动工具（选择 **Start/Programs/Klippel Analyzer/QC-Engineer**）。
2. 从下拉框 **选择测试** 中选择一个测试。
3. 按 **开始** 按键，以“工程师”身份登录。

（图略）

创建一个新的测试

1. 在工程师的模式下打开 QC 启动工具（选择 **Start/Programs/Klippel Analyzer/QC-Engineer**）。
2. 按 **创建新的测试** 按键。
3. 从下拉框 **模板** 中选择一个模板。
4. 为该测试输入一个唯一的名称。
5. 按 **OK** 按键。
6. 按 **开始** 按键，以“工程师”登录。
7. 设置测试任务、发生器和门限（参见章节 *测试配置* ）。

（图略）

Delete a test

删除一个测试

1. Select the Task to be deleted.
2. Press button **Delete**.
3. Confirm to remove the task from the list.

Note: Pressing the **Delete** button only deletes a test from the **Select Test** box. It does not delete the corresponding database on the hard disk.
As a consequence, a deleted name cannot be used again, since the data is

still available on the hard disc.
You have to permanently delete a test to use a test name again (see below).

Permanently delete a test

If you want to permanently remove a test and all connected data you must additionally to the procedure “Delete a test” above delete or move the data folder associated to this test.

1. Before deleting the test from within the QC Start tool, select *View / Current Test* from the QC-Start menu. An Explorer instance of the data folder will be opened.
2. Use the Explorer functions to delete or to move the data.
   You must remove the folder name from the Test-folder to use this test name again.

1. 选择要删除的任务。
2. 按 **删除** 按键。
3. 确认从列表中去除任务。

（图略）

注：按 **删除** 按键仅从 **选择测试** 框中删除一个测试。它并被没有删除硬盘中对应的数据包。
因此，被删除的名字并不能再使用，因为该数据在硬盘中依然有效。
为了再次使用一个测试名称，您必须永久删除一个测试（见下文）。

永久删除一个测试

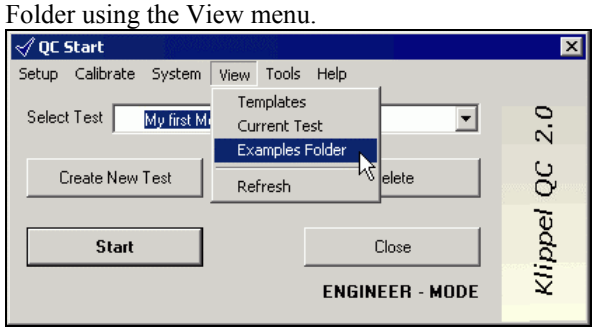
如果您想永久地移除一个测试及所有相关的数据，您必须删除或去掉与该测试相关的数据文件夹。

1. 在使用 QC 启动工具删除一个测试之前，从 QC 启动菜单中选择 *查看/当前测试* 。一个数据文件夹将被打开。
2. 使用资源管理功能来删除和移动数据。
   为了再次使用测试名字，您必须从测试文件夹中去掉该文件夹的名字。

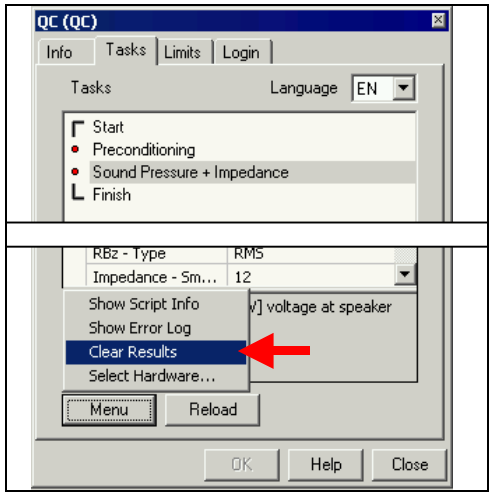
Create a template
创建一个模板

Once you have set up a certain test, you can save it as a template. A template stores the test sequence with generator and limit calculation settings. It must not contain reference DUT or measurement data. Follow the steps to prepare and save a test setup as a template:

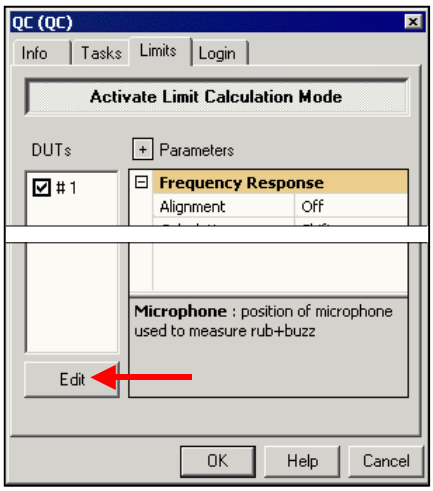
1. Open the test setup you want to store as a template (see section above).
2. Store database using the *Export Selection* Icon  button in the dB-Lab icon toolbar. Specify as target the template directory. The default directory is
   C:\Documents and Settings\All Users\Application Data\ Klippel\QC\QC\templates
3. Logout from the system, go back to QC-Start. Open the Templates Folder using the View menu.



4. Open the database by double-clicking the stored database in the explorer window. Press OK, if the *Open Project* dialog pops up.
5. Click on the **QC** operation.
6. Log in to the QC System by pressing the button from the dB-Lab icon tool bar. If not already available, open the property window by pressing the button. Click on the Property Page Tasks and select **Clear Results** from the Menu.



7. Click on the Property Page **Limits** and activate the **Limit Calculation Mode**. Delete all DUTs by pressing the **Delete All** button.



8. Log out by pressing the **Logout** button in the **Control Panel**.
9. Exit dB-Lab by choosing **Exit** from the **Project** menu.
10. It is good practice to compress the created template to minimize disc space. In the Explorer Window click with the right mouse button on the template – database and select *Compact Database*.

The template is now available from the test list within the QC-Start software.

一旦您建立了一个特定的测试，您可以将它作为模板来保存。一个模板保存了一个带有发生器和门限计算设置的测试序列。它肯定不包含参考 DUT 或测量数据。按照下列步骤来准备和保存一个当作模板的测试设置：

1. 打开您想要作为模板存储的测试设置（见上文）。

2. 用 **dB-Lab** 图标工具栏中的输出选择图标 按键来储存数据包。指定模板的路径，默认的是 *C:\Documents and Settings\All Users\Application Data\Klippel\QC\QC\templates*
3. 退出系统，返回到 **QC** 启动界面，用查看菜单打开 模板文件夹。
（图略）

4. 在资源管理器窗口中双击存储的数据库以打开数据库。如果弹出 *打开工程* 对话框，请按 **OK**。
5. 点击 **QC** 运行。
6. 在 **dB-Lab** 图标工具栏中按按键，登录 QC 系统。如果不可用，则请按 按键以打开属性窗口。点击属性页面任务，从菜单中选择 **清空结果** 。
（图略）

7. 点击属性页面 **门限**，激活 **门限计算模式** ，按 **清除全部** 按键来清除所有的 DUT。
（图略）

8. 在 **控制面板** 中按 **注销** 按键退出系统。
9. 在 **工程** 菜单里选择 **退出** 来退出 dB-Lab。
10. 把创建的模板压缩到最小硬盘空间是个好习惯。在资源管理器窗口中，用鼠标右键点击模板-数据库并选择 *压缩数据库* 。

现在在 **QC** 启动软件中的测试列表中，模板可以使用了。

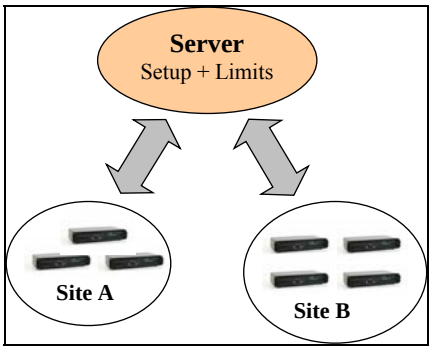
Synchronizing multiple QC Systems (Master Tests)

同步多个 QC 系统（主测试）

When multiple systems are used to test the same driver type, it is highly desirable to have identical setups and limits. This can be achieved using the Master-Template functionality.

Not only lines at one location but also multiple factories can be synchronized using that technique.

The basic idea is to have a central folder (Server) in the network, were the Master tests are stored. Master Tests are simply databases with setup and limits stored at a specific place.



At each start of a test with enabled Master function, the Master Test from the server location will be copied to the test folder. So it is guaranteed that the test is running using the latest version on the server. An update of the test configuration for all lines can be done globally with much less effort than updating each QC-System.

A special function supports the modification or update of the Master-Template.

This can be done from each connected QC-System or even from a remote computer with network access.

当使用多个系统测试同一类型的发声器时，非常值得使用相同的设置和门限。采用主模板功能即可实现此目的。
使用该技术不仅可以同步同一地方的多条生产线，而且也可同步多个工厂的生产线。

基本的思路是在网络上设立一个中心文件夹（服务器），该文件夹中存储了主测试。主测试也就是存储在指定位置的包含设置和门限的数据库。
（图略）

当每次带有主测试功能的测试开始时，来自服务器位置的主测试都将复制到测试文件夹中。这样就保证了服务器上是使用最新版本来运行测试的。这样相对于在全球范围内更新每个 QC 系统，在线更新测试配置减少了相当多的工作量。

一个特殊的功能支持修改和更新主模版。
每个连接网络的 QC 系统，甚至一台带有网络连接的地处边远地区的计算机也可完成此功能。

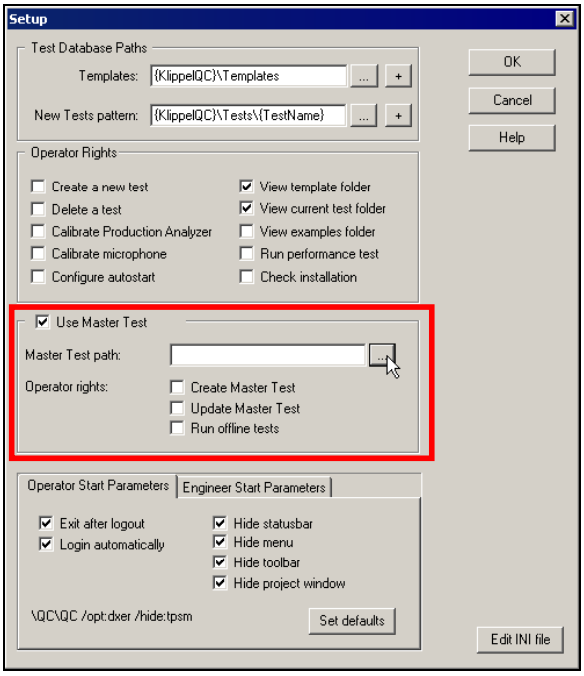
Using Master Tests

使用主测试

To activate the Master function for a test, this Test must be created based on a Master Test.

First, the Master-Template folder location on the Template-Server must be configured.

Open QC-Start and select Setup / Edit Settings. The configuration property page will be opened.



Click on the Browse button to select a folder on the Template Server (on the network in most cases).

Then define the operator rights regarding the Master Tests. The QC-Engineer has all rights by default while the operator needs the rights to be granted here.

为一个测试而激活主功能，该测试必须基于一个主测试而创建。
首先，必须配置模板服务器上的主模板文件夹。
打开 **QC** 启动，选择设置/编辑设定，则配置属性页面被打开。
（图略）

点击 **Browse** 按键，在模板服务器（很多情况是在网络上的）中选择一个文件夹。
然后根据主测试定义操作员权限。默认情况下，QC 工程师拥有所有的权限，而操作员需要授权才可以。

Create a Master Test

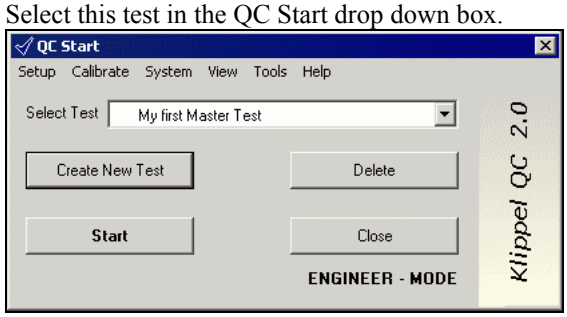
创建主测试

Follow the instructions below to create a master test on a server.

1. Set the *MasterPath* to a valid network path.
   Decide, which access rights are granted to the operator (the engineer has all rights by definition):
   AllowCreateMaster: Operator may create a new Master Test on the server.
   AllowUpdateMaster: Operator may update existing Master Test on the server.
   CanRunOfflineTests: Operator may start test which is connected to a Master Test, but the network connection is not working.

   The default setting is *Disabled* for all Operator rights.

2. Create a local test which shall be connected to the server. Please refer to section *Create a template* above.
   Select this test in the QC Start drop down box.



Note: Make sure, that the specified folder for storing test results is available on all computers that should run this test. This must be ensured, when the *Target Folder* is set to *custom* (please refer to section *Storing Results / File Location*).

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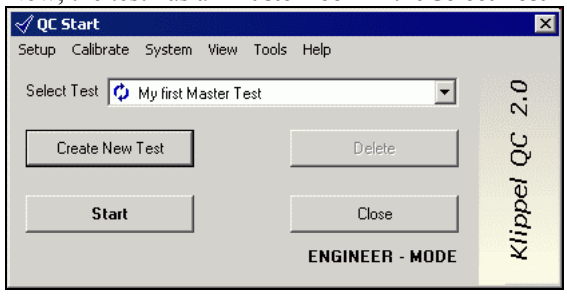
3. Select from the Menu Tools / *Create Master*. Confirm the question *Start creation of the master?*. The successful operation will be confirmed.
   Now, the test has an *Master Icon* in the *Select Test* list:



The blue icon  shows, that the server is online and that the connection has been established. When the server is offline, there is a red mark  .
Depending on the setting of the *CanRunOfflineTests* option (see above), the test can be executed or not. A warning is always displayed in this case.

4. The test can now be started as usual. Now, a copy from the server is made in the current test folder and this copy is started.

Note: The user access right are always stored on the local computer and cannot be transferred / synchronized using the Master Test functions.

请按照下面的指示在服务器上创建一个主测试。

1. 设置主路径以建立一个有效的网络路径。
   决定哪些访问权限是授权给操作员的（工程师拥有所有权限）：
   允许创建主测试：操作员可在服务器上创建一个新的主测试。
   允许更新主测试：操作员可在服务器上更新存在的主测试。
   可运行离线测试：操作员可开启一个与主测试相连的测试，但是此时未连接网络。

   对所有操作员权限的默认设置都是 *关闭* 的。

2. 创建一个与服务器相连的本地测试。请查阅前面章节 *创建一个模板*。
   在 **QC** 启动下拉框中选择一个测试。
   （图略）

   注：确保所有将运行本测试的计算机上用来存储测试结果的指定文件夹都是有效的。 当目标文件夹设是自定义设置时，必须保证它是有效的（请查阅章节 *存储结果/ File* Location）。

3. 从菜单工具中 选择 */创建主测试* 。确认问题 *启动创建主测试？* 一个成功的操作将被确认。
   现在，在 *选择测试* 列表中这个测试有了一个 *主测试* 的标记：
   （图略）
   这个蓝色的标记  表明服务器已经在线，连接已经建立。当服务器离线，则就会出现一个红色标记  。
   根据 *可运行离线测试* 中选项的设置，可执行或不执行该测试。在此情况下总会显示一个警告。
4. 现在可以像通常一样开启测试了。来自服务器的副本已存于当前测试文件夹中，这个副本已开始测试了。

注: 用户访问权限总是存放在本地计算机中，并且不能使用主测试功能转移或者同步。

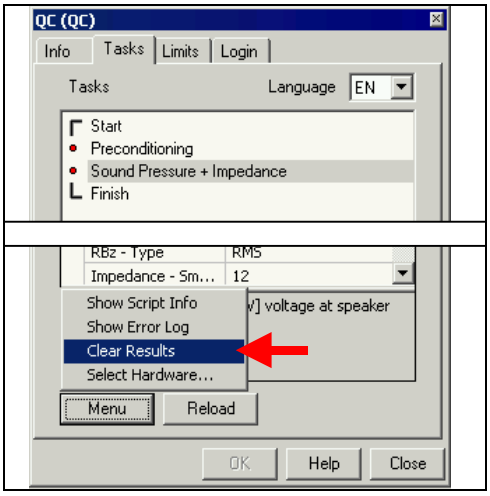
Update Master Tests

更新主测试

The master test can be updated from each connected QC-system or also from any other remote computer in the network (e.g. the R&D or QC manager office using an offline license). Please follow the steps below:

1. Modify the test locally. You may change the setup, task sequence or limits.
2. Log in to the QC System. If not already available, open the property window by pressing the  button. Click on the Property Page

Tasks and select **Clear Results** from the Menu.



This removes the last results from the test, so a cleared display is shown, when starting this test.

3. Log out from the system. When returned to QC-Start, select the menu *Tools / Update Master*. You have to confirm this action and the success will be confirmed or a warning produced.

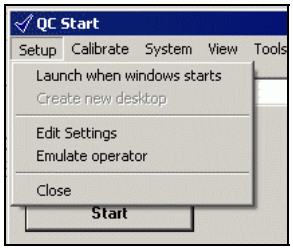
可以从每个连接网络的 QC 系统，或者也可以从一台连接网络的远程计算机（例如， R&D 或 QC 经理办公室使用脱机证书）来更新主测试。请遵循下列步骤：

1. 在本地修改测试。您可以改变配置、任务顺序或门限。
2. 登录 QC 系统。如果还不可用，请按  按键打开属性窗口。点击属性页面任务，从菜单选择 **清空结果** 。
   （图略）
   这是从测试中清除上次结果，因此当开始测试时会给出一个清空显示。
3. 登出 QC 系统。当返回 **QC** 启动，从菜单选择 *工具/更新主测试* 。您必须确认这个动作，系统将确认成功，或者给出一个警告。

Setup Menu

设置菜单

The **Setup** menu allows to



1. configure the PC in such a way, that the QC System is started automatically at the start of the Windows system. To learn more about items of the Setup menu see chapter *User Modes / Administration.*
2. Configure the QC-Start Tool: Selecting **Edit Settings** will open a text editor with the setup (qc-start.ini) file. In this file the engineer can define, what level of access the operator will be granted. Please refer to section *QC* Start below.
3. When selecting **Emulate Operator**, the functions of the running QC-Start (in Engineer Mode only) will be restricted to the Operator rights. This simplifies the testing of granted rights. You may exit the Operator-Mode by selecting the *Setup / Emulate Operator* again.

4. **Close** will terminate the *QC-Start* program.

设置 菜单允许：

（图略）

1. 可以这样一种方式配置 PC 机，当 Windows 操作系统开启时，QC 系统也自动打开。需要了解有关设置菜单中的项目，请参见章节 *用户模式/管理* 。
2. 配置 QC 启动工具：选择 **编辑设置** 将打开一个带有设置文件（qc-stat.ini）的文本编辑器。在这个文件里，工程师可以定义操作员可被授予的访问权限的级别。请查阅上文 *QC 启动*。
3. 当选择 **模拟操作员** ，针对操作员权限，运行 QC 启动的各项功能将被限制（只在工程师模式下）。这样简化了授权测试。您可以再选择 *设置/模拟操作员* 退出操作员模式。
4. 选择 **关闭** 将终止 *QC 启动* 程序。

Calibrate Menu

校准菜单

This menu directly starts the local calibration of the system with the connected power amplifier as well as the calibration of the used microphones.

It is recommended to calibrate the system on a regular basis (e.g. monthly). This routine also acts as self test for the system.

For microphone calibration a pistonphone / sound calibrator is strongly recommended to achieve absolute and accurate results. The specified sensitivities of microphones vary usually considerably with temperature and pressure.

Note: After calibrating the system also the inputs are recalibrated, thus the microphone input gain might have been changed and therefore always a calibration of the microphones is requested after calibrating the Production Analyzer.

该菜单直接启动了系统的本地校准，包括相连接的功放校准和使用的传声器校准。

推荐有规律地校准系统（比如按月校准）。这一工作也是对系统的自检。

对于传声器校准，强烈推荐使用一个活塞发声器/声校准器以获得绝对的、准确的结果。所指定的传声器的灵敏度很大程度上是随着温度和压力的变化而变化。

注：在校准系统之后，输入也被重新校准，传声器的输入增益也会随之改变，因此，在完成产线分析仪的校准之后，还要求对传声器校准。

System Menu

系统菜单

The **System** menu allows an easy access to **Production Analyzer (Hardware) Calibration** and **Microphone Calibration**. To learn more about the calibration see chapter *Hardware/ Calibration/ Production Analyzer Calibration*. Furthermore you can start the **QC Performance Test** or the **Latency Check** for a System Check or Troubleshooting.

The item **Check Installation** starts the configuration process for the QC System.

The setup can be verified or repaired. Select the link *Diagnostics* on the first page to get an overview over installed components.

If accidentally or by other reasons the PC settings have been changed, they can be restored to the required state using this procedure.

系统 菜单允许简单地访问 **产线分析仪（硬件）校准** 和 **传声器校准**。需要了解有关校准的更多信息，请参见章节 *硬件/校准/产线分析仪校*

准 。此外，为了系统检查或者故障诊断，您可以进行 **QC 性能测试** 或者 **潜在问题检查**。

检查安装 项开启 QC 系统的配置过程。

可以验证和修改设置。在第一页选择链接 *诊断* 以获得对所安装部件的概览。

如果因为意外或者其他原因导致 PC 设置改变，您可通过该程序重新存储为您所要求的状态。

Where is the data? (View Menu)

数据在哪？（视图菜单）

The View menu gives you an easy access to the **Template Folder** and the folder, were the **Current Test** is stored.
An Explorer window will be opened and the test databases are shown.

The **Refresh** option rescans the network drives for a possible Master Test connection.

Note: Databases of the Klippel QC system have the extension "kdb". Double clicking on these database files will start dB-Lab and shows the last measurement performed (See also section *Getting Started*).

视图菜单给您一个简单访问 **模板文件夹** 的入口，这个文件夹是存储了 **当前测试**。

测试数据包将显示在一个资源管理器窗口中。

为连接一个可能的主测试，利用 **刷新** 选项将重新扫描网络磁盘。

注：Klippel QC 系统的数据包有一个扩展名“kdb”。
双击这些数据包文件将开启 dB-Lab，并显示上次完成的测量（请参见章节 *开始*）。

Tools Menu

工具菜单

The options in the tools menu are dedicated to the Master Test functions. Please refer to section *Synchronizing multiple QC Systems (Master Tests)* above.

工具菜单里的选项专门用于主测试功能。

请参阅上面章节 *Synchronizing* multiple QC Systems (Master Tests)。

Start Parameter

启动参数

Executing the program from the command line a start parameter decides in which mode the Start tool is invoked:

- Operator Mode
  C:\Program Files\Klippel\DA\QC\QC-Start.exe
- Engineer Mode
  C:\Program Files\Klippel\DA\QC\QC-Start.exe /expert

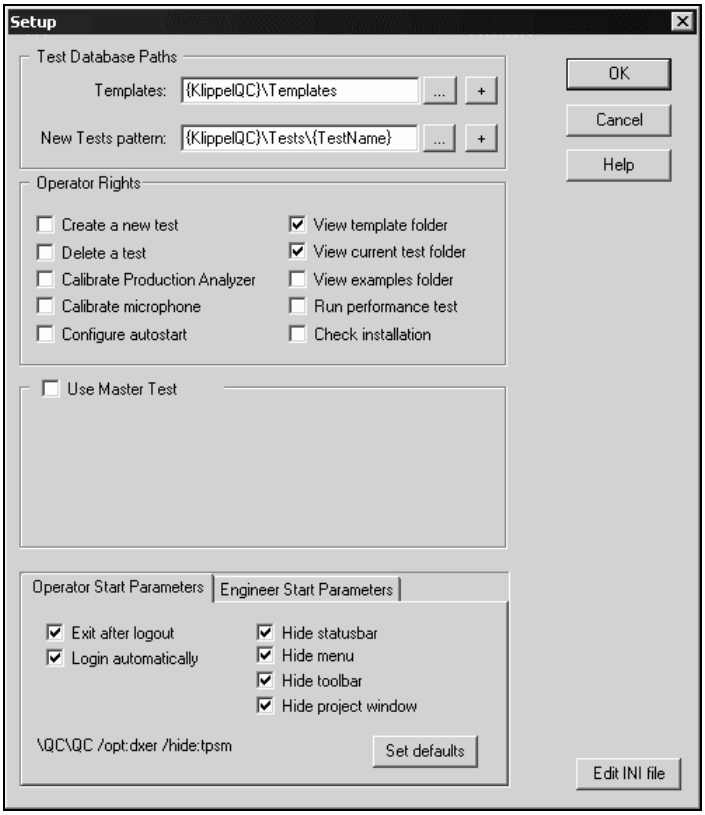
从指令行中执行程序，一个启动参数决定了启动工具以何种模式执行：

- 操作员模式
  C:\Program Files\Klippel\DA\QC\QC-Start.exe
- 工程师模式
  C:\Program Files\Klippel\DA\QC\QC-Start.exe /expert

QC Start Configuration

QC 启动配置

The configuration of the QC-Start Tool can be changed by selecting the menu item *Setup / Edit Settings*.



选择菜单项目 *设置/编辑设置* 可以改变 QC 启动工具的配置。

（图略）

Path definitions

路径定义

The top section contains all variables that specify directories where certain data is stored by the QC-System. The following variables must be defined in this section:

Item	Description
`Templates`	Path to template directory. May be on a network drive.
`NewTestPattern`	Defines how to build the path and name of the folder of a newly created test setup. (**Note**: Each test setup can be stored in its own directory) Should be on a local drive.
`MasterPath`	Path to server location of Master Tests. Network drives (e.g. W:\…) and also UNC notation (\\Server21\…) are supported.

Path variables may be specified using the following replacement strings:

Replacement String	Description
`{KlippelQC}`	Installation path of the Klippel System QC Software, by Default: **{drive}:\Documents and Settings\All Users\ Application Data\Klippel\QC\QC**
`{TestName}`	Specified name of the test at the “Create New Test” function
`{TemplateName}`	Used template at the “Create New Test” function
`{Day}`	Current Day (2 digits)

{Month}	Current Month (2 digits)
{Year}	Current Year (4 digits)
{UserName}	Logged in User Name (Windows Login)

Example:

Assume you want to store each new test setup in its own directory on hard disk C:. The directory name shall be built from the test name and the date of creation:

```
NewTestPath=C:\Tests\{TestName}_{Month}_{Day}_{Year}
```

So a test setup named *WooferX3* created on the 01st June 2006 will be stored in the directory:

```
C:\Tests\WooferX3_06_01_2006\
```

最顶端部分包含了所有指名目录的变量，在这些目录下存放着 QC 系统的某些数据。以下变量必须在本节中定义：

项目	描述
模板	到模板目录的路径。可能在网络磁盘上。
新测试样本	定义如何建立路径以及给一个最新创建的测试设置的文件夹取名。 （**注：**每个测试设置都可以存在它自己的目录下） 应该在本地磁盘上。
主路径	到主测试服务器位置的路径。支持网络驱动（例如：W:\…）和 UNC 标记法（(\\Server21\…）。

路径变量可以使用下列替代字符来指定：

替代字符	描述
{KlippelQC}	Klippel QC 系统软件安装路径，默认： **{drive}:\Documents and Settings\All Users\ Application Data\Klippel\QC\QC**
{TestName}	在“创建新测试”功能中指定测试名称。
{TemplateName}	在“创建新测试”功能中使用的模板。
{Day}	当日（2 位数字）
{Month}	当月（2 位数字）
{Year}	当年（4 位数字）
{UserName}	登录用户名（Windows 登录）

例:

假设您想把每个新测试设置存放在硬盘（C：）该测试自己的目录下。由测试名和创建日期可创建目录名：

```
NewTestPath=C:\Tests\{TestName}_{Month}_{Day}_{Year}
```

因此，2006 年 6 月 1 日创建的取名为 *WooferX3* 的测试设置将存放在以下目录下：

```
C:\Tests\WooferX3_06_01_2006\
```

Operator Rights

操作员权限

This section defines which of the Engineer Mode functions are also enabled in the Operator-Mode of the QC-Start Tool.

If these rights are not ticked, the operator cannot access the corresponding menu item.

Hint: Untrained persons should not be allowed to change the calibration or test setup accidentally. Thus in the Operator Mode all engineer functions should be disabled.

本节定义了在 QC 启动工具中工程师模式中的各项功能在操作员模式下也是可用的。

如果这些权利没有被授予，则操作员不能访问相应的菜单项。

提示：没有经过培训的人不允许随意改变校准或测试设置。因此在操作员模式下所有工程师的功能都应该被禁用。

Use Master Test
使用主测试

See section *Using Master Tests* above.

The Master Test path as well as the Operator rights are described in the specified section.

参见前面章节 *使用主测试*。

主测试路径包括操作员权限都已指定章节中描述。

Start Parameters
启动参数

Specifies the start up behaviour of the measurement system dBLab (see also *dB-Lab manual*).

Select first the Operator or Engineer Access and select the items and properties, the corresponding user group shall be granted.

The derived command line from the settings is also shown.

明确说明测量系统 dBLab 开始运行状态（同样参见 *dB-Lab 手册*）

首先选择操作员或工程师访问，选择项目和属性，以及将被授权的相应的用户组。

显示输入命令行。

QC-Start ini file
QC-Start ini 文件

Although all settings can be edited using the property page described above, all settings can be directly be changed within the ini file of QC-Start. The *QC-Start.ini* file is located by default in *C:\Documents and Settings\All Users\Application Data\Klippel\QC\QC*.

The *QC-Start.ini* file has four sections:

1. [Paths]
2. [Access]
3. [Select]
4. [StartParams]

Each section contains a set of parameters. The parameters can be changed easily by opening the file with the Windows Editor program.

Note: It is recommended to use the graphical editing of the settings. Do not edit the ini file directly, if not required.

[Select]

Specifies the default test displayed in the **Select Test** box when starting the QC-Start tool. The entry must be one of the test labels. Creating a new test setup the entry is changed automatically to the name of the new test.

虽然使用上述属性页面可以编辑所有的设置，但是在 QC 启动里的 ini 文件中可直接更改所有的设置。*QC-Start.ini* 文件的默认存放位置是：

C:\Documents and Settings\All Users\Application Data\Klippel\QC\QC.

QC-Start.ini 文件有以下四个部分：

1. [路径]
2. [访问]
3. [选择]
4. [启动参数]

每一部分包含一组参数。可以使用 Windows 编辑器程序打开该文件，从而可以很方便地改变这些参数。

注意： 建议使用图形编辑器编辑这些设置。如果没有必要，请不要直接编辑 ini 文件。

[选择]

明确指明在开启 QC 启动工具时显示在 **选择测试** 框中的缺省测试。入口可能是这些测试标号中的一个。创建一个新测试设置，入口将自动改为新测试的名字。

Remote Configuration

远程配置

The Remote QC Configuration tool provides logging into each measurement without the need of the hardware unit (Production Analyzer).

It allows the safe modification of the limits and of the measurement setup even when the test is running (using Master Tests, see *Synchronizing multiple QC Systems (Master Tests)* above). It eases the correction of limits due to (temporary) changes of the production. These changes can easily be authorized by the customer when sharing the modified data files (databases).

It is also possible to modify the graphical appearance of the QC desktop for the Operator and for the QC-Engineer.

Note: The Remote Configuration Tool is an optional component. A special license as well as a special installation setup is required. Please contact Klippel for details.

远程 QC 配置工具无需硬件装置（产线分析仪）即可登录到每个测量。

它允许安全地修改门限和测量设置，即使这个测试仍在运行之中（使用主测试，参见上文章节 *同步多个 QC 系统（主测试）*）。这样简化由于产线临时改变而需要修改门限的过程。当共享修改数据文件（数据库）时，经客户授权可以很方便地实现这种远程配置。

它也同样可以针对操作员和针对工程师修改 QC 桌上电脑的图形桌。

注：远程配置工具是可选部分。

需要一个专门的许可证，同样需要一个专门的安装方案。详情请与 Klippel 联系。

Single QC System

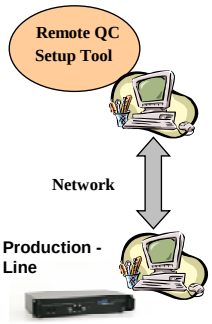
单个 QC 系统

Accessing the QC Database from a remote PC while it is used in production is not recommended and can cause unexpected data loss.

Using the remote QC Configuration tool, together with Master Tests (see *Synchronizing multiple QC Systems (Master Tests)* above), allows safe modification of a copy of the test while QC testing is in progress. To accept changes, the Operator only needs to log out from Klippel QC, and log on again.

Although the Master Test functions are primarily dedicated to multiple line synchroization, they should be also applied to the remote configuration of one single QC-System.

In this case, Master Tests should be stored on the local PC.



在生产线上使用时，不推荐使用远程的 PC 机来访问 QC 数据库，这样有可能导致意外的数据丢失。
当 QC 测试正在进行时，使用远程 QC 配置工具，同时使用主测试（参见上文 *Synchronizing* multiple QC Systems (Master Tests)），则可安全地修改一个测试的副本。为了接受这一修改，操作员只需先注销 Klippel QC 系统，然后再次登录。

虽然主测试功能主要用于多线同步，但它也可用于单个 QC 系统的远程配置。

在这种情况下，主测试应存放于本地 PC 机上。
（图略）

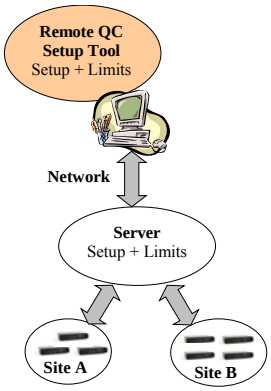
Multiple QC Systems

多个 QC 系统

A very useful combination is using the Remote QC Configuration tool with the Master Test functions (see *Synchronizing multiple QC Systems (Master Tests)* above) of the QC system for multiple lines:

1. Modify the Master Test offline, while the production is running from any remote computer.

2. Just instruct the operator on the production line to log out and log in again. This forces to update the current test setup with the remotely set modifications automatically.



对于多条生产线，一个非常有用的组合方式是使用远程 QC 配置工具的同时，使用 QC 系统的主测试功能（参见上文 *Synchronizing* multiple QC Systems
(Master Tests)）：

1. 离线修改主测试，与此同时，来自任何远端计算机的产线运行正在进行。
2. 只需命令产线上的操作员注销并再次登录系统。这样就迫使系统自动用远端设置修改来更新当前的测试设置。

（图略）

dB-Lab

dB-Lab

The KLIPPEL QC measurement system runs within the universal framework software called *dB-Lab*. Users who already use *dB-Lab* with the KLIPPEL R&D measurement system should notice the following differences:

- The  button does not start the QC measurement directly but is used to log in to the QC System. The actual start is triggered by the button on the control panel, I/O pins, serial number scans or releasing the *pause* icon.
- The  button is not used to finish a measurement but to log out from the QC System.
- The  button (*pause*) is always pressed and can be released to start a single measurement.
- As long as you are logged in, many functions of dB-Lab are disabled. You have to log out to access all known functions concerning dB-Lab objects.
  Depending on the setup of the QC Start-Tool, dB-Lab may be automatically shut down when logging out. In this case double click on the database in the test folder.

Users who don't know dB-Lab should read the *dB-Lab manual* to learn more about the software.

Note: Even if familiar with dB-Lab it is strongly recommended to use the QC-Start tool for managing tests. In this case, it is required to have only one operation in a database, which is QC / QC (one object labeled "QC"; one operation labeled "QC".

KLIPPEL QC 测量系统是与通用框架软件 *dB-Lab* 同时运行的 。已经使用带 KLIPPEL R&D 测量系统的 *dB-Lab* 的用户要注意以下几个不同：

- 按键  不直接开启 QC 测量，而是用于登录 QC 系统。实际的开启触发是使用控制面板上的按键，I/O 引线，序列号扫描，或者释放 *暂停* 图标。
- 按键  不是用来完成测量，而是用来注销 QC 系统。
- 按键  （暂停）总是被压下，释放暂停键可开启单个测量。
- 只要您在登录状态，dB-Lab 的很多功能是不可用的。您必须注销系统以访问所有有关 dB-Lab 的已知功能。

  根据 QC 启动工具的设置，当注销时 dB-Lab 可能会自动关闭。在此情况下，双击测试文件夹下的数据包。

不知道 dB-Lab 的用户应该阅读 *dB-Lab 手册* 以学习更多有关该软件的知识。

注：即使您很熟悉 dB-Lab，也同样强烈建议您使用 QC 启动工具来管理测试。在此情况下，要求一个数据库只有一个操作，就是所谓的 QC/QC（一个对象用“QC”标记，一个操作用“QC”标记）。

User Modes

用户模式

Operator

操作员

The Operator Mode is dedicated to run QC tests using test setups that were configured by an engineer. Depending on the setup the operator may also have the task to recalibrate the limits by means of a reference device.

操作员模式专用于由工程师配置好的测试设置来运行 QC 测试。根据设置，操作员也需要借助参考设备进行门限的重新校准工作。

How to start a test?

怎样启动一个测试

The QC Software is started using the QC Start Tool (see picture below). Depending on your system configuration the QC Start tool - icon may already be displayed on your desktop after you have logged on to your Windows system.

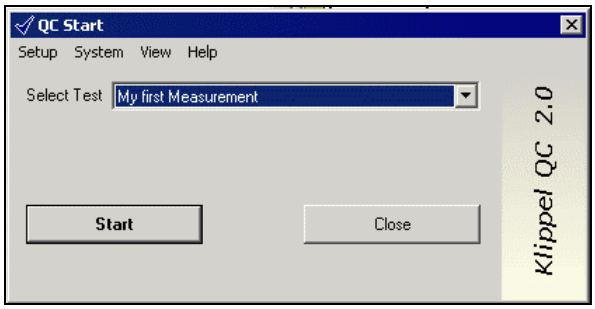
Double click on the icon.

If the icon is not visible, you can start using the **Windows-Start** menu:

- **Start/Programs/Klippel Analyzer/QC-Operator**

To start a test you have to:

1. Select the test for your application from the **Select Test** box.
2. Press **Start** button to start the test.



Depending on the access rights granted in the configuration of the QC Start-Tool, more buttons may be visible for Operators.

使用 QC 启动工具来启动 QC 软件（参见下面的图片）。根据您的系统配置，在您登录 Windows 系统后，QC 启动工具的图标可能已经显示在您的桌面上了。

（图略）

双击这个图标。

如果这个图标没有出现，您可以使用 **Windows 开始** 菜单启动 QC 软件：

- **Start/Programs/Klippel Analyzer/QC-Operator**

要开启一个测试您必须：

1. 从 **选择测试** 框中选择针对您的应用的测试。
2. 按 **开始** 按键开始测试。

（图略）

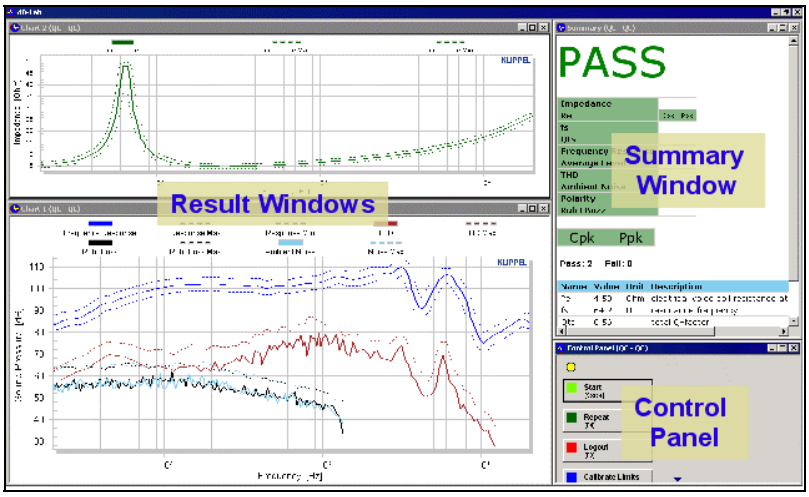
根据 QC 启动工具中配置授予的访问权限，操作员可看见更多的按键。

Desktop
桌面

The appearance of the operator desktop depends on the test configuration that was setup in the Engineer Mode. Normally the following windows will be displayed (see also picture below):

Window	Comment
Result Windows	Display measurement results as charts.
Summary Window	Displays Pass/Fail result and measured parameters
Control Panel	Displays control buttons like measurement start

Note: If you close a window, it will be reopened automatically after you have started the next measurement. Do not close the Control Panel. However, the Hotkeys will still work.



操作员的桌面外形取决于工程师模式下设置的测试配置。一般情况下将显示以下窗口（同时请参见下面图片）：

窗口	注释
结果窗口	以曲线形式显示测量结果。
摘要窗口	显示通过/失败结果和测量到的参数。
控制面板	显示控制按键，如测量开始。

注：如果您关闭了一个窗口，在您开启下一个测试时这个窗口将自动打开。不要关闭控制面板。当然，快捷键依旧在工作。

（图略）

Summary Window

摘要窗口

The Summary Window displays, if a tested device is OK or not. It also gives an overview over the test results and can display the linear parameters of a device.

PASS/FAIL

In the upper part of the window the PASS/FAIL test result is displayed.

PASS means the measured device is OK and within the set limits. All parameters that appear in the table below the word PASS must be displayed green.

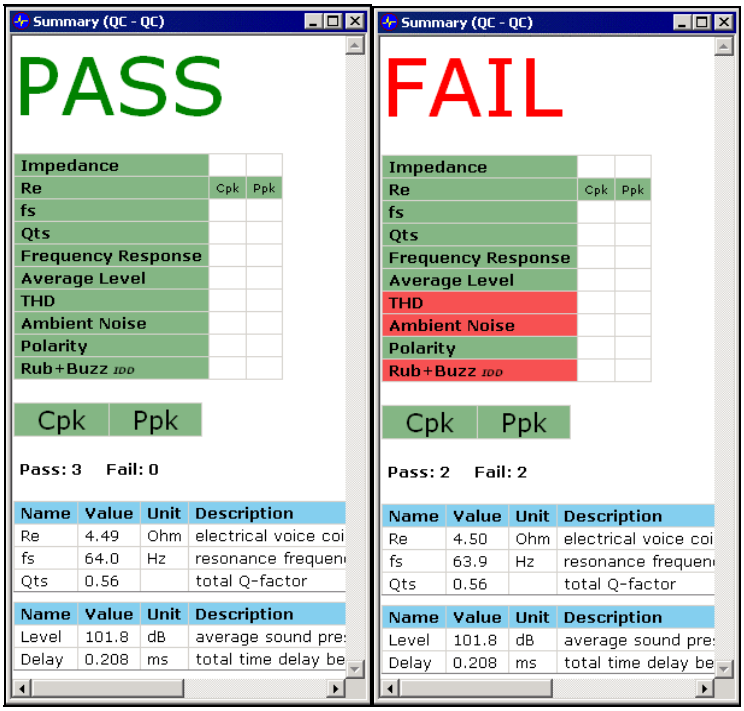
FAIL means that the measured device has hurt one or more limits. The parameters that hurt the limits are displayed red in the table below the word FAIL.

Attention: In case the noise limit was hurt (NOISE displayed red) the measurement was corrupted by ambient noise. Repeat the measurement.

Examples (see pictures below):

The left picture shows PASS measurement. All parameters with limits like Impedance, fs, Re etc. are displayed green. The tested device has passed the test.

The right picture shows a FAIL measurement where the THD (total harmonic distortion) and the Rub&Buzz limit were exceeded (both displayed red). Normally this device has failed the test. But in this example the ambient noise field is also red indicating that the ambient noise level was to high and disturbed the measurement. In this case the measurement should be repeated since the tested device may be OK.



摘要窗口显示被测设备是好还是不好。它同时给出了测试结果的概要，并可显示设备的线性参数。

通过/失败

在窗口的最上面部分显示了通过/失败测试结果。

通过 表示被测设备在设置的门限内是好的。所有参数显示在下面的表格中，通过一词一定显示为绿色。

失败 表示被测设备超过了一个或多个门限。失败一词和其下面表格中超过门限的参数显示为红色。

注意：当超过噪声门限时（噪声显示为红色），表示周围的环境噪声干扰了测量。请重新测量。

例子（参见下面的图片）：

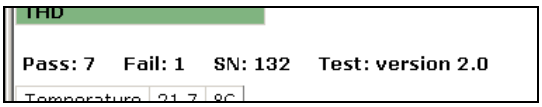
左边的图片显示通过测量。所有参数在门限以内，如阻抗、 fs、 Re 等都显示为绿色。被测设备通过了测试。

右边的图片显示了一次失败的测量，其中 THD（总谐波失真）和异音门限超过范围（都显示红色）。一般情况下，被测设备不能通过测试。但是在这个例子中，周围环境噪声区域也显示红色，表明环境噪声级太高，它干扰了测量。在这种情况下，被测设备可能是好的，所以应该重新测量。

（图略）

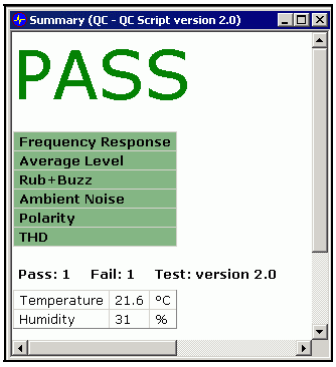
Counting / Test Name

Below the detailed test results, the number of good and bad units in the current test session are listed as well as the serial number (if applicable) and the test name (name of test selected in the QC start tool).



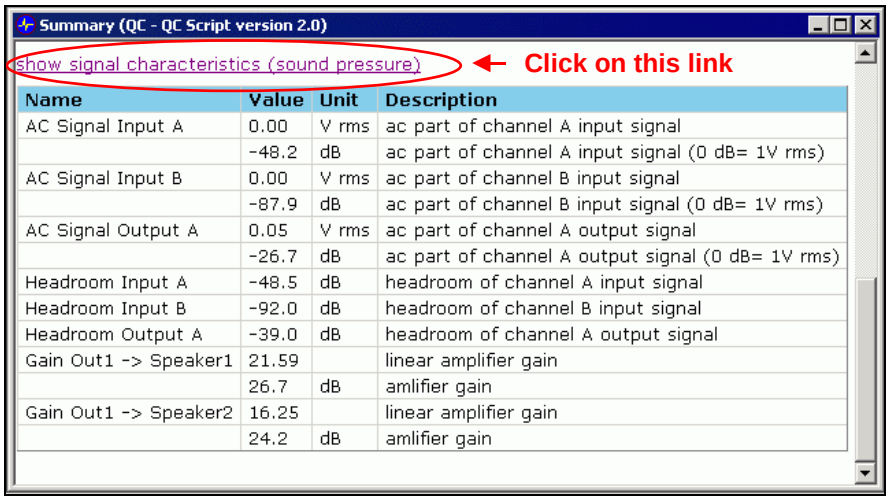
Temperature / Humidity

If the external Temperature / Humidity Sensor is connected, the environmental data are displayed automatically in the Summary window.



Signal Characteristics

For each task signal properties are listed. This data is hidden by default. Click on the link *show signal characteristics ({task-name})* to show the rms value, headroom and measured amplifier gain for this measurement.



Name	Value	Unit	Description
AC Signal Input A	0.00	V rms	ac part of channel A input signal
	-48.2	dB	ac part of channel A input signal (0 dB= 1V rms)
AC Signal Input B	0.00	V rms	ac part of channel B input signal
	-87.9	dB	ac part of channel B input signal (0 dB= 1V rms)
AC Signal Output A	0.05	V rms	ac part of channel A output signal
	-26.7	dB	ac part of channel A output signal (0 dB= 1V rms)
Headroom Input A	-48.5	dB	headroom of channel A input signal
Headroom Input B	-92.0	dB	headroom of channel B input signal
Headroom Output A	-39.0	dB	headroom of channel A output signal
Gain Out1 -> Speaker1	21.59		linear amplifier gain
	26.7	dB	amlifier gain
Gain Out1 -> Speaker2	16.25		linear amplifier gain
	24.2	dB	amlifier gain

计数/测试名称

在详细测试结果下面，列表给出了本次测试中好的和不好的单元的数目，以及序列号（如果可用）和测试名称（在 QC 启动工具中所选择测试的名称）。

（图略）

温度/湿度

如果连接了外部温度/湿度传感器，那么环境数据将自动地在摘要窗口中显示。
（图略）

信号特性

对于每个任务，信号属性都罗列出来了。默认状态下这些数据是隐藏的。点击 *显示信号特性 ({任务-名字})* 链接以显示这个测量的均方根值、动态余量和测量到的功放增益。

（图略）

Control Panel

控制面板

The control panel window contains control elements that allow starting a measurement, recalibrating the limits by means of a reference device, type in a serial number of a device or exiting the test.

Start a measurement

There are two ways to start a measurement depending on the test setup

- Press **Start** button.
  (or press **Space** key on the keyboard)

or

- Type in a **Serial Number** and press **Enter** key on the keyboard.

In the second case the serial number of the tested device is recorded with the measurement and displayed in the Summary Window (e.g. SN: 12345).

Note: If you use a bar code reader to scan the serial number, you have to click into the serial number field before the **first** measurement in order to activate the field. After scanning a serial number the measurement starts automatically then.

Exit the test

Press the **Logout** button to close the test desktop and return to the QC Start tool.

Recalibrate Limits

If the button Calibrate Limits is available in the control panel, you can recalibrate the test limits by means of a reference device, if necessary. The limit calibration must be enabled in the section *Configuration / Allow Limit Calibration* of the Start Task (Engineer Login required).

1. Press **Calibrate Limits** button.
2. Connect device ('Golden DUT'), see chapter *Test Configuration / Golden DUT Handling*.
3. Press **OK** button

Repeat Tests

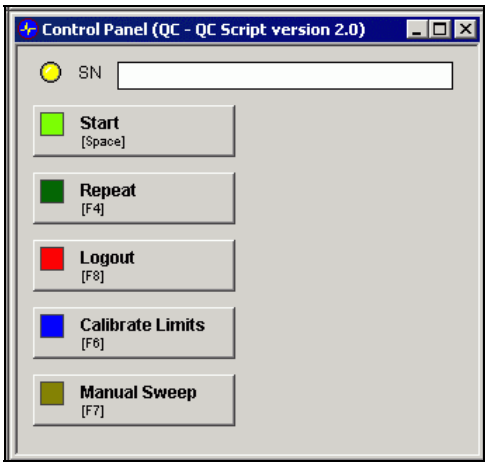
After a test against limits (which must exist), the test may be repeated. Serial numbers are not incremented. In the log file the preceeding test will be marked as `SKIPPED` to identify repeated tests.

Manual Sweep

The Manual Sweep is an easy to use Sine Sweep Generator. This button must be enabled in the section *Configuration / Allow Limit Calibration* of the Start Task (Engineer Login required).

For details refer to section *Manual Sweep* below.

Example of the Control Panel:



控制面板窗口包含了控制元素，如允许开启测量，通过参考设备来重新校准门限，输入设备的序列号或者退出测试。

开启一个测量

根据测试设置，有两种方法来开启一个测量：

- 按 **开始** 按键。

  （或者敲键盘上的 **空格键** ）

或：

- 输入 **序列号** ，敲键盘上的 **回车键** 。

第二种方法中，被测设备的序列号被记录在测量中，同时会在摘要窗口中显示（例如：SN：12345）。

注：如果您使用条形码阅读器来扫描序列号，在 **初次** 测量之前，您必须点击进入序列号区域以激活该区域。扫描完序列号后，测量将会自动开启。

退出测试

按 **注销** 按键关闭测试桌面，返回到 QC 启动工具。

重新校准门限

如果在控制面板中按键 **校准门限** 是可用的，假如需要，您可以借助参考设备来重新校准门限。在启动任务的 *配置/允许门限校准* 中，必须开启门限校准（需要以工程师登录）。

1. 按 **校准门限** 按键。
2. 连接 *设备*（“黄金 DUT”）。参见章节 *测试配置/ Golden DUT* Handling。
3. 按 OK 按键。

重复测试

当测试超过门限时（门限必须存在），可能需要重新测量。序列号不应增加。在登录文件中，正在进行中的测试将会被标记上 `SKIPPED`（跳过），以识别重复的测试。

手动扫频

手动扫频就是简单地使用 *正弦扫频发生器*。在启动任务的 *配置/允许门限校准* 中，必须开启该选项（需要以工程师登录）。

更详细的信息请查阅下面章节 *Manual* Sweep。

控制面板 的 *例子*:

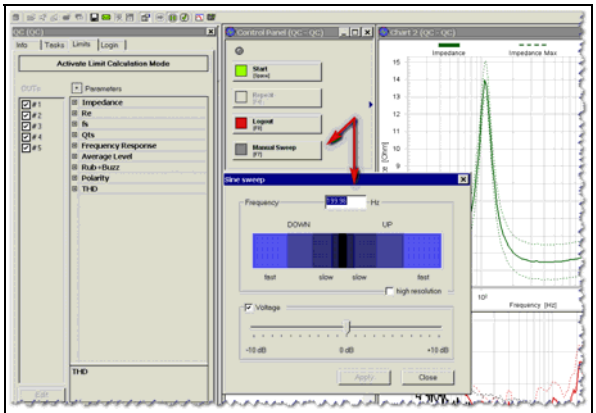
（图略）

Manual Sweep

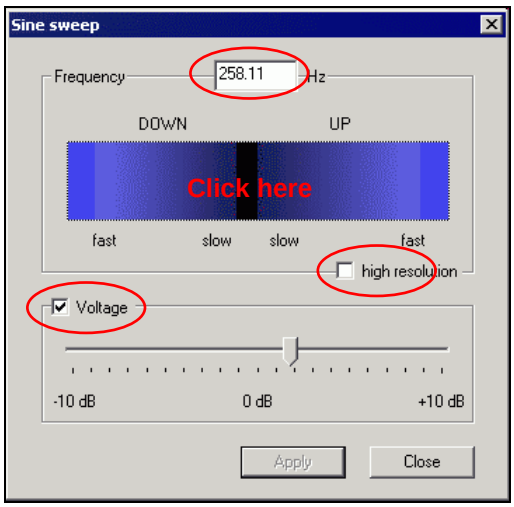
手动扫频

For manual testing / listening a sine generator is implemented. This provides simple verification of the automatic test results and allows detailed investigation on critical units.

The Manual Sweep can be started by a button on the Control Panel. It must be enabled in the section Configuration / Allow Limit Calibration of the Start Task (Engineer Login required).



Open Manual Sweep feature



The **frequency** can be

- entered directly or
- changed continously by clicking on the blue field (if high resolution selected, this field is red).
  As long as the mouse button is pressed, the frequency will be increased or decreased, depending on which side of the field the mouse is located. In the very center (black range) no frequency change occurs. The more the mouse is moved to the outer range, the higher the frequency change.

  The *High Resolution* mode provides a very sensitivity frequency adjustment for narrow band defects.
- The frequency range is not limited by the task setting. The sampling rate limits the high frequencies.

If enabled, the **voltage** can be modified by +/-10 dB relative to the specified voltage in the task. Note, that a potential level profile is considered in the manual sweep.

Note: The manual sweep is based on the voltage setting of the first task found in the task list, that provides SPL measures.

正弦信号发生器是为手动测试/听测而准备的。它提供了一种验证自动测试结果的简单方法，允许对关键单元进行更详细的分析研究。
通过控制面板上的一个按键可以开启手动扫频。在启动任务的 *配置/允许门限校准* 中，必须开启该选项（需要以工程师登录）。
（图略）

（图略）

这个 **频率** 可以被

- 直接输入 或者
- 通过点击蓝色区域来连续改变（如果选择了高分辨率，这个区域会是红色的）。

  只要按下鼠标键，根据鼠标所在的区域，频率会增加或者减少。在正中间（黑色范围）频率不会变化。鼠标移到离中心越远，频率改变就越大。

  对于窄带宽瑕疵， *高分辨率* 模式提供了一个非常灵敏的频率调整。
- 频率范围不受任务设置的限制。采样率限制了高频率。

如果允许，**电压** 可以相对于任务中指定的电压每次修改+/-10 dB。注意，在手动扫频时，需考虑电压曲线。

注：手动扫频是基于任务列表中的第一个任务的电压设置，该电压设置是为 SPL 测量所准备。

Engineer

工程师

Entering the QC System in the Engineer Mode you can setup tests, define limits, change the user interface for the operator and control the access to the system.

The following sections describe the user interface for the engineer. A description how to configure a test and define limits can be found in chapter *Test Configuration*. Information about access control can be found in the section *Administration* below.

Basically the Engineer has all functionality of the Operator described in the section *User Modes / Operator* and additional features described in this section.

以工程师模式进入 QC 系统您可设置测试，定义门限，改变操作员的用户界面和控制对系统的访问。

下面几节描述了工程师的用户界面。在章节 *测试配置* 中能找到如何配置一个测试和定义门限的描述。在下面小节 *管理* 中能找到访问控制的相关信息。

一般来说，工程师具有在章节 *用户模式/操作员* 中所描述的操作员的所有的功能，额外特性将在本节中描述。

Desktop

桌面

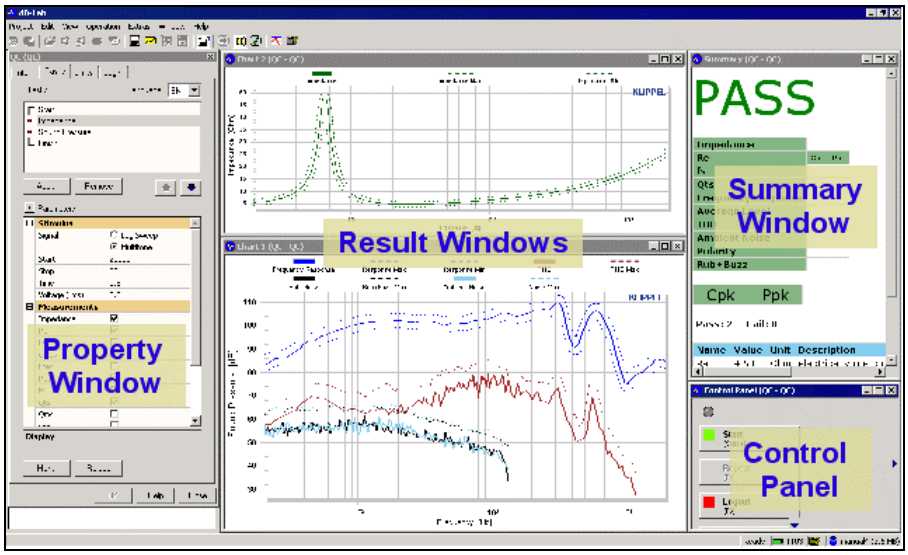
Besides the menu bar and the tool bar, the following windows are displayed on the desktop in the Engineer Mode (see also pictures below):

Window	Display
Property Window	A set of property pages (tasks, task settings, limits and user accounts) (not visible in Operator Mode)
Result Windows	Results of measurements as chart; performance information,

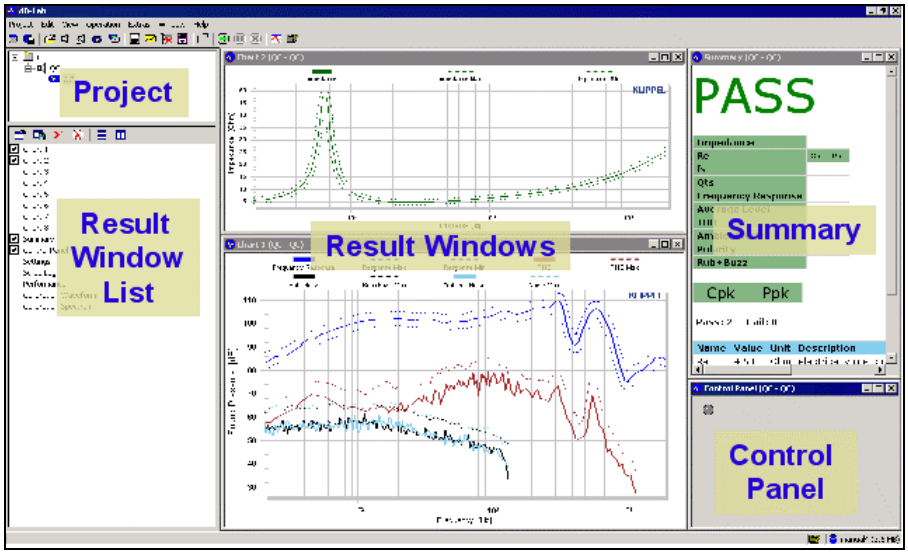
	debug information
Summary Window	PASS/FAIL results and measured parameters
Control Panel	Control elements (start measurement button etc.)
Project Window	QC measurement operation object (see dBLab manual)
Result Window List	List of all Result Windows that can be displayed. (not visible in Operator Mode)

Note: The Project Window and the Result Window List are fixed and may be covered by the Property Window. The Property Window can be opened and closed by pressing the  button in the tool bar.

State after logging in as Engineer with open Property Page:



State after logging in as Engineer without Property Page:



在工程师模式下，除了菜单栏和工具栏之外，桌面还将显示下列窗口（同时请参见下面图片）：

窗口	显示
属性窗口	一系列属性页面（任务，任务设置，门限和用户帐户）。（操作员模式下看不见）
结果窗口	以曲线形式给出的测量结果，性能信息，调试信息。

摘要窗口	通过/失败结果和测量到的参数。
控制面板	控制单元（启动测量按键等）。
工程窗口	QC 测量操作对象 （参见 dBLab 手册）。
结果窗口列表	可显示的所有结果窗口列表。 （操作员模式下看不见）

注:工程窗口和结果窗口列表是固定的，它们可能被属性窗口所覆盖。
按工具栏中的 按键可以打开和关闭属性窗口。

作为工程师登录后的状态（带打开的属性页面）：
（图略）

作为工程师登录后的状态（不带属性页面）：
（图略）

Control Panel
控制面板

The Control Panel is basically identical to the operator.
However, the QC-Engineer has access to all buttons, while the operators Control Panel may be restricted according to the setup in the Start-Task. For more information about the restrictions please refer to *Test Configuration / Tasks / Control Task*.

控制面板基本上与操作员是一模一样的。
尽管如此，QC 工程师有权使用所有的按键，而根据启动-任务中的设置，操作员则有可能受限制。要了解更多有关限制的信息，请查阅章节 *测试配置/任务/控制任务* 。

Result Windows
结果窗口

The Result Windows can be opened and closed by checking the corresponding check boxes in the Result Window List. The following windows are available:

Result window	Content
Chart 1	Frequency response and all active distortion measures (THD, Rub & Buzz).
Chart 2	Impedance
Chart 3	Harmonic Distortion (single orders, THD)
Chart 4	Rub & Buzz crest factor, IDD performance measure
Chart 5	Phase
Chart 6	Spectra of voltage, current (impedance task)
Chart 7, 8	Not used
Summary	Output window for Pass / Fail information and details
Control Panel	Control elements for start/stop measurement See *User Modes / Operator / Control Panel* for details.
Settings	List of all test settings for reference when viewing
Scilab Log	Output of Scilab routines for debugging or logging. Intended for programmers use.
Performance	Time Analysis of the test
Calibration Waveform	Result of internal synchronization and amplifier self test. For trouble shooting only.
Calibration Spectrum	Result of internal synchronization and amplifier self test. For trouble shooting only.

可以在结果窗口列表中相应的选择框打钩的方式，打开和关闭结果窗口。有以下窗口：

结果窗口	内容
曲线 1	频响及所有激活的失真测量（THD、异音）
曲线 2	阻抗
曲线 3	谐波失真（单阶、THD）
曲线 4	异音峰值因子，IDD 性能测试
曲线 5	相位
曲线 6	电压和电流的频谱（阻抗任务）
曲线 7、8	未使用
综述	输出窗口，显示通过/失败信息和相关细节。
控制面板	开始/停止测量的控制单元 详情请参见 *用户模式/操作员/控制面板* 。
设置	所有测试的列表，为查看作参考。
Scilab 日志	为调试或者登录用的 Scilab 例行程序的输出。准备给程序员使用。
性能	测试的时间分析。
校正波形	内部同步和功放自检的结果。仅用于故障排除。
校正频谱	内部同步和功放自检的结果。仅用于故障排除。

Window Management

窗口管理

Result windows, Summary Window and Control Panel window can be rearranged on the desktop. The small tool bar above the Result Window List offers some windows management functions:

	Window Management Toolbar	
	**Open Default Windows**	Open the default Window set. For each Operation there is a set of default windows. They are also opened when you double-click the operation in the project window, or select the operation and press RETURN.
	**Save Default Windows**	Clicking this button, you can replace the default window set.
	**Close All Windows**	Close all result windows.
	**Close Alien Windows**	Close all result windows that do not belong to the selected Operation
	**Tile Horizontally**	Arrange windows without overlapping, prefers wide over tall windows
	**Tile Vertically**	Arrange windows without overlapping, prefers tall over wide windows

Default windows remember the position when  button (Save Default Windows) was clicked. All other windows remember their last position. All positions are relative to the size of the main window.

Note: The default window arrangement that you store by clicking the  button (Save Default Windows) will also be displayed by default in the Operator Mode. The only difference is that the Project window, Result Window List and Property Window will be hidden.

可以在桌面重新布置结果窗口、摘要窗口和控制面板窗口。结果窗口上面的小工具栏提供了一些窗口管理功能：

	窗口管理工具栏	
	**打开默认窗口**	打开默认窗口组。

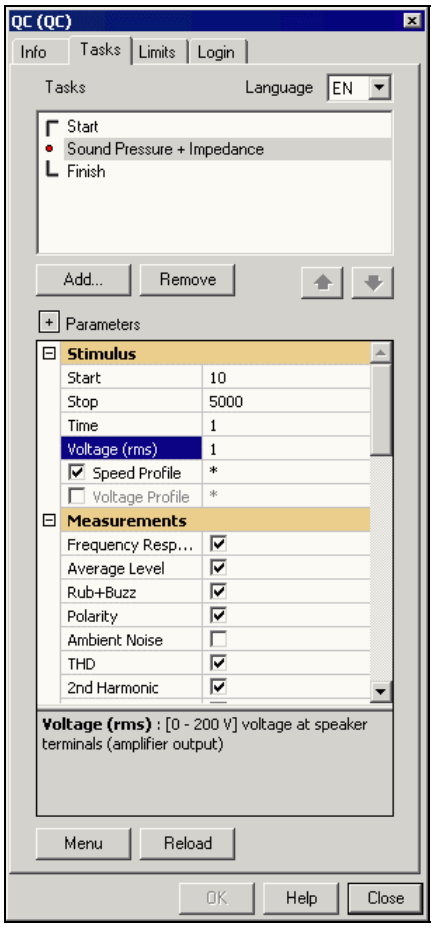
		对于每个操作都有一组默认窗口。 当您双击工程窗口的操作时也可打开这些窗口，或者选择操作然后再按返回。
	保存默认窗口	点击此按键，您可以替换默认窗口组。
	关闭所有窗口	关闭所有的结果窗口。
	关闭不相容窗口	关闭所有不属于被选操作的结果窗口
	水平排列	无重叠排列窗口，水平排列。
	垂直排列	无重叠排列窗口，垂直排列。

当按 按键（保存默认窗口），系统会记住默认窗口的位置。所有其他窗口也都记得上次的位置。所有位置都是与主窗口的大小有关的。

注：通过按按键（保存默认窗口）保存的缺省窗口布局，在缺省状态下也将在操作员模式下显示。所不同的是工程窗口、结果窗口列表和属性窗口是隐藏的。

Property Page Tasks
属性页面任务

Each test can be divided in a sequence of measurement tasks which are managed on the Tasks Page of the Property Window (see also picture below). The sequence always begins with a Start task and ends with a Finish task. Between these obligatory tasks you can add the measurement tasks you need for your test (see also chapter Test Configuration).



The Tasks page is divided in two corresponding sections:

- The task section where the measurement tasks are displayed.

- The parameter section where the corresponding parameters are displayed.

Each task has its own parameter list. By clicking on a task, the task parameters are displayed in the parameter section.

Adding/Removing a task

To add a task to the test:

1. Press the **Add…** button and select a task file in the following dialogue box.

   Note, that in the basic version the number of tasks is restricted.

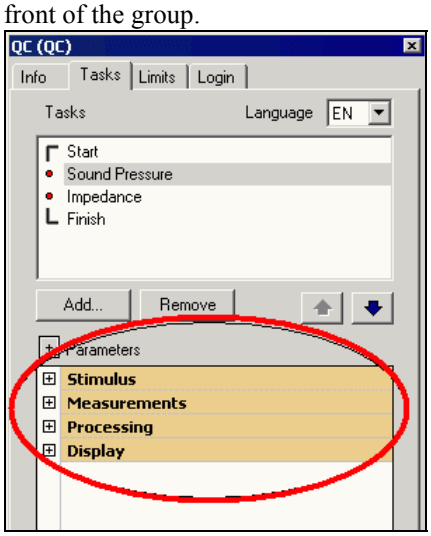
2. Change the task sequence with the  and  buttons.

To remove a task from the test:

1. Select the task.
2. Press the **Remove** button.

Parameter

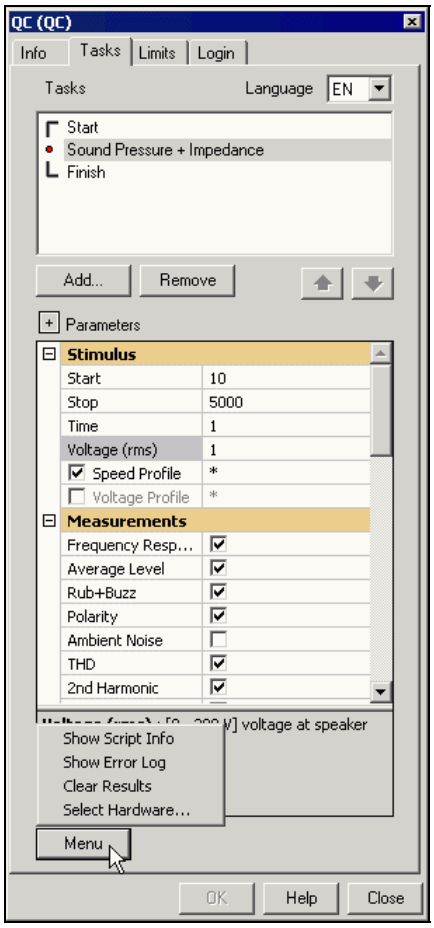
Parameters are arranged in groups (e.g. stimulus, measurements etc.). A group can be expanded or collapsed by clicking the plus or minus symbol in front of the group.



When you click on a parameter, a help line is displayed at the end of the parameter section. The help line shows some specific parameter information like maximum/minimum values or physical unit.

Menu Button

The menu button offers you access to further information.

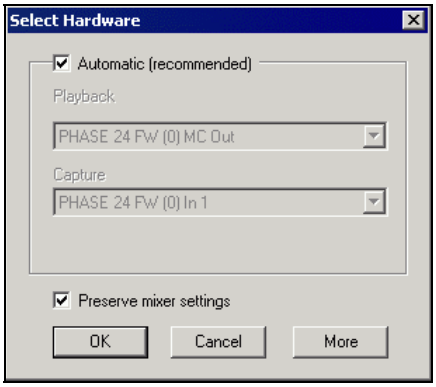


Show Script Info – displays information where the script of the task is stored.

Show Error Log – opens the log file, were all errors are accumulated during the operation. Please send this file in case of trouble to the Klippel Support.

Clear Results – All current results and limits are deleted but the reference units are kept. This is to clean operations before creating templates from used measurements.

Select Hardware – allows access to the setup of the sound device *(see next section for further information)*



每个测试都可划分为一系列测量任务，这些任务由属性窗口的任务页面来管理（也请查看下图）。这一系列任务总是以开启任务开始并以完成任务结束。您可以根据您的测试需要在这些必要的任务之间增加测量任务（也请参见章节 *测试配置* ）。

（图略）

任务页面可分为两个相对应的部分：

- 任务部分，显示测量任务。
- 参数部分，显示对应的参数。

每个任务都有自己的参数列表。通过点击一个任务，参数部分就会显示任务参数。

添加/删除一个任务

给测试增加一个任务：

1. 按 **添加…** 按键并在下面的对话框中选择一个任务文件。
   注：在基本版中任务的数目是有限制的。
2. 用  和  来改变任务的顺序。

从测试中删除一个任务：

1. 选择任务。
2. 按 **删除** 按键。

参数

参数是分组编排的（例如：激励，测量等）。点击前面的“+”号和“-”号可以展开组和收缩组。

（图略）

当您点击一个参数时，在参数部分的末尾会显示一个帮助行。该帮助行会提供一些指定参数信息，像最大/最小值或者物理单位。

菜单按键

菜单按键提供您使用进一步的信息。

（图略）

显示脚本信息 –显示任务脚本的存储位置。

显示错误日志 –打开日志文件，日志文件记录了操作过程中积累的所有错误。当需要咨询 Klippel 技术支持时，请发送这个文件。

清除结果 –除了参考单元被保留外，所有当前结果和门限都被删除。这是为了在从已用测量中创建模板之前清空操作。

选择硬件 –允许访问声音设备的设置（*参见下节以获得更多信息*）。

（图略）

Sound Device & Sampling Rate

声音设备和采样率

The sound device can be setup by means of the **Menu** button at the end of the property page.

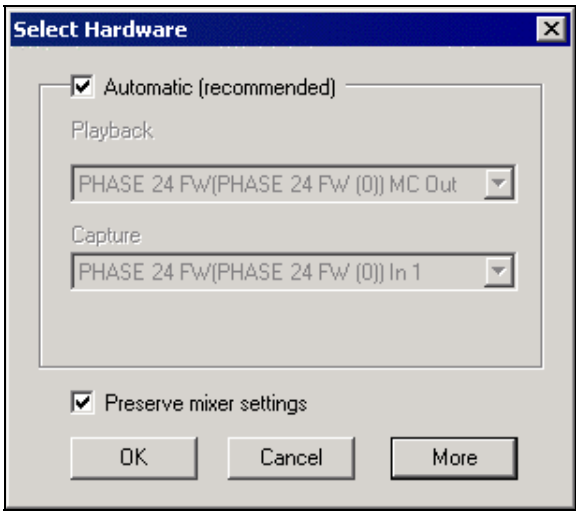
1. Press **Menu** button.
2. Choose **Select Hardware.**

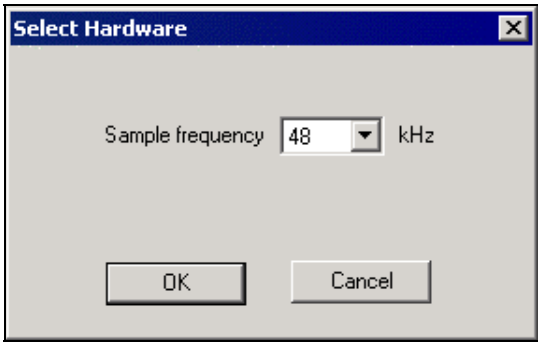
The Select Hardware dialog is opened. It is recommended to check the boxes **Automatic** and **Preserve mixer settings.**

The sample frequency can be changed by pressing the **More** button and choose the required sample frequency in the following dialogue window.

Attention: Measurements can be incorrect when you change the sample frequency.

After changing the sample frequency you must logout and login again in order to reinitialize the system.





通过按属性页面最后的 **菜单** 按键可设置声音设备。

1. 点击 **菜单** 按键。
2. 挑选 **选择硬件** 。

选择硬件对话框被打开。推荐选择 **自动** 和 **保存混频装置** 。

通过按 **更多** 按键可改变采样频率，也可在下面的对话框中选择您需要的采样频率。

注意：当您改变采样频率时测量可能是不正确。

在改变采样频率后，您必须先注销，然后再登录以重新初始化系统。

（图略）

（图略）

Property Page Limits

属性页面门限

The *Limit page* of the Property Window allows to manage the measurement of reference devices and to set limits to all measured curves and parameters. It is divided in two sections:

- DUT section, where the measured reference devices are displayed.
- Limit Parameter section, where the parameter limits are set.

The Limit page has two operation modes:

- Measurement Mode (Limit Calculation Mode button released)
- Limit Calculation Mode (Limit Calculation Mode button pressed)

To activate or deactivate the Limit Calculation Mode click on the **Activate Limit Calculation Mode** button at the top of the limit page.

Please refer to chapter *Test Configuration* /

Reference Units for more information about Refernce DUTs.

属性窗口中的 门限页面 允许管理参考设备的测量，设定所有测量得到的曲线和参数的门限。它分成两部分：

- DUT 部分，显示被测的参考设备。
- 门限参数部分，设置参数门限。

门限页面有两个操作模式：

- 测量模式（释放门限计算模式按键）
- 门限计算模式（按下门限计算模式按键）

点击门限页面顶端的 **激活门限计算模式** 可激活或者停用门限计算模式。

请查阅章节 *测试配置/参考单元* 以获得更多 有关参考 DUT 的信息。

Property Page Login

属性页面登录

The property page Login allows controlling the access to the QC system by means of user accounts.

For further information see section *User Modes / Administration*.

属性页面允许通过使用用户帐户来控制进入 QC 系统。

详情请参阅章节 *用户模式/Administration*。

Programmer

程序员

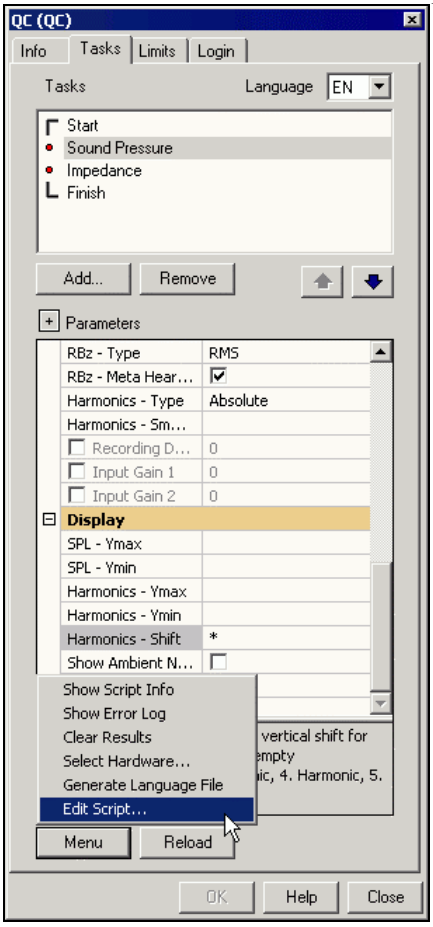
The Programmable System allows logging in as a programmer and loading your own SciLab measurement scripts as tasks. The only difference in the user interface is that the programmer has an Edit button for the scripts. Further information about programing the QC system can be found in the separate *Programmer Manual*.

Edit a script

Editable scripts have the file name extension *.kla*. You can use any text editor to edit these files.

1. Click on a task you want to edit.

2. Press **Menu** button at the end of the Property Window.



3. Select **Edit Script** from the menu.

An explorer window is opened with the script file of the task marked.

4. Open script file with an editor.

Note: Only script files with the suffix .kla can be edited. Standard scripts provided by Klippel are compiled and have the suffix .klb. See also *Programmer Manual*.

Reload a script

After you have changed a script file you have to reload it explicitly. No parameter or setting will be changed.

1. Click on a task you want to reload.
2. Press **Reload** button at the end of the Property Page (see above picture). This button is availbale only in the Programmer Mode.

可编程系统允许以程序员的身份登录，并允许作为任务加载您自己的 SciLab 测量脚本。用户界面的唯一不同点是程序员有一个编辑脚本按键。有关可编程 QC 系统的更多信息可在单独的 *程序员手册* 中找到。

编辑脚本

可编辑的脚本有文件扩展名 *.kla*。您可以使用任何文本编辑器来编辑这些文件。

1. 点击您想要编辑的任务。
2. 按属性页面底部的 **菜单** 按键。
   （图略）
3. 从菜单中选择 **编辑脚本** 。

一个带有标记的任务脚本文件的资源管理器窗口被打开。

4. 用编辑器打开脚本文件。

注: 只可以编辑带有 .kla 字尾的脚本文件。由 Klippel 提供的标准脚本是编辑过的并带有字尾 .klb。也请参见 *程序员手册* 。.

重新加载脚本

当您改变了一个脚本文件后，您必须明确地重新加载它。重新加载不改变任何参数和设置。

1. 点击您想要重新加载的任务。
2. 按属性页面底部的 **重新加载** 按键（参见上幅图片）。该按键只有在程序员模式下才可用。

Administration

管理

The access to the KLIPPEL QC System can be controlled by means of user accounts. Each user account is assigned to one of the user groups Operators, Engineers or Programmer.

通过用户帐户可以控制进入 KLIPPEL QC 系统。每个用户帐号被分派给操作员、工程师或程序员用户组中的一个成员。

User Administration

用户管理

Activate the User Identification

1. Open an arbitrary test and log in as engineer.
2. Click on the page **Login** of the property window.
3. Check the box **Require User Identification.**

Note: If you activate the User Identification, the settings in the page **Login** are valid for the whole QC System and not only for the opened test.

Add/ Delete a User

1. Press button **Add User** on **Login** page.
2. Choose a user group in the **Login as** box.
3. Type in a user name and a password for the new user.
4. Press **OK** button.

Note: If you *Allow Windows login* (see below*)*, you can either choose the user name from a list of Windows users on the system or you type in an arbitrary name.

To delete a user you just need to

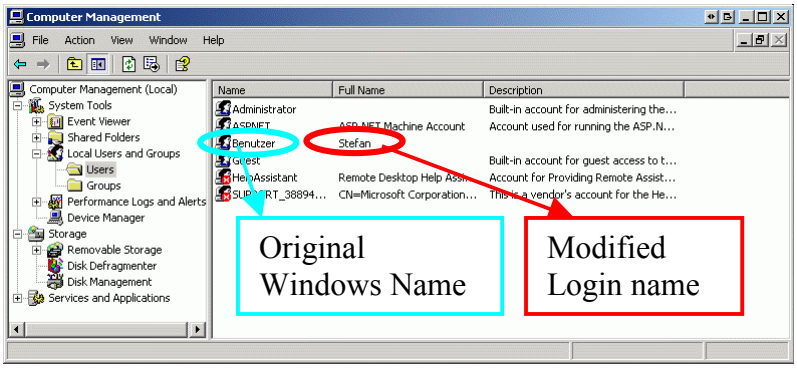
1. Click on the user you want to delete.
2. Press button **Delete User**.

Using Windows User Accounts

To ease the access to the QC system, you can allow certain users to log on to the QC system with their Windows user account. Once the user has logged on to the Windows system the QC system can be started without an additional QC login. The QC identifies the user by its Windows Login Name.

If you are using restricted user accounts, you must use Windows XP Professional and assign that user to the Power User Group. Restricted User accounts and Windows XP Home do not satisfy the system requirements!

Note: The Window Login Names are derived from the Windows "Names". These are the names that are specified at the creation of the windows account. Later on these names may be changed to a new "Full Name", which is different from the original "Name". If you can't find the name of your windows account in the list, check the Start / Settings / Control Panel / Administrative Tools / Computer Management / Local Groups and Users list, to find the original name.



To activate the use of Windows user accounts

1. Check the **Allow Windows Login** box.
2. Choose one of the **Require Windows Login** options.
3. Add users with their Windows user names (no password required).

The following options are available in the **Require Windows Login** field:

Option	Comment
For Nobody	Anyone, who is registered in the user list, can log on to the system.
For Operators	Only those operators, who are registered with their Windows user name in the Operators list, are allowed to log on to the QC system.
For Anybody	Only users, who are registered with their Windows user name in one of the user groups, are allowed to log on to the QC system.

Hint: For security reasons you can force that an operator is always logged on to the QC system with his Windows user name by choosing the **For Operators** option. He cannot log on with a different operator account without logging on as another Windows user. The **For Anybody** option extends this principle to all users.

激活用户鉴定

1. 打开一个任意的测试，并且以工程师身份登录。
2. 点击属性窗口上的 **登录** 页面。
3. 选中 **要求用户鉴定**。

注：如果您激活了用户鉴定，则 **登录** 页面上的设置对于整个 QC 系统都是有效的而不仅仅只针对已打开的测试。

添加/删除用户

1. 按 **登录** 页面上的 **添加用户** 按键。
2. 在 **以...登录** 框中选择一个用户组。
3. 输入一个新用户的用户名和密码。
4. 按 **OK** 键。

注：如果您 *允许窗口登录* （见下文），您可以从系统的 Windows 用户列表中选择用户名字，或者输入一个任意的名字。

要删除一个用户您需要：

1. 点击您想要删除的用户。
2. 按 **删除用户** 按键。

使用 Windows 用户帐户

为方便进入 QC 系统，您可以允许某些用户用他们的 Windows 用户帐户登录 QC 系统。一旦该用户登录到 Windows 系统，无须另外的 QC 登录即可开启 QC 系统。QC 系统可通过它的 Windows 登录名来识别用户。

如果您使用受限制的帐户，您必须使用 Windows XP 专业版并且分配该用户到权限用户组中。受限制的用户帐户和 Windows XP 家庭版不满足系统要求。

注：Windows 登录名是源于 Windows 的“名字”。这些名字在 Windows 帐户创建的时候就被指定。之后这些名字可能被改成新的“全名”，它和最初的“名字”是不同的。如果您在清单中找不到您的 Windows 帐户的名字，请检查 开始/设置/控制面板/管理工具/计算机管理/本地组和用户清单 以找到最初的名字。

（图略）

激活 Windows 用户帐号中的用户

1. 选中 **允许 Windows 登录** 框。
2. 选择 **要求 Windows 登录** 选项中一个。
3. 用它们的 Windows 用户名添加用户（不需要密码）。

在 **要求 Windows 登录** 区域中以下选项是可用的：

选项	注释
无用户限制	在用户列表中注册过的任何人都可以登录到系统。
针对操作员	只有那些使用操作员列表中的 Windows 用户名注册过的操作员才允许登录系统。
针对任何人	只有那些使用某一用户组中的 Windows 用户名注册过的用户才允许登录 QC 系统。

提示：出于安全考虑，您可以要求操作员总要选择 **针对操作员** 选项，即用他的 Windows 用户名登录 QC 系统。当他没有以另外一个 Windows 用户登录时，他就不能够使用一个不同的操作员帐户登录。**针对任何人** 选项将此原则扩展到所有人。

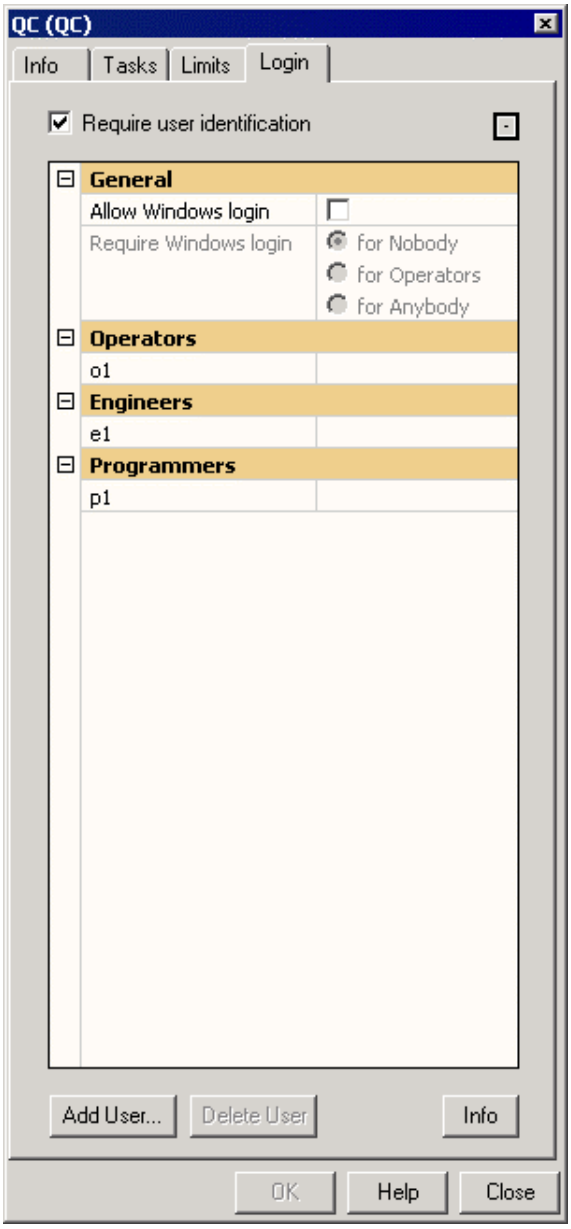
Security

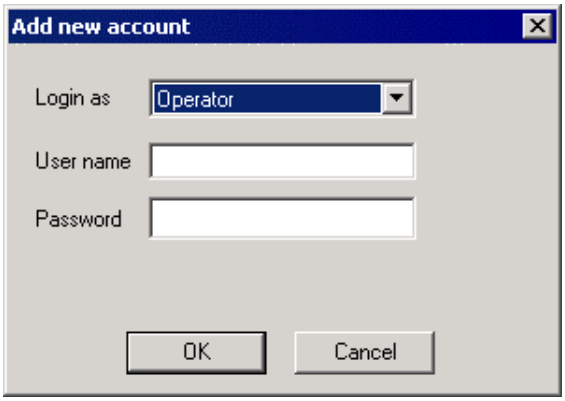
安全

All user accounts are stored in the file *qclogin.dat*. The default path of the file is *{Program Files}/Klippel/DA/QC/* or press **Info** button on the bottom of the property page for path information.

Use operating system functions to allow write/delete access to this file for administrators only. Operators need read access to this file.

Attention: If the file *qclogin.dat* is deleted, the user list is removed and you can access the system without a password. You may use this, if the engineer/programmer password got lost and you can't access the system.





所有的用户帐户都存储在文件 *qclogin.dat* 中。默认的文件路径是 *{Program Files}/Klippel/DA/QC/*，或者按属性页面底部的 **信息** 键来得到路径信息。

使用操作系统功能可允许管理员对文件进行写或清除操作。操作员可以对该文件进行读操作。

注意：如果文件 *qclogin.dat* i 被删除，用户列表也会被去掉，而您可以不需要任何密码来访问系统。如果工程师/程序员密码遗失，您不能访问系统时，您就可使用此方法。

（图略）
（图略）

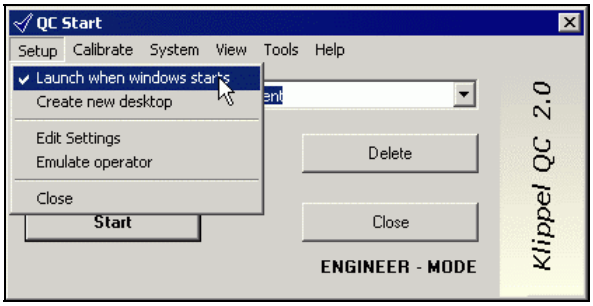
Starting the QC with Windows

QC 系统随 Windows 自动启动

You can setup the QC system in such a way that the QC Start Tool starts automatically with the Windows login.

1. Open the QC-Start Tool in the engineer mode (choose **Start/Programs/Klippel Analyzer/QC Start (Engineer)**)
2. Select **Launch when windows starts** from the **Setup** menu.
3. You may optionally select **Create new desktop** from the **Setup** menu.

If you choose the option **Create new desktop** the user will find an empty desktop with the QC Start Tool running after he has log on to the Windows system.



您可以设置 QC 系统，当 Windows 登录时 QC 启动工具自动开启。

1. 在工程师模式下打开 QC 启动工具。
   （选择 **Start/Programs/Klippel Analyzer/QC Start (Engineer)**）
2. 从 **设置** 菜单中选择 **当 Windows 启动时登录** 。
3. 您 **设置** 菜单中随意地选择 **创建新桌面** 。

如果您选择 **创建新桌面** 选项，当用户登录到 Windows 系统时，他将发现一个带有 QC 启动工具运行的空桌面。

（图略）

Test Configuration

测试配置

General Structure

总体结构

All checks of a particular test object (DUT) are combined in one **test**.

Each **test** may consist of several **tasks**, that define different **measures** to be checked against limits.

对一个特定的测试对象（DUT）的所有检查都可整合在一个测试中。

每一个测试可包含几个任务，该任务定义了针对门限的不同的测量。

Test

测试

Tests comprise all actions performed on one DUT. Multiple Tasks can be included as well as multiple measures for each task.

Each test is stored in a database ({test name}.kdb). Within this database all results and settings are stored. However, the task definitions (task files) are not stored in the database but are linked to fixed external locations in the file system.

New tests can be created using the QC-Start tool (see chapter *Organizing Projects / QC-Start Tool*) based on test templates. In the Basic version these templates are predefined and cannot be altered. In the Standard and Programmable version user defined templates can be created and used for new tests (see chapter *Tasks*).

测试包含了在一个 DUT 上所作的所有动作。也像针对每项工作的多项测量一样，它包含了多项任务。

每个测试存放在一个数据包里（{测试名字}.kdb）。在这个数据包里存储着所有结果和设置。然而，任务定义（任务文件）没有被存储在这个数据包里，而是链接到文件系统中的固定外部地址。

可基于测试模板用 QC 启动工具建立新测试（参见章节 *组织工程/QC 启动工具*）。在基本版里，预先定义好这些模板而不能改变。在标准

版和可编程版下，可以建立用户定义的模板，该模板可用于新的测试（参见章节 *任务*）。

Test Storage
测试存储

By default each test (the database) is stored in a separate folder. In this folder all results should be stored for a simple data management. You can change the location in your file system where this folder is created. (see chapter *Organizing Projects / QC* Start).

Attention: It is not recommended to work on network drives. Due to high traffic peaks and CPU load the measurement could be interrupted, which leads to avoidable errors.
DO NOT USE WIRELESS NETWORK! Due to high system load in most cases no reasonable operation can be ensured!

在默认状态下每个测试（数据包）被存储到独立的文件夹中。在此文件夹中，所有结果以一个简单的数据管理形式而被存储。您可以改变您所创建的文件夹在文件系统中的位置路径（参见章节*组织工程/QC 启动*）。

注意：不推荐在网络磁盘上使用。由于网络通信高峰和 CPU 的负荷会导致测试中断，这将引起可避免的错误。
不要使用无线网络！由于较高的系统负担，在大多数情况下系统正常运行难以保障！

Task
任务

One Task describes one particular test signal applied to the DUT such as sine sweep or multitone. Several tasks can be grouped in one test. Each task can be adjusted using task parameters.

In the Basic version only predefined sequences of tasks can be chosen (but not changed) where as in the standard and programmable version arbitrary composition of tests with multiple tasks is provided. (see chapter *Tasks*).

Each task is defined in a task file, which holds all definitions for the stimulus, acquisition, post processing and limit check as well as limit calculation. In the Basic and Standard version these files are binary type. In the programmable version these files are readable and editable text files (see *In this* chapter all available default tasks are described.

Since tasks could not be used in the Basic version to compose tests, this chapter is applicable for Standard and Programmable version only.

Filename	Label on Prop.-Page Tasks	Measures / Comments
spl.{version}.task.kla	Sound Pressure	Freq.-response, Level, Polarity, THD, Rub&Buzz, IDD, Ambient Noise
imp.{version}.task.kla	Impedance	Impedance, T/S Parameter based on Multitone or Sweep
spl-imp.{version}.task.kla	Sound Pressure + Impedance	Freq.-response, Level, Polarity, THD, Rub&Buzz, IDD, Ambient Noise, Impedance, T/S Parameter based on SineSweep.
start.{version}.control.kla	Start/Finish	Global settings for routing, logging

在这个章节中将描述所有可用的默认任务。

由于基本版不能用任务组成测试，所以本章节仅适用于标准版和可编程版。

文件名	在属性页面任务中的标签	测量/注释
spl.{version}.task.kla	声压	频率响应、声压级、极性、THD、异音、IDD、环境噪声。
imp.{version}.task.kla	阻抗	基于多频和扫频的阻抗、T/S 参数。
spl-imp.{version}.task.kla	声压+阻抗	频率响应、声压级、极性、THD、异音、IDD、环境噪声，基于多频和扫频的阻抗、T/S 参数。
start.{version}.control.kla	开始/结束	路径和登录的总设置

Filename Convention). The syntax is based on the high-level math software Scilab, which is very similar to Matlab®.

一个任务描述一个用于 DUT 的特殊测试信号，如正弦扫频信号或多频信号。几个任务可以被整合在一个测试中。每个任务能用任务参数进行调整。

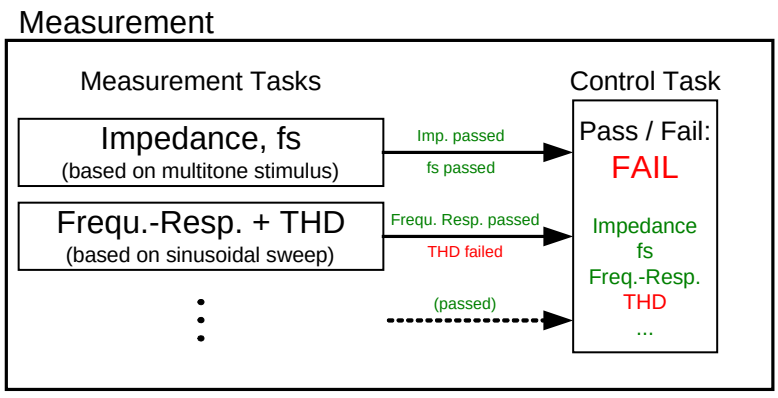
在基本版中只有预先定义的任务顺序才可以被选择（但不可改变），在标准版和可编程版中，可提供多重任务的任意组合测试（参见章节 *任务*）。

在任务文件中定义了每个测试任务，它包括了所有激励、响应、后处理和门限检查以及门限计算的定义。在基本版和标准版本中，这些文件是二进制的。在可编程版本中，这些文件是可读和可编辑的文本文件（参见 *文件名规范*）。语法是基于高水平的数学软件 Scilab，类似于 Matlab。

Control Task

控制任务

The Control Task is a special task. It collects all information from the Measurement Tasks and calculates the final Pass/Fail decision, generates log files and provides parameter for the complete test (e.g. used speaker channel for the test, report folder).
The control task is displayed as Start and Finish task in the task list. For details and parameter see section *Control Task*.



控制任务是一项特殊任务。它从测试任务中收集所有信息并计算给出最后通过/失败的结论，产生日志文件并为完整的测试提供参数（例如为测试所用的扬声器通道、报告文件夹）。

控制任务在任务列表中以开始和结束任务的形式显示。更多细节参见章节 *控制任务*。

Measure

测量

Measures are derived results from post-processed response of a task such as Re, fs or frequency response. Each measure has its own limit that can be individually adjusted with limit parameters and will be checked against these limits.
From the results of all measures the overall Pass / Fail result is calculated.

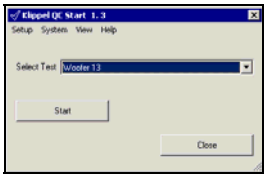
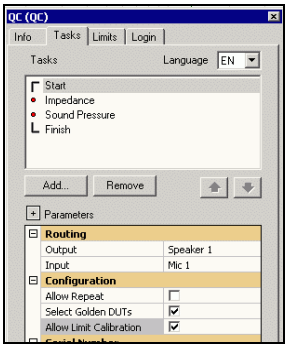
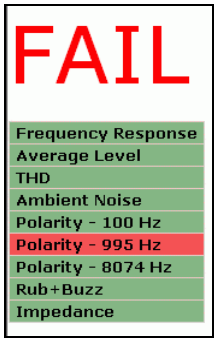
测量是来源于对一项任务响应的后处理的结果，如直流电阻、谐振频率或者频率响应。每个测试都有自己的门限值，它可以用门限参数独立地调节并检验。

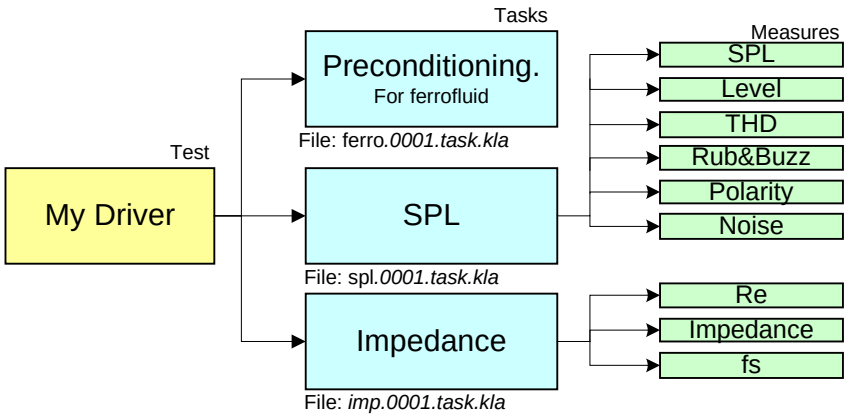
从所有测量得到的结果，系统将计算得出最终通过/失败的结果。

How does it work together

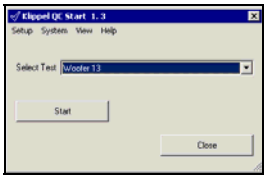
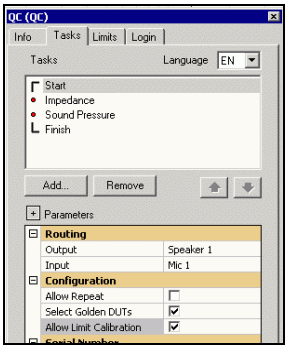
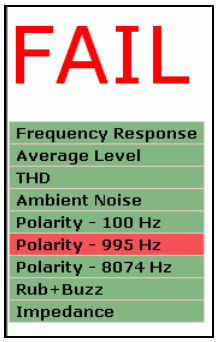
它们是怎样 一起工作的

This is an example structure of a complete Test Configuration:

Test	Task	Measure
to be selected in QC Start Tool	to be configured in Property Page Tasks	Result list after limit check
		



这是一个完整的测试配置的范例结构：

测试	任务	测量
在 QC 启动工具中选择测试	在属性页面任务中配置任务	在门限校对后的结果列表
		

（图略）

Measures and Limits

测量和门限

All measures, their corresponding limits and parameter for setting up are described in this chapter.

For these measures all tasks are listed which provide a test of the requested measure.

Note: All Measures may be individually disabled on the Property Page *Tasks* / *Parameter* Table / section *Measurements.* If one measure is disabled, all exclusively related parameter, limits and curves are hidden.

The Measures that are part of the Basic Package are marked with Basic in the headline. All Measures (but Meta Hearing Technology for improved Rub&Buzz) are part of the Standard and Programmable QC Software Package. See also chapter *Basic, Standard, Programmable version*.

本章将介绍所有测量及其对应的门限和参数设置。

对于这些测量，一个测试必须的所有任务的测量都被罗列出来。

注意：在属性页面的 *任务/参数表 / 测试板* 区域中，所有测量都可能被单独关闭。如果一个测量被关闭，那么，所有独立相关的参数、门限和曲线都会被隐藏。

测量是基本版本的一部分，它打上了大标题的标记。所有测量（不包括改良的超级听力异音检测技术）是标准和可编程 QC 软件程序包的一部分。请同时参照章节 *基本版*、*标准版 和 可编程版*。

Impedance (Basic)

阻抗（基本）

Impedance provides the magnitude of the electrical impedance vs. frequency.

This table lists all Tasks, which provide impedance measurement:

Tasks	Info	Version	Filename Convention
Impedance	Measurement of current and voltage	Basic Standard Prog.	*Imp*
Sound Pressure + Impedance	Measurement of current only, assuming constant Voltage	Basic Standard Prog.	*SPL + Imp*

阻抗提供了不同频率对应的电阻抗大小。

下表给出了提供给阻抗测量的所有 *Tasks*：

Tasks	信息	版本	Filename Convention
阻抗	测量电流和电压	基本 标准 可编程	*Imp*
声压 + 阻抗	假设电压不变，只测量电流,	基本 标准 可编程	*SPL + Imp*

This table lists all basic properties related to impedance. Please use the links to get more information about details (use online help or pdf version for linked tables).

Parameter (shared among several measures or private for exclusive use by this measure) are editable on the *Property Page Tasks*.

Category	Properties
Stimulus	*SineSweep, Multitone* (Impedance Task only)
Shared Parameter	Generator, Routing, Resolution, Smoothing, Display setting for Y-axis
Limit Modes	Relative (*Relative Limits*), Statistics (*Standard Deviation*), Absolute (*Absolute Limits*), *Jitter*
Results	Impedance vs. frequency: Result Window 2

下表给出的是有关阻抗的所有基本属性。请使用链接获得更多详细信息（使用在线帮助或 pdf 版本取得链接的表格）。

Property Page Tasks 中的参数（在几个测量中可共享，或者为某个测量应用所独用）是可编辑的。

种类	属性
激励	*SineSweep*， *Multitone*（只为阻抗任务）
共享参数	发生器，路径，分辨率，平滑，Y 轴的显示设置
门限种类	相对 （*Shifting* Limits），统计 （*Standard* Deviation），绝对（*Absolute* Limits ），*Jitter* 。
结果	阻抗对频率：结果窗口 2

The Impedance Task allows selecting two different test signals. Here is a short overview, how to select the correct one.

Stimulus	Description
Multitone	This is the optimal stimulus for best SNR at (very) low frequencies.
SineSweep	For highest speed the combined SPL+Imp task uses SineSweep for both, SPL and Impedance. Using SineSweep no intermodulation can be generated.

Note: For adjusting and optimizing the impedance task, please refer to section *Optimizing Performance / Impedance*.

阻抗任务允许选择两个不同的测试信号。下表告诉您如何选择一个正确信号。

激励	描述
多频信号	对于（极）低频最佳信噪比情况，这是最佳激励。
正弦扫频信号	采用正弦扫频信号可以快速完成整合测试声压+阻抗任务。采用该信号不会产生互调信号。

注意：为调整和优化阻抗任务，请查阅章节*优化参数/ Impedance* 。

T/S Parameter

T/S 参数

Thiele/Small (T/S) Parameters are linear parameter describing the equivalent lumped parameter circuit of an electrodynamic transducer.

This table lists all Tasks, which provide T/S Parameter measurement:

Tasks	Info	Version	Filename Convention
Impedance	Measurement of current and voltage	Standard Prog.	*Imp*
Sound Pressure + Impedance	Measurement of current only, assuming constant Voltage	Standard Prog.	*SPL + Imp*

T/S 参数是描述电动换能器的等效电路参数的线性参数。

下表给出了提供给 T/S 参数测量的所有 *Tasks*：

Tasks	信息	版本	Filename Convention
阻抗	测量电流和电压	基本 标准 可编程	*Imp*
声压 + 阻抗	假设电压不变，只测量电流,	基本 标准 可编程	*SPL + Imp*

This table lists all basic properties related to T/S Parameter . Please use the links to get more information about details (use online help or pdf version for linked tables).

Parameter (shared among several measures or private for exclusive use by this measure) are editable on the *Property Page Tasks*.

Category	Properties
Stimulus	*SineSweep, Multitone* (Impedance Task only)
Shared Parameter	Generator, Routing, Resolution, Smoothing, Display setting for Y-axis
Limit Modes	Relative (*Relative Limits*), Statistics (*Standard Deviation*), Absolute (*Absolute Limits*), *Cpk / Ppk Limits*
Results	R_e, L_e, C_{mes}, L_{mes}, R_{es}, f_s, Q_{ts}, Q_{ms}, Q_{es}

The Impedance Task allows selecting two different test signals. Refer to measure *Impedance (Basic)* for more details. For details on Cpk/Ppk, refer to *Appendix / Glossary / Ppk / Cpk.*

Note: For adjusting and optimizing the T/S parameter measurement, please refer to section *Optimizing Performance / Impedance*.

下表给出的是有关 T/S 参数的所有基本属性。请使用链接获得更多详细信息（使用在线帮助或 pdf 版本取得链接的表格）。

Property Page Tasks 中的参数（在几个测量中可共享，或者为某个测量应用所独用）是可编辑的。

种类	属性
激励	*SineSweep*，*Multitone*（只为阻抗任务）
共享参数	发生器,路径, 分辨率, 平滑,Y 轴的显示设置
门限种类	相对 （*Shifting* Limits），统计 （*Standard* Deviation），绝对（*Absolute* Limits ）, *Cpk / Ppk Limits*
结果	R_e, L_e, C_{mes}, L_{mes}, R_{es}, f_s, Q_{ts}, Q_{ms}, Q_{es}

阻抗任务允许选择两个不同的测试信号。为获得更详细信息请查阅测量 *Impedance (Basic)* 。为获得 Cpk/Ppk 的细节，请查阅 *附录/术语表 / Ppk / Cpk* 。

注意：为调整和优化 T/S 参数测量，请参考章节 *优化性能 /Impedance*。

Frequency Response (Basic)

频率响应（基本）

Frequency Response provides the magnitude of the measured SPL vs. frequency in dB SPL.

This table lists all *Tasks*, which provide frequency response measurement:

Tasks	Info	Version	Filename Convention
Sound Pressure	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Basic Standard Prog.	*SPL*
Sound Pressure + Impedance	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Basic Standard Prog.	*SPL + Imp*

频率响应提供了不同频率对应的测量得到的 SPL 的大小（用 dB 表示）。

下表给出了提供给频率响应测量的所有 *Tasks*：

Tasks	信息	版本	Filename Convention
声压	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	基本 标准 可编程	*Imp*
声压 + 阻抗	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	基本 标准 可编程	*SPL + Imp*

This table lists all basic properties related to frequency response . Please use the links to get more information about details (use online help or pdf version for linked tables).

Parameter (shared among several measures or private for exclusive use by this measure) are editable on the *Property Page Tasks*.

Category	Properties
Stimulus	*SineSweep*
Shared Parameter	Generator, Routing, Resolution, Display setting, Recording Delay (e.g. due to Mic distance)

Private Parameter	**Response Smoothing**: Part of octave used for smoothing, no smoothing if left empty.
Limit Modes	*Shifting Limits*, Statistics (*Standard Deviation*), Absolute (*Absolute Limits*), Alignment to level (see below), *Jitter*
Results	Frequency Response vs. Frequency in Result Window 1

Note: To obtain valid results the sensitivity of the used microphone must be known to the system. Refer to section *Hardware / Calibration / Microphone Calibration.*

Alignment to Level:

If selected, the limits are relatively shifted (aligned) to be centered around the measured level. Consequently the curve shape is checked only but not the absolute level. This must be tested using the limits of "Average Level". Average Level must be enabled to allow this mode.

Note: For adjusting and optimizing the SPL task, please refer to section *Optimizing Performance / SPL Tests*.

下表给出的是有关频率响应的所有基本属性。请使用链接获得更多详细信息（使用在线帮助或 pdf 版本取得链接的表格）。
Property Page Tasks 中的参数（在几个测量中可共享，或者为某个测量应用所独用）是可编辑的。

种类	**属性**
激励	*SineSweep*
共享参数	发生器，路径，分辨率，平滑，显示设置，录音延迟（例如由于 MIC 的距离）
特有参数	**响应平滑**: 用于平滑的部分倍频程，如果左边为空，就不平滑。
门限种类	*Shifting* Limits，统计 （*Standard* Deviation），绝对（*Absolute* Limits ）, 与声压级对齐（见下文）， *Jitter*。
结果	频率响应，见结果窗口 1。

注意：为了获得正确的结果，系统必须知道所用传声器的灵敏度。请查阅章节*硬件/校准/Microphone* Calibration。

与声压级对齐：

假如被选中，门限将以测量到的声压级为中心平移（排成一线）。因此，该门限只检验曲线形状，而不检测绝对声压级。这必须用“平均声压级”的门限来测量。平均声压级必须开启以允许这一模式。

注意：为调整和优化 SPL 任务，请参考章节*优化性能/ SPL* Tests。

Average Level (Basic)

平均声压级（基本）

This is a single number specifying the average level in a user defined frequency band or at discrete frequencies.

This table lists all *Tasks*, which provide average level measurement:

Tasks	Info	Version	Filename Convention
Sound Pressure	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Basic Standard Prog.	*SPL*
Sound Pressure + Impedance	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Basic Standard Prog.	*SPL + Imp*

This table lists all basic properties related to average level. Please use the links to get more information about details (use online help or pdf version for linked tables).

Parameter (shared among several measures or private for exclusive use by this measure) are editable on the *Property Page Tasks*.

Category	Properties
Stimulus	*SineSweep*
Shared Parameter	Generator, Routing, Resolution, Display setting, Recording Delay (e.g. due to Mic distance)
Private Parameter	**Level Frequencies**: In Frequency band: Format: f_{min}, f_{max} (separated by comma) At Discrete Frequencies: Format f_1; f_2; f_3 … (separated by semicolon or line break)
Limit Modes	*Shifting Limits*, Statistics (*Standard Deviation*), Absolute (*Absolute Limits*), Alignment to level (see below), *Jitter*
Results	Level in dB

Average Level must be enabled to allow the "Alignment to Level" option of the Frequency Response Limit.

The calculation of the Average Level is based on the smoothed frequency response.

Note: For adjusting and optimizing the SPL task, please refer to section *Optimizing Performance / SPL Tests*.

平均声压级是在用户定义的频带或在离散频率点范围内的平均声压级，它是一个单一的值。

下表给出了提供给平均声压级测量的所有 *Tasks*：

Tasks	信息	版本	Filename Convention
声压	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	基本 标准 可编程	*Imp*
声压 + 阻抗	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	基本 标准 可编程	*SPL + Imp*

下表给出的是有关平均声压级的所有基本属性。请使用链接获得更多详细信息（使用在线帮助或 pdf 版本取得链接的表格）。

Property Page Tasks 中的参数（在几个测量中可共享，或者为某个测量应用所独用）是可编辑的。

种类	属性
激励	*SineSweep*
共享参数	发生器，路径，分辨率，显示设置，录音延迟（例如由于 MIC 的距离）
特有参数	**声压级频率**: 在频带内：格式： f_{min}, f_{max} （用逗号分开） 在离散频率点上：格式： $f_1; f_2; f_3 \ldots$（用分号或换行分开）
门限种类	*Shifting* Limits，统计 （*Standard* Deviation），绝对（*Absolute* Limits ）, 对齐声压级（见下文）， *Jitter*。
结果	用 dB 表示的声压级。

必须开启平均声压级，频响门限中才会出现“对齐声压级”选项。
平均声压级的计算是基于平滑的频响。

注意：为了调整和优化 SPL（声压级）任务，请查阅章节*优化性能 /SPL Tests*.。

Harmonics / THD
谐波/THD

The first 4 harmonics (2^{nd} – 5^{th}) as well as THD can be measured and checked.

The Total Harmonic Distortion (THD) provides all accumulated harmonics within the analysis bandwidth (depending on sampling frequency) versus frequency.

Note, that there are low frequency and high frequency restrictions on Harmonics / THD:

- High frequencies are limited to roughly sample frequency / 4 (Second harmonic is at Nyquist Frequency).
  On the sample frequency refer to section *User Modes / Engineer / Property Page Tasks / Sound Device & Sampling Rate*.
- Low frequencies are limited to the first full period in the time signal to calculate a valid rms value. Thus this depends on the sweep speed and start frequency if swept from lower to higher frequencies.
  The result point resolution is also restricted to full periods. When more result points are within one signal period, the points are interpolated linearly to the next valid result.
  When swept from high to low frequencies, the results for the last (and not complete) signal period at lowest frequencies are copied from the last full period and therefore are constant.

This table lists all *Tasks*, which provide harmonics / THD measurement:

Tasks	Info	Version	Filename Convention
Sound Pressure	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Standard Prog.	*SPL*
Sound Pressure + Impedance	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Standard Prog.	*SPL + Imp*

This table lists all basic properties related to harmonics / THD. Please use the links to get more information about details (use online help or pdf version for linked tables).

Parameter (shared among several measures or private for exclusive use by this measure) are editable on the *Property Page Tasks*.

Category	Properties
Stimulus	*Sine Sweep*
Shared Parameter	Generator, Routing, Resolution, Display setting, Recording Delay (e.g. due to Mic distance)
Private Parameter	**Harmonics Smoothing:** Part of octave used for smoothing, no smoothing if left empty.
	Harmonics type: Absolute: THD and 2^{nd} -5^{th} Harmonics in dB SPL Relative (dB): THD amd 2^{nd}-5^{th} Harm., relative to fundamental in dB (rel), fundamental is 0 dB. If Absolute then THD is in Result Window 1 else in result Window 3.
Limti Modes	Shifting Limits, Absolute (Absolute Limits), Jitter separately for all harmonics
Results	2^{nd} - 5^{th} Harm. – Type is absolute then THD is shown in Result Window 1 else in Result Window 3.

A **THD+N** measure based on a tracking high pass filter is available with the programmers version of the QC-System. This THD+N will consider all harmonics and noise above the fundamental from 2^{nd} order up to the Nyquist frequency.

Note: Smoothing of THD and Harmonics is possible but not recommended. The fine structure of the distortion may reveal a defect (especially if tested without Rub&Buzz), which is not detectable in a smoothed THD.

The calculation of THD and Harmonics requires a certain bandwidth of the stimulus. Please allow sufficient bandwidth (at least 1 decade, depends on speed and speed profile).

Note: For adjusting and optimizing the SPL task, please refer to section *Optimizing Performance / SPL Tests.*

系统可以测量并核对开始的四次谐波（2 – 5 次）和 THD。

总谐波失真（THD）包含了分析带宽内（基于采样频率）所有相对频率的累积谐波。

注意：谐波/THD 有低频和高频限制：

- 高频限制在约 1/4 采样频率处（二次谐波在奈奎斯特频率上）。关于采样频率请查阅章节 *用户模式/工程师/属性页面任务/Sound Device* & Sampling Rate。
- 低频受到用来计算有效值的时间信号的第一个完整周期的限制。如果从低到高扫频，这取决于扫频速度和起始频率。
  结果点的分辨率也受限于完整周期。当一个信号周期内有很多的结果点，这些点将线性地插值出下一个有效结果。
  当从高到低扫频时，将会用最后一个完整周期的低频信号的结果替代最后一个不完整周期的低频信号的结果，因此它们是一致的。

下表给出了提供给谐波/THD 测量的所有 *Tasks*：

Tasks	信息	版本	Filename Convention
声压	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	标准 可编程	*Imp*
声压 + 阻抗	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	标准 可编程	*SPL + Imp*

下表给出的是有关平均谐波/THD 的所有基本属性。请使用链接获得更多详细信息（使用在线帮助或 pdf 版本取得链接的表格）。
Property Page Tasks 中的参数（在几个测量中可共享，或者为某个测量应用所独用）是可编辑的。

种类	属性
激励	*SineSweep*
共享参数	发生器，路径，分辨率，显示设置，录音延迟（例如由于 MIC 的距离）
特有参数	**谐波平滑**：按倍频程平滑，如果没有设置就不平滑。
	谐波种类： 绝对值：THD 和 2-5 次谐波。用声压级 dB 表示。 相对值：THD 和 2-5 次谐波相对于基频（dB）。基频为 0dB。 如果是绝对值，THD 显示在结果窗口 1 中，否则在结果窗口 3 中。
门限种类	*Shifting* Limits， 绝对（*Absolute* Limits ）, *Jitter*。，对所有的谐波都是独立的。
结果	2-5 次谐波。谐波种类是绝对值，则显示在结果窗口 1 中，否则在结果窗口 3 中。

QC 系统的可编程版可进行基于一个跟踪高通滤波器的 THD+N 测量。THD+N 测量考虑了从二次谐波到奈奎斯特频率的所有高于基频的谐波和噪声。

注意：允许对 THD 和谐波进行平滑处理，但并不推荐。好的失真结构可揭示一个缺陷（特别是假如没有异音检测的测试），平滑处理的 THD 是不会检测到该缺陷的。

THD 和谐波的计算需要一定程度的激励带宽，请提供足够的带宽（至少 10 倍，具体取决于扫描速度和扫描形式）。

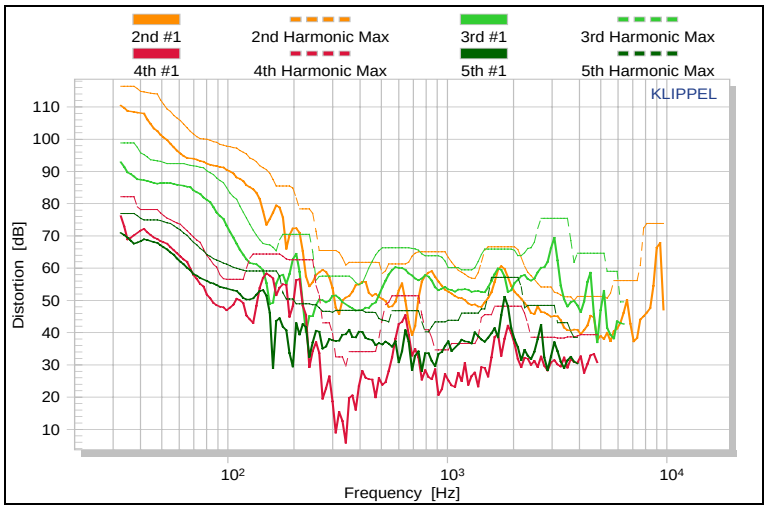
注意：为了调整和优化 SPL（声压级）任务，请查阅章节*优化性能 /SPL Tests*.。

Separating Harmonics visually

视觉上分离谐波

When using the individual harmonics, it is recommended to separate them visually in order to have a more clear graph.

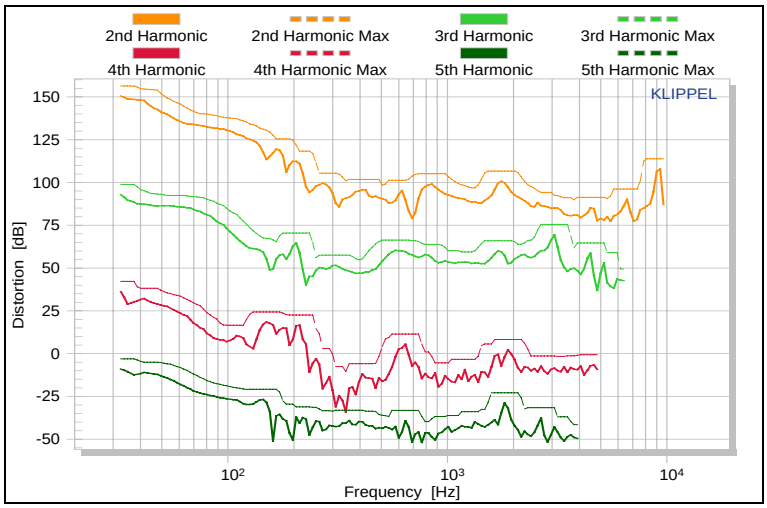
Absolute, non separated harmonics:



Apply the Harmonics – Shift parameter:

- Select Property Page Tasks
- Select Task SPL
- Open Category Display
- Set Harmonics – Shift parameter to (as an Example):
  win3YShift = [40. 0. -40. -80.]

Result: Separated Harmonics (Note: the absolute scale is NOT valid!)



Note: The absolute scale of the harmonics is NOT valid anymore, if the shift parameter is applied!

为了获得一个更加清楚的图表，建议从视觉上分离各次谐波。

完全没有分开的谐波：
（图略）

应用谐波-平移参数：

- 选择属性页面任务
- 选择任务 SPL
- 打开种类显示

- 设置谐波-平移参数如下（举例如下）：
  Win3YShift=[40. 0. -40. -80.]

结果：分离的各次谐波（注：绝对坐标是无效的！）
（图略）

Note: 当使用平移参数后，谐波的绝对坐标不再有效了。

Rub & Buzz
异音

Rub&Buzz is a generic term for a group of instantaneous, short time and low energy disturbances or defects in transducers. Although they are usually much lower in level (more than 80 dB!), they can be reliably detected. For even enhanced sensitivity the Meta Hearing technology can be optionally applied to the Rub&Buzz measure. This technique suppresses regular distortion, which mask potential defects, and provides therefore a higher rate of defect detection as well as higher headroom for limit setting.

Note, that there are low frequency and high frequency restrictions on the Rub&Buzz:

- High frequencies are limited to roughly
  *f < sample frequency / (2 * RBz Highpass).*
  On the sample frequency refer to section *User Modes / Engineer / Property Page Tasks / Sound Device & Sampling Rate*.
- Low frequencies are limited to the first full period in the signal to calculate a valid rms value. So this depends on the sweep speed and start frequency if swept from lower to higher frequencies.
  The resolution also is restricted to full periods. When by a higher resolution more points are within one signal period, the points are interpolated linearly.
  When swept from high to low frequencies, the results for the last (and not complete) signal period at the lowest frequency is copied from the last full period and therefore constant.

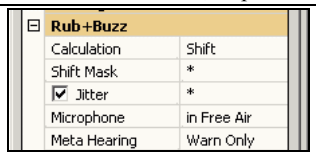
This table lists all *Tasks*, which provide Rub&Buzz measurement:

Tasks	Info	Version	Filename Convention
Sound Pressure	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Standard Prog.	*SPL*
Sound Pressure + Impedance	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Standard Prog.	*SPL+Imp*

This table lists all basic properties related to Rub&Buzz . Please use the links to get more information about details (use online help or pdf version for linked tables).

Parameter (shared among several measures or private for exclusive use by this measure) are editable on the *Property Page Tasks*.

Category	Properties
Stimulus	*SineSweep*
Shared Parameter	Generator, Routing, Resolution, Display setting, Recording Delay (e.g. due to Mic distance)

Private Parameter	**RBz Highpass:** corner frequency rel. to fundamental RBz – Type: **RMS**: repetetive defects (e.g. rubbing) **Peak**: short, impulsive defects (e.g. loose particle)
Limit Modes	 **Calculation**: *Shifting Limits*, Absolute (*Absolute Limits*), *Jitter* **Microphone:** Position of the measurement microphone. This setting influences the calculation of the Ambient Noise Limit. If measured *in Box/ Custom* the influence of ambient noise is reduced due to the shielding of the box enclosure comparing with testing *in Free Air*. See section Ambient Noise below for details. **Meta Hearing***: Warn Only: Failed IDD but passed Rub&Buzz results in a Warning and consequently to Pass, if no other measure failed. Enforce Fail:Failed IDD results in FAIL
Results	Rub&Buzz vs. frequency in Result Window 1. Crest factor of Rub&Buzz in Result Window 4.
	Meta Hearing*: Isolated Defect Distortion based on Meta Hearing Technology vs. frequency in Result Window 1 (by default hidden, can be activated using context menu of Result Window 1 / Customize / Subsets / IDD; IDD Max. Compensation of regular Rub&Buzz distortion by Meta Hearing Technology in Result Window 4.

* Only available, if optional Hearing License is installed.

Note: For more details and background information on Meta Hearing and Isolated Defect Distortion (IDD) see section *Appendix / Glossary / MeasurementTechnique (Theory) / Rub & Buzz / Meta Hearing Technology* for Details.

Note: For adjusting and optimizing the Rub&Buzz detection, please refer to section *Optimizing Performance / SPL Tests*.

异音是描述发生在换能器上的一组瞬间、短时和低能量的干扰或瑕疵的一般术语。虽然异音的声压级通常非常低（超过 80dB！），但还是可以确切地检测出异音。对于更高的灵敏度，超听力技术可用于异音测量（可选）。该技术抑制了有规律的失真（该失真将掩盖那些潜在的失真），从而可获得更高的缺陷检测率和更大的门限设置动态余量。

注意，对异音检测有低频和高频限制：

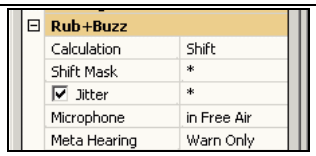
- 高频限制在大约
  $f < 采样频率 / (2 * 异音高通)$.
  关于采样频率请查阅章节 *用户模式/工程师/属性页面任务 /Sound Device* & Sampling Rate。。
- 低频限制在对应于计算有效值的时间信号的第一个完整周期所对应的频率。如果从低到高扫频，这取决于扫频速度和起始频率。
  结果点的分辨率也受限于完整周期。当在一个信号周期内有多余的结果点，这些点将线性地插入下一个有效结果。

当从高到低扫频时，将会用最后一个完整周期的低频信号的结果替代最后一个不完整周期的低频信号的结果，因此它们是一致的。

下表给出了提供给异音测量的所有 *Tasks*：

Tasks	**信息**	**版本**	**Filename Convention**
声压	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	标准 可编程	*Imp*
声压 + 阻抗	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	标准 可编程	*SPL + Imp*

下表给出的是有关异音的所有基本属性。请使用链接获得更多详细信息（使用在线帮助或 pdf 版本取得链接的表格）。
Property Page Tasks 中的参数（在几个测量中可共享，或者为某个测量应用所独用）是可编辑的。

种类	**属性**
激励	*SineSweep*
共享参数	发生器，路径，分辨率，显示设置，录音延迟（例如由于 MIC 的距离）
特有参数	**异音高通:** 与基频有关的角频率 异音种类： **均方根**:：可重复的缺陷（例如，摩擦） **峰值**：短时、脉冲缺陷（例如，松散的微粒）
门限种类	 **计算**： *Shifting* Limits, 绝对（*Absolute* Limits ）, *Jitter*。 **传声器:** 测量传声器的位置。该设置将影响到周围噪声门限的计算。如果在定制的消音箱中测量，相对于自由空间的测试，消音箱的保护作用将讲降低周围噪声对测量的影响。 **超听力：** 仅警告：如果没有其他测量失败，当 IDD 测试失败而异音通过时，会给出一个警告，并给出通过的最终结果。 执行失败：IDD 测试失败，结果是失败。
结果	异音，结果窗口 1。 异音峰值因子，结果窗口 4。
	超听力*： 基于超听力技术检测到的独立缺陷失真显示在结果窗口 1 中（默认是隐藏的，使用 Result Window 1 / Customize / Subsets / IDD; IDD Max 中的上下文菜单可激活它）。 采用超听力技术对常规异音失真的补偿结果显示在结果窗口 4 中。

* 只有安装了可选的超听力证书才可用。

注意：为了获得更多关于超听力技术和独立缺陷失真（IDD）的细节和背景信息，请查阅章节 附录/词汇表 / 测量技术（理论） /异音 / Meta Hearing Technology。

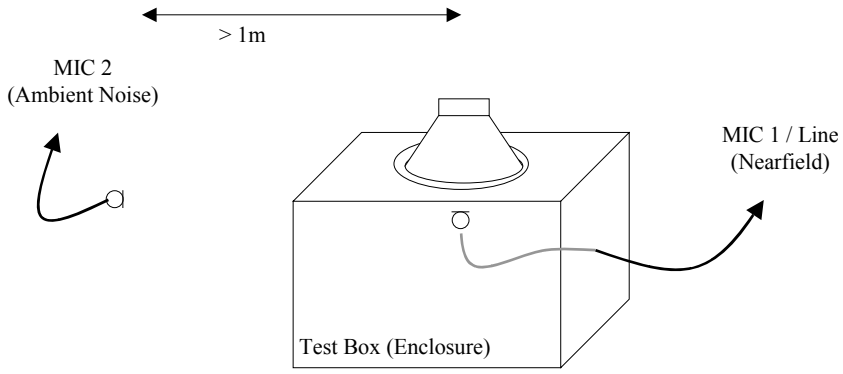
注意：为了调整和优化异音检测，请查阅章节*优化性能/SPL Tests*.。

Ambient Noise

环境噪声

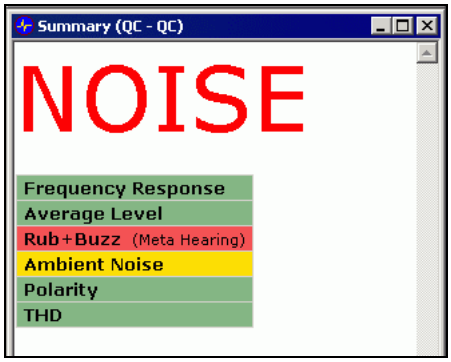
Distortion measurements (e.g. Rub&Buzz, THD, Harmonics) are sensitive to noise disturbances from production environment, here designated as *Ambient Noise*. Using a second microphone the impact on the measurement by external noise can be evaluated.

A typical setup for the test with Ambient Noise detection is shown below.



If the Ambient Noise test AND the Rub&Buzz test fails, the test result is invalid and therefore marked "NOISE" and the test should be repeated.

The overall result of this kind of test is FAIL (although NOISE is displayed).



This table lists all *Tasks*, which provide Ambient Noise measurement:

Tasks	Info	Version	Filename Convention
Sound Pressure	Nearfield microphone must be Mic1 or Line 1. Noise microphone must be Mic 2.	Standard Prog.	*SPL*
Sound Pressure + Impedance	Nearfield microphone must be Mic1 or Line 1. Noise microphone must be Mic 2.	Standard Prog.	*SPL + Imp*

This table lists all basic properties related to Ambient Noise. Please use the links to get more information about details (use online help or pdf version for linked tables).

Parameter (shared among several measures or private for exclusive use by this measure) are editable on the *Property Page Tasks*.

Category	Properties
Stimulus	*SineSweep*
Shared Parameter	Generator, Routing, Resolution, Display setting, Recording Delay (e.g. due to Mic distance)
Private Parameter	**Show Ambient Noise (Display):** If enabled, show curve in Result Window 1.
Limit Modes	No Parameter. The calculated headroom of the Rub&Buzz Limit is used to ensure optimal sensitivity for Ambient Noise. However, it is important for the sensitivity of the measurement to know the test condition. If tested in a box, an additional attenuation of the ambient noise can be considered. This attenuation can be measured and the result can be specified for optimal results. Please refer to *Testing in a box enclosure* for details.
Results	Noise floor if enabled in Result Window 1

失真测试（例如异音，THD，谐波）对于来自生产环境的噪声（在这里称为环境噪声）的干扰是非常敏感的。使用第二只传声器可以估计出外部噪声对测试的影响。

下图给出了一个带有环境噪声的典型测试设置。

（图略）

如果环境噪声测试 和异音测试都失败，则测试结果是无效的并因此而被标记上“噪声”，应该重新测试。这类测试总的结果是失败的（尽管也显示了“噪声”这一结果）。

（图略）

下表给出了提供给环境噪声测量的所有 *Tasks*：

Tasks	**信息**	**版本**	**Filename Convention**
声压	近场传声器必须接在 Mic 1 或 Line 1。	标准 可编程	*Imp*
声压 + 阻抗	近场传声器必须接在 Mic 1 或 Line 1。 噪声传声器必须接在 Mic 2。	标准 可编程	*SPL + Imp*

下表给出的是有关近场噪声的所有基本属性。请使用链接获得更多详细信息（使用在线帮助或 pdf 版本取得链接的表格）。
Property Page Tasks 中的参数（在几个测量中可共享，或者为某个测量应用所独用）是可编辑的。

种类	**属性**
激励	*SineSweep*
共享参数	发生器，路径，分辨率，显示设置，录音延迟（例如由于 MIC 的距离）

特有参数	显示环境噪声（显示）： 如果开启，在结果窗口 1 中显示曲线。
门限模式	无参数。计算得到的异音门限的动态余量可用于保证最优的环境噪声灵敏度。 然而，了解测试条件对于测量灵敏度是非常重要的。在消音箱中测试，可以进一步衰减环境噪声。
结果	如果开启噪声级别，它将在结果窗口 1 中显示。

Calculation of the Ambient Noise Limit

环境噪声门限计算

The limit of the ambient noise is derived from the Rub&Buzz limit considering the microphone noisefloor and the box enclosure shielding (noise attenuation).

In other words, the higher the Rub&Buzz Limit, the more ambient noise can be tolerated without influencing the measurment.

考虑到传声器的噪声基底和消音箱保护作用（噪声衰减），从异音门限衍生出环境噪声门限。

换句话说，异音门限越高，在不影响测量的情况下，更多的环境噪声将被容忍。

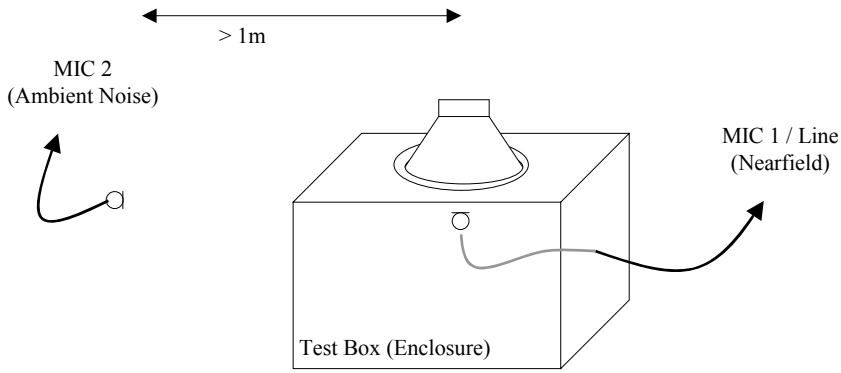
Testing in a box enclosure

在消音箱中测试

Please make sure that the box is appropriate in size. Refer to section *Appendix / Maximal SPL* for calculation of the maximum SPL level for a known box / driver combination.

Make sure that the maximum SPL level of your measurement microphone is not exceeded.

When testing in an enclosure, the influence of ambient noise is reduced considerably. Hence the threshold of ambient noise detection must be adopted.



This can be done generally assuming that the box has a typical ambient noise attenuation of 15dB over the whole frequency range.

Note: For Ambient Noise Monitoring a second microphone is required.
There is only one valid routing:
Nearfield Microphone → Mic 1 / Line 1 Input
Ambient Noise Microphone → Mic 2 Input
The Noise Microphone should be arranged in about 1 m distance from the DUT.
Do not use the Ambient Noise microphone inside a test enclosure!

If the specific attenuation of the box is known, a curve

frequency attenuation in dB

can be specified. Please see the section *Optimizing Performance / SPL Tests / Measurement Box / How to obtain the box attenuation curve* for details.

Although it is not recommended there is also the possibility to test in a free air environment. In this case a well shielded testing room is required.

请确保有一个大小合适的消音箱。为了计算一个已知消音箱/发声器组合下的最大声压级，请参阅章节 /附录/ *Maximal* SPL

。

确保不要超过您所用测量传声器的最大声压级。

当在消音箱中测试时，将大大降低环境噪声的影响。因此，必须调整环境噪声检测的门槛。

（图略）

一般认为消音箱可以在整个频率范围内衰减环境噪声 15dB。

注意：为监控环境噪声需要第二个传声器，仅有以下一种有效路径：

近场传声器 → Mic 1/Line 1 输入

环境噪声传声器 → Mic 2 输入

噪声传声器应该放置在距 DUT 1 米左右的地方。

请不要将环境噪声传声器放置在测试消音箱中。

如果可具体得到消声箱的衰减值，就可具体得到衰减（dB）与频率的关系曲线。为获得更详细的资料，请参见章节 *优化性能 / 声压级测试 / 测量箱体 /How* to obtain the box attenuation curve 。

虽然不推荐但还是可以在自由空间环境中做测试，在这种情况下，需要隔音很好的测试房间。

Polarity (Basic)

极性（基本）

Polarity indicates the acoustical phase of the transducer. It is based on the phase between the generator and the measured sound pressure level.

This table lists all *Tasks*, which provide polarity measurement:

Tasks	Info	Version	Filename Convention
Sound Pressure	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Basic Standard Prog.	*SPL*
Sound Pressure + Impedance	Measurement of Mic at Mic 1, Mic 2, Line 1 or Line 2.	Basic Standard Prog.	*SPL + Imp*

This table lists all basic properties related to Ambient Noise. Please use the links to get more information about details (use online help or pdf version for linked tables).

Parameter (shared among several measures or private for exclusive use by this measure) are editable on the *Property Page Tasks*.

This table lists all basic properties related to polarity. Please use the links to get more information about details (use online help or pdf version for linked tables).

Parameter (shared among several measures or private for exclusive use by this measure) are editable on the *Property Page Tasks*.

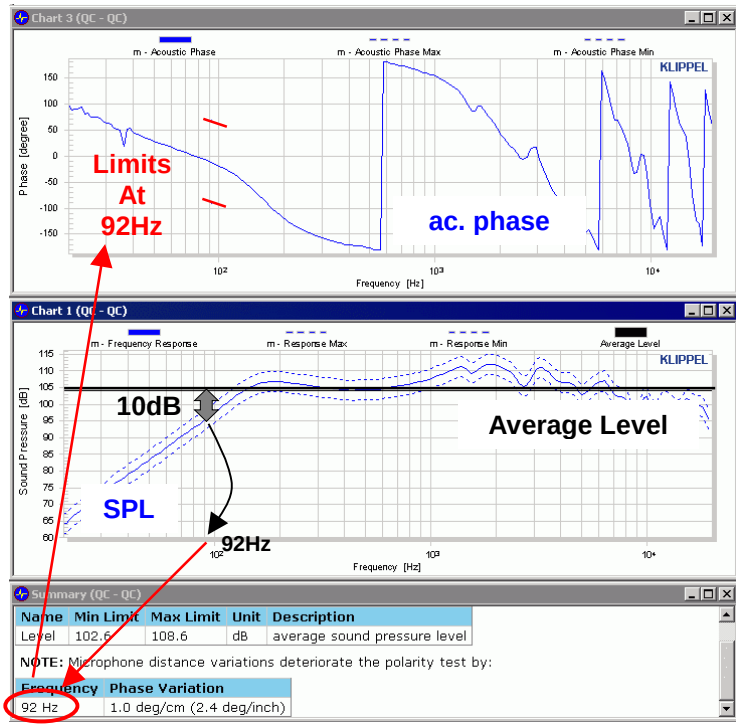
Category	Properties
Stimulus	*SineSweep*
Shared Parameter	Generator, Routing, Resolution, Display setting, Recording Delay (e.g. due to Mic distance)
Limit Modes	Test Frequencies: **Format: Frequency1 Tolerance1;** **Frequency2 Tolerance2;** **Frequency3 Tolerance3; ...** For a one-way driver one pair is sufficient. For multi way drivers for each driver the polarity of the individual channels can be checked. The test frequencies should be selected within the pass band of each channel. **Default:** * 80 The "*" character is a wild card for automatic limit setting. Refer to the example below for more details.
Results	Acoustical Phase in Result Window 5

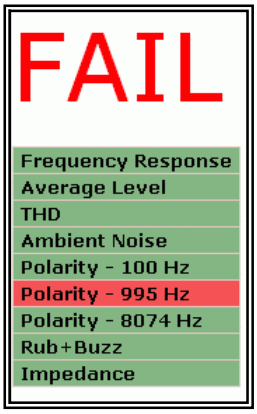
This is an example for the calculation of the acoustical phase. The limit is set to

[Test Frequencies] = * 80

which is the default setting.
The lowest frequency, were the SPL-level is 10dB below the average level is calculated (Please see middle graph below).
At this frequency the limits are set for polarity (top graph).
This ensures a good signal noise ratio during the test as well as low sensitivity against microphone distance variation.

As a result, the frequency of this lowest frequency will be displayed at the *Summary Window* (bottom window).





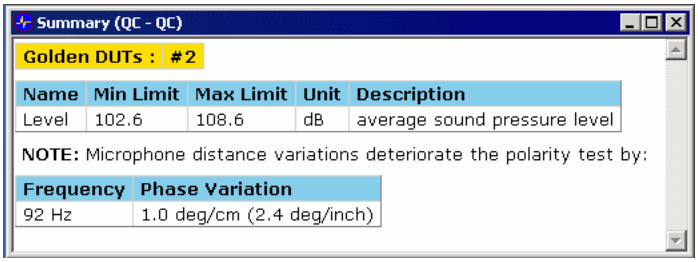
If multiple frequencies are defined to check for polarity, for each frequency an entry in the result list (in window Summary) is generated. This allows separating polarity failures of multi channel systems. Additional to the Keyword *Polarity* the test frequency is added.

In this example the limit is specified as:

[Test Frequencies] =	100	80
	995	80
	8074	80

Note: The polarity is based on the acoustical phase, which is highly determined by the geometrical distance from the driver to the Mic. Thus, to obtain consistent results a fixture is required to ensure reproducible arrangements and distances.

When calculating the limits the sensitivity of phase will be calculated, that would be caused by a variation of the microphone distance of 1 cm (1 inch). Please check the Summary result window.



极性代表的是电声换能器的声学相位。它是基于信号发生器和测量到的声压级之间的相位。

下表给出了提供给极性测量的所有 *Tasks*：

Tasks	**信息**	**版本**	**Filename Convention**
声压	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	基本 标准 可编程	*Imp*
声压 + 阻抗	在 Mic 1, Mic 2, Line 1 或 Line 2 的 Mic 测量。	基本 标准 可编程	*SPL + Imp*

下表给出的是有关极性的所有基本属性。请使用链接获得更多详细信息（使用在线帮助或 pdf 版本取得链接的表格）。
Property Page Tasks 中的参数（在几个测量中可共享，或者为某个测量应用所独用）是可编辑的。

种类	**属性**
激励	*SineSweep*
共享参数	发生器，路径，分辨率，显示设置，录音延迟（例如由于 MIC 的距离）
门限模式	测试频率： **格式：频率 1 公差 1；** **频率 2 公差 2；** **频率 3 公差 3；…** 对于单路发声器一对就够了；对于多路发声器，可以检验每个发声器各自通道的极性。应该在每个通道的通带内选择测试频率。 **缺省：　　*　　80** “*”号表示自动门限设置时的万能牌。更多细节参见下面的例子。
结果	声相位，结果窗口 5。

下面是计算声相位的一个例子。门限设置为

[测试频率] = * 80

这是一个默认设置。

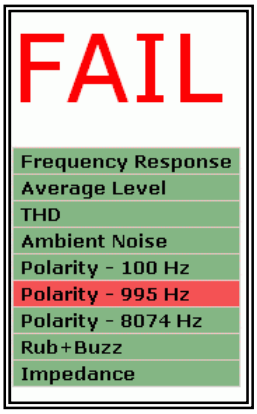
可计算出最低频率，这里声压级低于平均声压级 10dB （请看下图中部）。

在这个频率点上设置极性的门限（下图的顶端）。

这样保证了在测试过程中有一个好的信噪比，以及相对传声器的距离变化的低灵敏性。

作为结果，该最低频率的频率值将在摘要窗口中显示（底部窗口）。

（图略）



如果定义多个频率来检查极性，在（摘要窗口）结果列表中对每个频率都会有一个条目。这就允许分离多通道系统的不合格极性。除了关键词 *极性 之外*，还加入了测试频率。
在这个例子中门限指定为：

[测试频率]=　　100　80
　　995　80
　　8074　80

注：极性是基于声相位的，它高度依赖于从扬声器到传声器的几何距离。因此为了获得一致的结果，需要一个固定装置来确保可重复的安排和距离。

当计算门限时，还将计算相位的灵敏度，它是由传声器距离每变化 1 厘米（1 英吋）所引起的。请检查综述结果窗口。

（图略）

Reference Units

参考单元

In most cases limits are obtained from known good samples or reference units. The simplest way to create limits is measuring one (good) sample and deviate the limits from the result (e.g. by shifting the curve) to create a tolerance corridor.

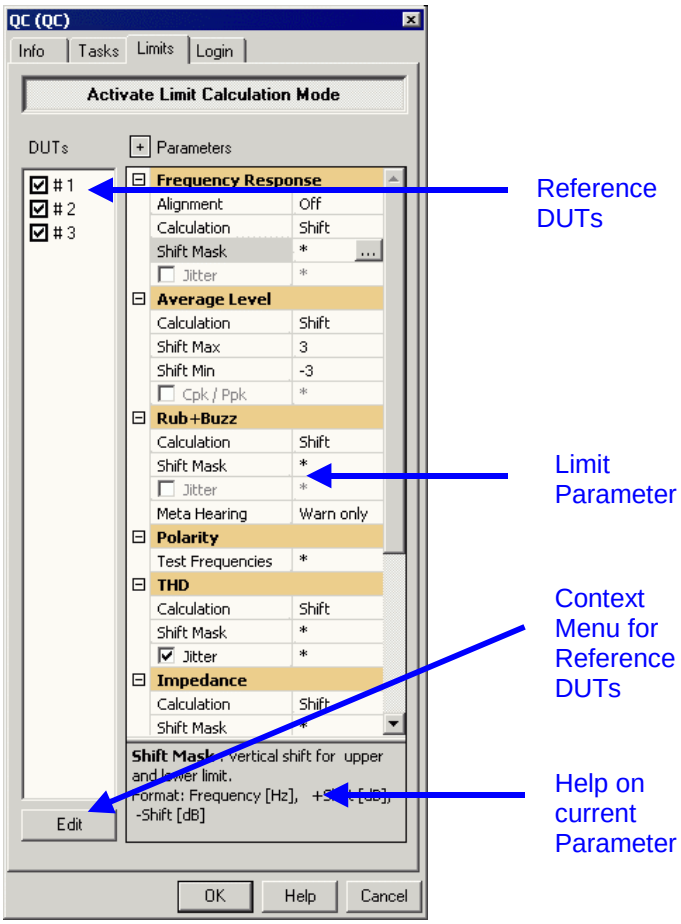
Measuring reference units is performed in a special mode, the *Limit Calculation Mode*. This mode is available in the Engineer or Programmer Mode only (see chapter *User Modes*).

The Property Page *Limits* is dedicated to Reference DUTs and Limit Calculation.

Note: Before measuring Reference DUTs and calculating limits, all settings should be double checked before. Reference DUTs are valid for the current setup only. If the setup will be changed, the reference DUT become invalid and are deleted (after a message)! So make sure that your setup is ok.

To measure Reference DUTs:

1. Activate Limit Calculation Mode.
2. Press Start to measure one or more connected DUT
3. Press OK to calculate limits or release the Limit Calculation Mode.



在大多数情况下，门限由已知的好的样品或者参考单元得到。创建门限的最简单的方法是测量一个（好的）样品，然后从结果中提取门限（比如平移曲线），创建一个公差范围。

在特定的 *门限计算模式* 下，可测量参考单元。只有工程师或者程序员模式可使用该模式（参见章节 *用户模式*）。

属性页面 *门限* 专用于参考 DUT 和门限计算。

注：在测量参考 DUT 和计算门限之前，应该反复检查所有设置。参考 DUT 只对当前设置有效。如果设置改变，则参考 DUT 变为无效并被删除（在一个消息之后）！所以，请确认您的设置是正确的。

测量参考 DUT：

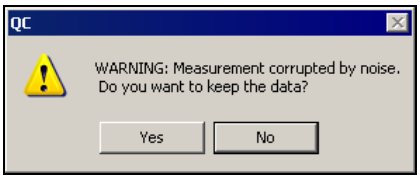
1. 激活门限计算模式。
2. 按开始键测量一个或者多个连接的 DUT。
3. 按 **OK** 键计算门限，或者释放门限计算模式。

（图略）

Noise Check for Reference Units

参考单元的噪声检查

When measuring Reference DUTs the noise from the production line should be minimized. However, the system detects an excessive noise although no limits are calculated yet. The following message appears:



Press "no" to reject the measurement. In this case there will be no reference DUT added to the list. You may also allow this DUT to be included in the list.

当测量多个参考 DUT 时，应保证来自生产线上的噪声最小。然而，尽管还没有计算门限，但系统还是可以检测到过度的噪声。出现以下消息框：

（图略）

点击“NO”按键拒绝测试。在这种情况下，不会有参考 DUT 添加到列表中。您也可以允许这个 DUT 加入列表中。

Managing Reference DUTs

管理参考 DUT

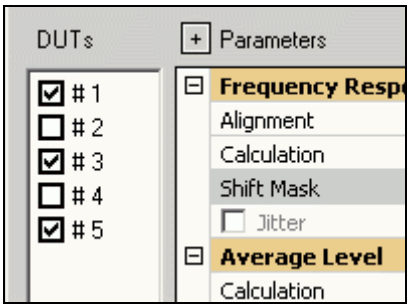
To measure Reference DUTs:

1. Activate Limit Calculation mode.
2. Connect a device you want to measure as reference.
3. Press **Start** button in the control panel.

Note: The Basic QC System allows measuring only one reference DUT. You need to upgrade to the Standard Version to get support of multiple Reference DUTs.

All checked Reference DUTs are used to calculate the limits.

Unchecked DUTs are not considered for the limits but data will not be deleted.

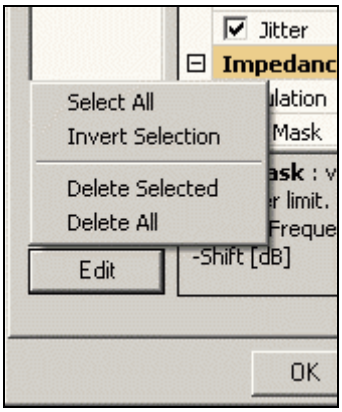


Note: For details on the limit calculation see chapter *Test Configuration / Limit Calculation.*.

Each reference device is displayed as a number in the DUT section of the Limit page. By clicking on a number the corresponding measurement curves are highlighted in the result windows.

To remove reference DUTs:

1. Activate Limit Calculation mode.
2. Click on the reference device you want to remove. Multiple selection is supported (Keep **shift** pressed while selecting range or keep **Ctrl** pressed while selecting individual DUTs).
3. Press **Edit** button to open the context menu, select **Delete Selected**.



You may use **Delete All** to remove all DUTs from the list.

Using **Select All** and **Invert Selection** you may manage the selection of a larger number of reference DUTs in an effective way.

测量参考 DUT：

1. 激活门限计算模式。
2. 连接一个您想要成为参考设备测量的设备。
3. 在控制面板中按 **开始** 键。

注：在基本版的 QC 系统中只允许测量一个参考 DUT。您需要将系统更新到标准版来支持多个参考 DUT。

所以被检验的参考 DUT 都是用来计算门限。

未被检验过的 DUT 不用于计算门限但是数据不会被删除。

（图略）

注: 为了解门限计算的细节，请参见章节 *测试配置 / Limit* Calculation 。

在门限页面的 DUT 部分，每个参考设备都显示一个数字。通过点击这个数字，则在结果窗口中相应的测量曲线会变亮。

移除参考 DUT：

1. 激活门限计算模式。
2. 点击您想要移除的参考设备。支持多选（按住 **shift** 键的同时，选择范围，或者按住 **Ctrl** 键的同时，选择单独的 DUT）。
3. 按 **编辑** 键打开文本菜单，选择 **清除选择** 。

（图略）

您可使用 **清除全部** 来从列表中删除所有 DUT

使用 **全选** 和 **反选** ，您可以一种有效的方式来管理大量参考 DUT 的选择。

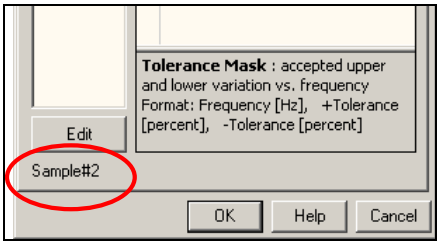
Labeling Reference DUTs

标记参考 DUT

All measurements within the Limit Calculation Mode are numbered consecutively (#1, #2, #3…). These numbers are added to the curves in the result windows to assign the curves to the Reference DUTs.

However, a label can be assigned to Reference DUTs using the Serial Number function.

Specify the label as Serial Number (e.g. Sample#1) and press Enter to start the test. When selecting the reference DUT in the DUTs list, the label is shown in the bottom line of the Property Page.



More Information about Serial Number Handling can be found in section *Test Configuration / Serial Number Handling.*

在门限计算模式中，所有的测量都是连续编号的（#1, #2, #3…）。这些编号被加入结果窗口中的曲线，每条曲线对应一个参考 DUT。

然而，使用序列号功能也可以分配标记给参考 DUT。

用系列号指定标记（如样本 #1）标记并按 **Enter** 键开始测试。在 DUT 列表中选择参考 DUT，则在属性页面的底部会显示该标记。

（图略）

更多有关序列号处理的信息请参阅章节 *测试配置/ Serial* Number Handling 。

Setting Limits

设置门限

Limit parameters are arranged in groups like the task parameters. You have to activate the Limit Calculation Mode, if you want to change limits. Clicking on a parameter field, the help line at the bottom of the limit parameter section displays some specific information concerning the parameter (function, format etc.).

If you have more than one task in your test that measures a certain parameter, you should give each test task an own name or number. The task name will then be displayed as a part of the limit parameter and result name. Please see section *Test Configuration* / Tasks / *Adding Labels to Tasks.*

On calculation methods for limits, refer to chapter *Test Configuration / Limit Calculation.*

门限参数如同任务参数一样被安排成组。如果您想要更改门限，您必须激活门限计算模式。点击参数区域，门限参数区域底部的帮助行会显示一些有关参数的特殊信息（功能、格式等）。

如果在您的测试中有不止一个任务来测量某个参数，您应该给每个测试任务一个自己的名字或者数字。任务的名字将会作为门限参数和结果名字的一部分显示出来。请参见章节 *测试配置/任务/Adding* Labels to Tasks。

有关门限计算的方法，请参阅章节 *测试配置/Limit* Calculation 。

Limit Calculation

门限计算

In this chapter the generic limit calculation methods are explained. For each measure different limit calculation methods apply to keep the complexity low and dedicated to the physics.

本章讲解一般的门限计算方法。对于每个测量使用不同的门限计算方法以获得低的复杂度和物理的专用性。

General

概述

For curves vs. frequency the limits are frequency dependent.

For single number measures the limit is just a number.

Note: The frequency range of the limit does not have to meet the range of the measure. The limit will only be applied in the range of measured values and specified limits.

Depending on the measure there might be also combinations of limit modes available. For instance it is good to combine statistics and shifting to allow a minimal headroom. Refer to the limit parameter of the tasks, which combination is available.

频响曲线的门限依赖于频率。

对于单个点的测量门限只是一个数值。

注：门限的频率范围不需要与测量频率范围相一致。门限仅应用于被测值和指定门限的范围。

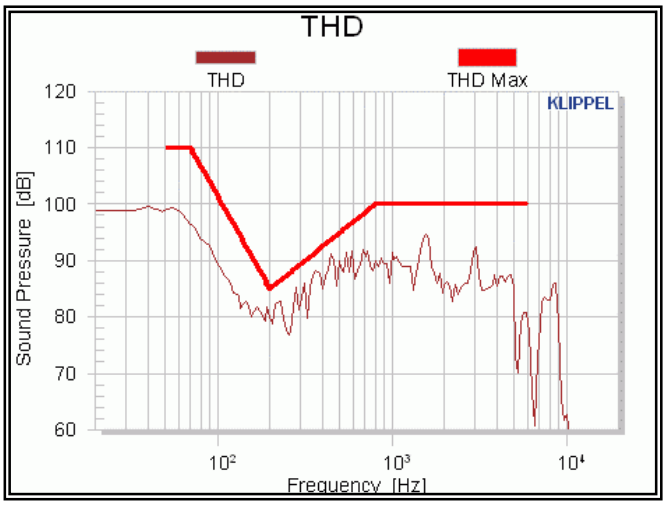
根据测量要求，可能要求一个门限模式的组合。举例来说，为了获得一个最小动态余量，统计门限和平移门限就是一个很好的组合。参考任务门限参数，参数组合是有效的。

Absolute Limits

绝对门限

Arbitrary, constant limits may be specified or imported. If the frequencies of the entered limit do not agree with the measure, the limit values exactly at the frequency points of the measure are calculated by linear interpolation.

Note that absolute limits may be combined with a shift to create symmetric limits easily. Just import one absolute curve for MIN and MAX limit and apply an additional shift.



Example of absolute Limit:

Limit definition:

```
50    110
70    110
200   85
800   100
6000  100
```

Note: Absolute limits do not depend on the reference unit measurements. Even if recalibrated using Golden Units (see chapter *Golden DUT Handling*), absolute limits are always kept constant.

可指定或引入绝对的、不变的门限。如果输入门限的频率不符合测量，则通过线性插值，可准确地计算出测量频率点上的门限值。

注意，绝对门限可以简单地结合平移建立一个匀称的门限。只需输入一个最小和最大门限值得绝对曲线，再加平移。

（图略）

绝对门限的例子：

门限定义：

```
50    110
70    110
200   85
800   100
6000  100
```

注意: 绝对门限不依赖于参考单元测试。 即使是使用黄金单元做再校准（参见章节 *黄金单元 DUT 处理* ），绝对门限总是保持常数。

Relative Limits

相对门限

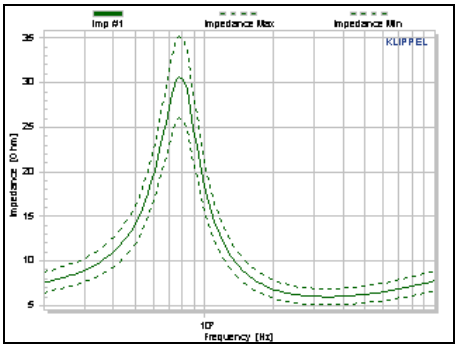
The relative limit is calculated by multiplying the tolerance value to the average of all enabled reference units. This is especially useful for the impedance curve to allow sufficient headroom at the resonance peak, were a simple shift (adding the shift value) is not sufficient.

Format for curves: [frequency +tolerance -tolerance]

Job	Example	Description
Single number measure (e.g. Re)	3 -3	Re(lim) = Re(reference) ± 3 Ohm
Constant shift for curves (e.g. impedance)	* +15 -15	for all frequencies: Imp(lim) = Imp(reference) * (1 ± tolerance/100)

For more options on frequency dependent limits, refer to section *Shifting Limits* below.

Example for relative limits (impedance):



使用公差值乘所有允许的参考单元的平均可计算相对门限。相对门限对阻抗曲线非常有用，它允许在共振峰处有足够的动态余量，在共振峰处，一个简单的平移（加一平移值）是不够的。

曲线格式：[频率 +公差 –公差]

工作	举例	描述
单个测量（如 Re）	3 -3	Re（门限） = Re（参考） ± 3 Ohm
曲线固定平移（如，阻抗）	* +15 -15	对所有频率： Imp（门限） = Imp（参考） * (1 ±公差/100)

更多有关频率隶属门限的选择，请参考下面章节 *Shifting* Limits 。

相对门限的例子（阻抗）：

（图略）

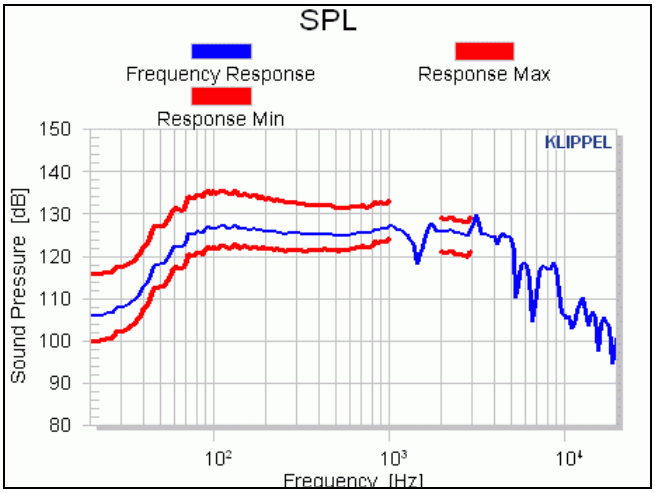
Shifting Limits
平移门限

The shifted limit is calculated by adding the shift value to the average of all enabled reference units.

Format for curves: [frequency +shift -shift]

Job	Example	Description
Single number measure (e.g. Level)	3 -3	Re(max) = Re(reference) ± 3 Ohm
Constant shift for curves (e.g. SPL)	* +3 -3	for all frequencies: Spl(max) = Spl(reference) ± 3 dB
Bandlimited Shift (SPL)	10 +5 –5 800 +5 -5	limit only exists from 10 to 800 Hz. Spl(max) = Spl(reference) ± 5 dB
Frequency dependent Shift (interpolated)	10 +5 –5 500 +3 –3 800 +2 –2	limit only exists from 10 to 800 Hz. Shift interpolated between 10,500,800 Hz with frequency from ±5 → ±3 → ±2 dB
Frequency dependent Shift (Steps)	10 +5 –5 500 +5 -5 500 +3 –3 800 +3 –3	limit only exists from 10 to 800 Hz. is ± 5dB between 10 and 500 Hz; ± 3 dB from 500 Hz to 800 Hz.

Asymmetric Shift (SPL)	10 +3 –3 500 +4 –8 800 +2 –1	different positive and negative limits
Segmented limits (SPL)	20 10 -6 1000 6 -3 1500 * * 2000 3 -5 3000 3 -5	Limit defined from 20-1kHz and from 2-3kHz. '*' stands for 'not defined'. See Example graph below.



Segmented, asymmetric Limits (SPL)

Note: Shifting Limits for relative Harmonics
Relative Harmonics in dB have a shift also in dB. However, when relative Harmonics in percent are selected, the shift is specified also in dB.
So a shift of 6 dB means a limit of the double percentage of relative harmonics or THD.
The benefit is to have one shift parameter and the possibility of switching between percentage and dB scale without touching the limit setting.

对所有有效的参考单元平均值加上一个平移值即可算得平移门限。

曲线格式： [频率 +平移 –平移]

工作	举例	描述
单个测量（如声压级）	3 -3	Re（最大） = Re（参考） ± 3 Ohm
曲线固定平移（如，SPL）	* +3 -3	对所有频率： Spl（最大） = Spl（参考） ± 3 dB
带限平移（SPL）	10 +5 –5 800 +5 -5	门限（10 ~ 800 Hz） Spl（最大） = Spl（参考） ± 5 dB
频变平移（插值）	10 +5 –5 500 +3 –3 800 +2 –2	门限（10 ~ 800 Hz） 10Hz 平移 ±5 dB→ 500Hz 平移 ±3 dB→ 800Hz 平移 ±2 dB
频变平移（步进）	10 +5 –5 500 +5 -5 500 +3 –3 800 +3 –3	门限（10 ~ 800 Hz） ± 5dB（10~ 500 Hz）； ± 3 dB（500~800 Hz）。
不对称平移 (SPL)	10 +3 –3 500 +4 –8 800 +2 –1	不同的正负门限

分段门限 (SPL)	20 10 -6 1000 6 -3 1500 * * 2000 3 -5 3000 3 -5	门限仅在 20Hz~1kHz 和 2-3kHz 有定义。 “*” 代表“不定义”。请看下图的例子。

（图略）

分割的，不对称门限（SPL）。

注意： 对于相对谐波的平移门限

用 dB 表示的相对谐波其平移也用 dB 表示。然而，当选择用百分比来表示相对谐波时，平移仍然用 dB 来表示。

所以，6dB 的平移表示相关谐波或 THD 的双百分比门限。

其好处在于用一个平移参数，可在百分比和 dB 尺度之间切换而不会碰到门限设置。

Standard Deviation

标准偏差

Limits also can be calculated using the standard deviation *sigma* of the reference measurements.

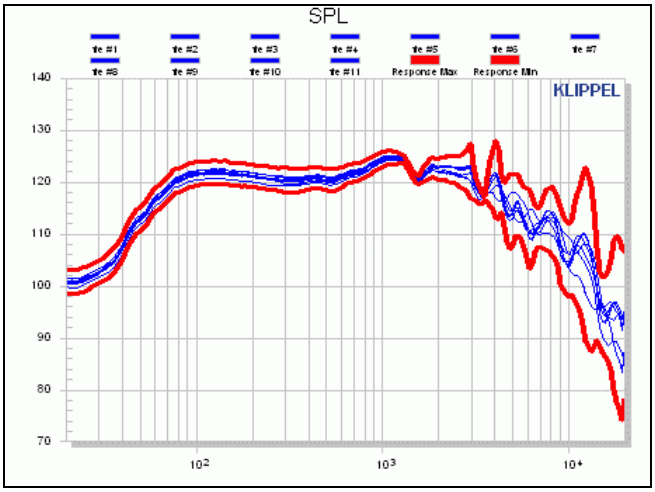
Sigma characterizes the variation of a parameter. The more variation the higher is sigma. Thus limits are widened up for regions were the parameter or curves vary.

Note: If using statistical calculation, ensure sufficient number of reference DUT. At least 10 DUT should be in the pool.

Format for curves: [frequency +x*sigma –x*sigma]

(x … factor of sigma)

The syntax is identical to the *Shifting Limits*. Asymmetrical, segmented and band limited limits are supported.



Example for statistical Limits (SPL)

Note: It is recommended to use a Statistical Limits always with Shift to ensure a minimal headroom. Using Statistics only the tolerance may become very useless small.

门限也可以用标准偏差（参考测量的 *sigma* ）来计算。

Sigma 描述了参数变化的特性。变化越大，sigma 值越高。因此，门限扩大了范围与参数或曲线的变化有关。

注: 如果使用统计计算，需要保证足够的参考 DUT 数目，DUT 数目至少需要 10 个。

曲线格式： [频率 +x*sigma –x*sigma]，（x 为 sigma 的系数)

该语法关系类似于 *Shifting* Limits 。同样也支持非对称、分割的和带限门限。

（图略）

统计门限的例子（SPL）。

注: 建议使用带平移的统计门限以保证最小的动态余量。仅采用统计时，公差有可能变得非常小而没有作用。

Jitter

抖动

Sharp resonances in the measured Curve usually generate limits with identical dips and peaks in it. However, these resonances may vary during production and should not cause a failed test. To provide this functionality* limits may be "jittered" or widened up in respect to frequency or X-axis. The graph below shows the SPL measure and the normally shifted limit (dotted curve). This limit is very close to the measure and a small variation of the resonance may cause a failed test. The Jitter function is a simple search for extrema within a certain frequency range. A percentage of the current frequency is specified to define this range. The jittered max limit value is the maximum of all limit points in this range while the jittered min limit is the minimum respectively.

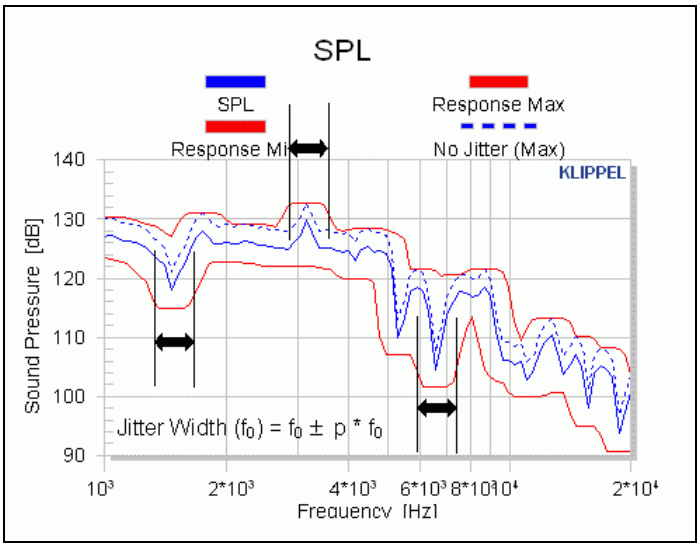
$$JitteredLimit_{Max}(f) = Max\{Limit(f \pm p * f)\} \quad p\text{...Percentage}$$

$$JitteredLimit_{Min}(f) = Min\{Limit(f \pm p * f)\}$$

Note: (1) Jitter is applied after the normal Limit Calculation.
(2) The frequency range of the Limit is **NOT** affected by the Jitter-Processing.

Jitter may be applied to SPL, THD, Rub&Buzz or Impedance. The Jitter factor p must be specified in the following format:

Job	Example	Description
Constant Jitter for complete limit	* 10	for all frequencies: p = 10 %
Bandlimited Jitter	10 8 800 8	limit is jittered only from 10 to 800 Hz.
Frequency dependent Jitter (interpolated)	5000 10 6000 20 7000 10	Jitter starts at 5kHz, increases with frequency to 6k (20%) and decreases to 7k (10%). No jitter out of the band 5 kHz – 7 kHz.
Frequency dependent Jitter (Steps)	5000 20 6000 20 6001 10 7000 10	Jitter starts at 5kHz, constant up to 6k (20%) and from 6 kHz to 7 kHz constant at 10%. No jitter out of the band 5 kHz – 7 kHz.
Segmented Jitter	2000 10 3000 10 4000 * 5000 10 6000 10	Jitter only defined from 2-3 kHz and from 5-6 kHz. '*' stands for 'not defined'. No jitter below 2 kHz, between 3 and 5 kHz and above 6 kHz.



Jittered limits (p = 10%) in SPL

*We would like to thank Pietro Massini from Sipe SpA. for suggesting this algorithm.

在测量得到的曲线中激烈的共振通常产生带有相同下降和峰值的门限。然而，这些共振在产线上可能不同，并不会导致测试失败。

为提供该功能*，门限根据频率抖动，或根据 X 轴展宽。下图给出了测量 SPL 的情况，点线是一般平移门限。该门限非常接近测量，共振峰的微小变化都可能导致测试失败。抖动功能是一种对某一频率范围内的极端情况的简单搜寻。当前频率的百分比明确定义了它的范围。抖动的最大门限值是这个范围内所有门限的最大值，而抖动的最小门限是相应的最小值。

$$JitteredLimit_{Max}(f) = Max\{Limit(f \pm p * f)\} \qquad p...百分比$$

$$JitteredLimit_{Min}(f) = Min\{Limit(f \pm p * f)\}$$

注： (1) 抖动用在一般门限计算之后。
(2) 门限的频率范围不受抖动处理影响。

抖动门限可用于 SPL、 THD、异音或阻抗。下表明确定义了抖动系数 p：

工作	举例	描述
完整门限的固定抖动	* 10	所有频率： p = 10 %
带限抖动	10 8 800 8	门限抖动只在 10~800 Hz 之间。
频变抖动（插值）	5000 10 6000 20 7000 10	抖动从 5kHz 开始，到 6kHz 时升到 20%，），而到 7kHz 又降到 10%。在 5-7 kHz 频带之外无抖动。
频变抖动（步进）	5000 20 6000 20 6001 10 7000 10	抖动从 5kHz 开始，一直维持 20% 到 6kHz。从 6 kHz 到 7 kHz 又维持 10%。在 5-7 kHz 频带之外无抖动。
分段抖动	2000 10 3000 10 4000 * 5000 10 6000 10	抖动仅在 2-3kHz 和 5-6kHz 有定义。“*” 代表“不定义”。在低于 2 kHz，3-5kHz，以及 6kHz 以上，无抖动。

（图略）

SPL 的抖动门限（p = 10%）。

* 我们要感谢 Sipe SpA 的 Pietro Massini，是他建议了这个算法。

Cpk / Ppk Limits

Cpk/Ppk 门限

The following parameters define the statistical post processing of parameter variation using performance indices. For background on Cpk/Ppk statistics, see chapter *Appendix / Glossary* / *Ppk / Cpk.*

Cpk Poolsize	number of DUT that are considered in the short term variation index Cpk
Cpk Limit **Ppk Limit**	Limit value for Cpk and Ppk. Ppk / Cpk < 1: Process out of control Ppk / Cpk > 1.33: Process within 4 sigma range Ppk / Cpk > 2.0: Process within 6 sigma range
Passed only	1: Only consider passed DUT in Cpk/Ppk statistics. 0: Consider all DUT in Cpk/Ppk statistics.

以下参数定义了用性能指数对参数变化进行统计后处理。要了解 Cpk/Ppk 统计的背景知识，请参阅章节 *附录 / 词汇表 / Ppk / Cpk.*

Cpk 池大小	用于统计短时变化指数 Cpk 的 DUT 数目。
Cpk 门限 **Ppk 门限**	Cpk 和 Ppk 的门限值。 Ppk / Cpk < 1：处理失去控制 Ppk / Cpk > 1.33：处理在 4 sigma 范围内 Ppk / Cpk > 2.0： 处理在 6 sigma 范围内
仅通过的	1：在 Cpk/Ppk 统计时仅考虑通过的 DUT。 0：在 Cpk/Ppk 统计时考虑所有的 DUT。

Tasks

任务

In this chapter all available default tasks are described.

Since tasks could not be used in the Basic version to compose tests, this chapter is applicable for Standard and Programmable version only.

Filename	Label on Prop.-Page Tasks	Measures / Comments
spl.{version}.task.kla	Sound Pressure	Freq.-response, Level, Polarity, THD, Rub&Buzz, IDD, Ambient Noise
imp.{version}.task.kla	Impedance	Impedance, T/S Parameter based on Multitone or Sweep
spl-imp.{version}.task.kla	Sound Pressure + Impedance	Freq.-response, Level, Polarity, THD, Rub&Buzz, IDD, Ambient Noise, Impedance, T/S Parameter based on SineSweep.
start.{version}.control.kla	Start/Finish	Global settings for routing, logging

在这个章节中将描述所有可用的默认任务。

由于基本版不能用任务组成测试，所以本章节仅适用于标准版和可编程版。

文件名	在属性页面任务中的标签	测量/注释
spl.{version}.task.kla	声压	频率响应、声压级、极性、THD、异音、IDD、环境噪声。
imp.{version}.task.kla	阻抗	基于多频和扫频的阻抗、T/S 参数。
spl-imp.{version}.task.kla	声压+阻抗	频率响应、声压级、极性、THD、异音、IDD、环境噪声，基于多频和扫频的阻抗、T/S 参数。
start.{version}.control.kla	开始/结束	路径和登录的总设置

Filename Convention
文件名规范

All Task file names consist of the following structure:
{Task Name}.{version}.{function}.{Mode}
Example: spl.0001.task.kla, start.0001.control.kla

Task Name	Short name of the task (e.g. *SPL*)
Version	Code version number, 4 digits
Function	*task*: describes one measurement applied to DUT *control*: describes overall Pass/Fail calculation and overall settings (report, routing etc.)
Mode	*klb*: Binary file. Not editable. Optional linked with license requirement. Usable for Standard and Programmable version *kla*: Text file. Editable with any editor. No license requirement

所有的任务文件名都是由以下结构组成：
{任务名}.{版本}.{功能}.{模式}
例子：spl.0001.task.kla，start.0001.control.kla

任务名	任务的简称（如 SPL）
版本	版本编号，4 个数字
功能	*任务*：描述一个用于 DUT 的测量 *控制*：描述全部的通过/失败计算和全部的设置（报告、路径等）
模式	*klb*：二进制文件。不可编辑。需要证书的可选链接。 对标准版和可编程版可用。 *Kla*：文本文件。可用任意编辑器编辑。不需要证书。

Test Sequences

测试顺序

Using the tasks it is straight forward to create test sequences that consist of multiple tasks. Just add or remove the tasks on the Property Page Tasks. Refer to section *User Mode / Engineer* / *Property Page Tasks* for more details.

Use labels (see below) to identify the tasks, if the same task is used several times.

Note: Test Sequences are available in Standard / Programmable Version only. The Basic version is restricted to one single task (except preconditioning for ferro fluids).

当使用任务时，可直接创建测试序列，它包含多个任务。只需在属性页面任务中添加或者移除任务。详情请参阅章节 *用户模式/工程师/ Property* Page Tasks 获得更多的细节。
如果多次使用同一个任务时，请使用标签（见下文）定义任务。

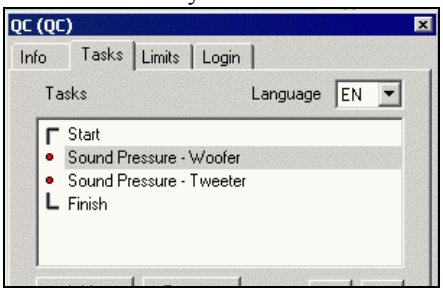
注: 测试序列仅在 标准版/可编程版有效。基本版只限于一个单一任务（除非对含铁流体作预处理）。

Adding Labels to Tasks

添加任务标签

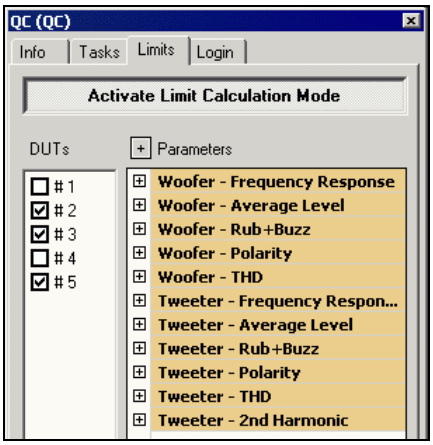
If you have more than one task in your test that measures a certain parameter, you should give each test task an own name or number. The task name will then be displayed as a part of the result and of the limit parameter name.

1. Click on the task Property Page.
2. Click on a task you want to be labeled.
3. Press function key F2 and enter a new task name.

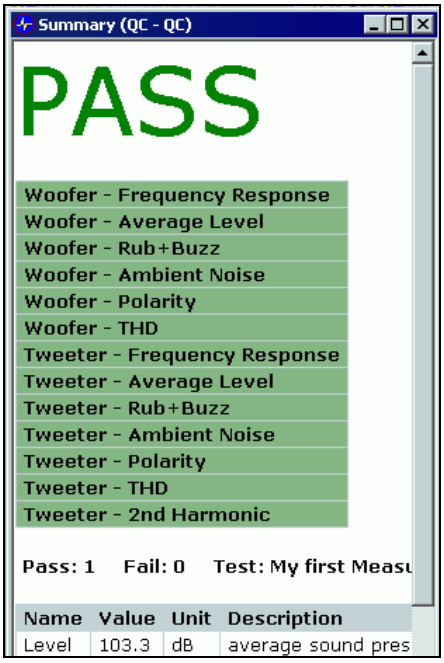


Example: You have two tasks in your test that measure the frequency response of a system or coax driver with a different setup for Woofer and Tweeter. You may now name one task *Sound Pressure-Woofer* and the other *Sound Pressure-Tweeter*. In the limit page you will then find a limit parameter Woofer-Sound Pressure and a second named Tweeter-Sound Pressure.

Limit Parameter with labels:



Result list with labels:



如果在您的测试中有不止一个任务来测量某个参数，您应该给每个测试任务一个它自己的名字或数字。任务名将会作为结果和门限参数名的一部分显示出来。

1. 点击属性页面任务。
2. 点击您想要标记的任务。
3. 按功能键 F2 并输入一个新任务名。

（图略）

举例：在您的测试中您有两个测量任务，测试带有针对低音扬声器和高音扬声器的不同设置的一个系统或一个同轴扬声器的频率响应。您可分别将任务命名为 *Sound Pressure-Woofe* 和 *Sound Pressure-Tweeter*。在门限页面中，您将会发现一个门限参数是 Woofer-Sound Pressure，而另一个是 Tweeter-Sound Pressure。

带标签的门限参数：

（图略）

带标签的结果列表：

（图略）

SPL+Impedance (Basic)

SPL+阻抗（基本）

The task SPL+Imp is dedicated to fast testing, comprising impedance as well as SPL related measures.

Measures	Results
Frequency Response	magnitude of frequency response in Result Window 1. Fundamental of recorded sound pressure signal.
Level	Average level of specified band or at discrete frequencies. **Note:** The realized voltage may be less than the specified voltage due to finite output impedance of the power amplifier. See section *Hardware / Calibration / Amplifier Gain* for details. The resulting level may therefore also be less.
Harmonics	Absolute THD in Result Window 1 or Relative THD in Result Window 3 (depending on mode). Individual Harmonics (2^{nd} – 5^{th}) in Result Window 3.
Rub&Buzz	Rub&Buzz distortion vs. frequency in Result Window 1. Crest factor of Rub&Buzz in Result Window 4.
Meta Hearing*	Isolated Defect Distortion based on Meta Hearing Technology vs. frequency in Result Window 1 (by default hidden, can be activated using context menu of Result Window 1 / Customize / Subsets / IDD; IDD Max. Compensation of regular Rub&Buzz distortion by Meta Hearing Technology in Result Window 4.
Polarity	Acoustical Phase in Result Window 5.
Ambient Noise**	Noise floor if enabled (Settings / Category Display) in Result Window 1
Impedance**	Impedance Magnitude vs. frequency, two signal measurement of Voltage and Current in Result Window 2. Voltage and Current signals in Result Window 6.
T/S Parameter**	Calculated parameters from fitted complex impedance. R_e, L_e, C_{mes}, L_{mes}, R_{es}, f_s, Q_{ts}, Q_{ms}, Q_{es}.

* Only available, if optional Meta Hearing License is installed.
**The Ambient Noise and the impedance with T/S parameter are mutually exclusive since the second input channel is either sensing current (impedance) or the second microphone (ambient noise).

任务 SPL +阻抗专用于快速测试，包括阻抗和 SPL 的相关测量。

测量	结果
频率响应	频率响应的幅值，显示在结果窗口 1。 所记录的声压信号的基频。
声压级	指定带宽或离散频率点的平均声压级。 **注**：因为功放的输出阻抗有限，实际的电压可能小于指定的电压。更详细信息请参阅章节 *硬件/校准/Amplifier* Gain。 作为测量结果的声压级因此也可能会减少。
谐波	绝对 THD 显示在结果窗口 1 或 相对 THD 显示在结果窗口 3）（基于于模式）。 单独谐波失真（2-5 次）显示在结果窗口 3。
异音	与频率相对的异音失真显示在结果窗口 1。 异音的峰值因子显示在结果窗口 4。
超听力*	与频率相对的基于超听力技术的独立缺陷失真（IDD）显示在结果窗口 1（默认是隐藏的，可使用结果窗口 1 / 客户化 / 子设置 / IDD 中的上下文菜单激活； IDD Max。 利用超听力技术对常规异音失真的补偿显示在结果窗口 4。
极性	声相位显示在结果窗口 5。
环境噪声**	如果噪声基底开启（设置/种类显示），其显示在结果窗口 1。

阻抗**	与频率相对的阻抗值，电压和电流两个信号的测量结果显示在结果窗口 2。 电压和电流信号显示在结果窗口 6。
T/S 参数**	由复数阻抗计算得到的参数。 R_e, L_e, C_{mes}, L_{mes}, R_{es}, f_s, Q_{ts}, Q_{ms}, Q_{es}.

*只有安装了选购的超听力证书才可用。

**由于第二个输入通道要么是感应电流（阻抗），要么是第二只传声器（环境噪声），所以，环境噪声和带有 T/S 参数的阻抗是相互独占的。

Parameter

参数

The following parameter can be applied to customize this task:

Categories	Parameter	Comments
Stimulus	Start, Stop, Time	Bandwidth and Length of stimulus
	Voltage	rms level in Volt at the speaker terminals. **Note:** The realized voltage may be less than the specified voltage due to finite output impedance of the power amplifier. See section *Hardware / Calibration /* Amplifier Gain for details. **Note**: Peak value can be more than 10 dB above rms level for Multitone!
	Speed Profile	Variable speed of sinesweep. See section *Speed Profile*.
	Voltage Profile	Variable Level of sinesweep. See section *Level Profile*.
Routing	Output	Loudspeaker to be tested, only visible, if *Routing / Output* in *Control Task* is set to *controlled by Task.* See *Test Configuration / Routing / Output Routing* for details.
	Input*	Used microphone for SPL recording. Only visible, if *Routing / Output* in *Control Task* is set to *controlled by Task.* See *Test Configuration / Routing / Input Routing* for details.
Measures	Freq. Response Average Level Rub&Buzz Polarity Ambient Noise** THD 2^{nd} - 5^{th} Harmonic Impedance** T/S Parameter**	dis-/enable measures individually. If disabled, also the limits are disabled.

Categories	Parameter	Comments
Processing	Resolution	points per octave, number of result points
	Response - Smoothing	Private Parameter for Freq.-response: Part per octave for smoothing, no smoothing if value is empty.
	Level – Frequencies	Private Parameter for Level: In Frequency band: Format: f_{min}, f_{max} (separated by comma) At Discrete Frequencies: Format f_1; f_2; f_3 … (separated by semicolon or line break)
	RBz – Highpass	Private Parameter for Rub&Buzz: highpass tracking corner frequency rel. to fundamental. See section *Optimizing*

		Performance / SPL Tests / Optimize Rub&Buzz detection.
	RBz – Type	Private Parameter for Rub&Buzz: RMS: repetitive defects (e.g. rubbing) Peak: short, impulsive defects (e.g. loose particle)
	RBz-Metahearing	Absolute: THD and 2^{nd}-5^{th} Harm. in dB SPL Relative (dB) : THD and 2^{nd}-5^{th} Harm. relative to fundamental in dB(rel) Relative (%): Same but in % If Absolute then THD is in Result Window 1 else in Result Window 3.
	Harmonics-Type	Absolute: THD and 2^{nd}-5^{th} Harm. in dB SPL Relative (dB) : THD and 2^{nd}-5^{th} Harm. relative to fundamental in dB(rel) Relative (%): Same but in % If Absolute then THD is in Result Window 1 else in Result Window 3.
	Harmonics - Smoothing	Applied for THD and 2^{nd} - 5^{th} Harmonic. Part per octave for smoothing, no smoothing if value is empty.
	Impedance – Smoothing	Private Parameter for Impedance: Part per octave for smoothing, no smoothing if value is empty.
	Recording Delay	Adjustable delay for considering time delay in the response due to microphone distance or digital delay (in electronics). **Note**: The response is shortened by the delay. Increase test time if you have excessive delay.
	Input Gain 1	Hardware Preamplifier for Mic 1 and Line 1 input to optimize SNR
	Input Gain 2	Hardware Preamplifier for Mic21 and Line 2 input to optimize SNR
Display	SPL – Ymax	maximal SPL value in dB, if empty, auto scaled
	SPL - Ymin	minimal SPL value in dB, if empty, auto scaled
	Harmonics – Ymax, Ymin	Maximal / Minimal value for Result Window 3. If empty, auto scaled.
	Harmonics – Shift	Vertical shift to separate Harmonics, no shift is applied, if empty.
	Impedance - Ymax	Maximal impedance value in Ohm, If empty, auto scaled
	Impedance - Ymin	Minimal impedance value in Ohm, If empty, auto scaled
	Impedance - Scale	Lin / Log scale option for impedance axis
	Show Ambient Noise	If enabled, the Ambient Noise measure and limit will be shown in Result Window 1.
	Custom Colors	Allows to modify standard colors for measures. Enable option to expand menu.

* If Ambient Noise monitoring is enabled, SPL must be recorded using Microphone 1 / Line 1. Microphone 2 is to be used to monitor ambient noise.

**The Ambient Noise and the impedance with T/S parameter are mutually exclusive since the second input channel is either sensing current (impedance) or the second microphone (ambient noise).

The limits belonging to the measures are explained in the respecting section of chapter *Test Configuration / Measures and Limits*.

下列参数可用于定制该任务：

种类	参数	备注
激励	开始，终止，时间	激励的带宽和长度。
	电压	扬声器终端的电压有效值（rms） **注**：因为功放的输出阻抗有限，实际的电压可能小于指定的电压。更详细信息请参阅章节 *硬件/校准/Amplifier* Gain。 **注**：对于多频信号，峰值可能大于有效值（rms）10dB。
	速度数据图表	正弦扫频信号的速度变化。参见章节 *Speed* Profile。
	电压数据图表	正弦扫频的电压变化。参见章节 *Level* Profile。
路径	输出	只有在控制任务中将*路径/输出*设置为由任务控制，被测试的扬声器才是可见的。 更详细信息请参阅章节*测试配置/路径/ Output* Routing。
	输入*	为记录 SPL 所用传声器。 只有当在控制任务中将*路径/输出*设置为由任务控制，它才是可见的。 更详细信息请参阅章节*测试配置/路径/ Input* Routing。
测量	频率响应 平均声压 异音 极性 环境噪声 THD 2-5 次谐波 阻抗** T/S 参数**	分别开启/关闭测量。 如果关闭测量，则门限也关闭。

种类	参数	备注
处理	分辨率	每个倍频程的点数，处理结果的样点数目。
	频响-平滑	频响的特有参数： 按倍频程平滑，如果该值为空，则不平滑。
	声压-频率	声压特有参数： 在频率带宽内：f_{min}, f_{max} （用逗号分开）。 在指定频率内：格式 $f_1; f_2; f_3$ …（用分号或换行分开）。

	异音-高通	异音特有参数： 高通跟踪角频率（相对于基频）。参见章节 *优化性能 / SPL 测试 / Optimize* Rub&Buzz detection。
	异音-种类	异音特有参数： 有效值：可重复瑕疵（如摩擦） 峰值：短时、脉冲瑕疵（如松动的部件）
	异音-超听力	绝对：THD 和 2-5 次谐波（dB SPL） 相对（dB）：相对基频的 THD 和 2-5 次谐波（dB） 相对（%）：同上（ %） THD（绝对）显示在结果窗口 1，其它显示在结果窗口 3。
	谐波-类型	绝对：THD 和 2-5 次谐波（dB SPL） 相对（dB）：相对基频的 THD 和 2-5 次谐波（dB） 相对（%）：同上（ %） THD（绝对）显示在结果窗口 1，其它显示在结果窗口 3。
	谐波-平滑	用于 THD 和 2-5 次谐波。 按倍频程平滑，如果该值为空，则不平滑。
	阻抗-平滑	阻抗特有参数： 按倍频程平滑，如果该值为空，则不平滑。
	录音延迟	为应对传声器的距离或数字延迟（电子系统中），所考虑的时间延迟应是可调的。 注：由于延迟会缩短响应时间。假如延迟时间过长，请增加测试时间。
	输入增益 1	为优化 SNR，在 Mic 1 和 Line 1 输入前增加硬件前置放大器。
	输入增益 2	为优化 SNR，在 Mic 21 和 Line 2 输入前增加
显示	SPL-Y 最大	用 dB 表示的 SPL 最大值。 如果该值为空，则采用自动刻度。
	SPL-Y 最小	用 dB 表示的 SPL 最小值。 如果该值为空，则采用自动刻度。
	谐波-Y 最大，Y 最小	结果窗口 3 显示的最大/最小值。 如果该值为空，则采用自动刻度。
	谐波-平移	为分离谐波而垂直平移。 如果该值为空，则不能平移。
	阻抗-Y 最大	用欧姆表示的阻抗最大值。 如果该值为空，则采用自动刻度。
	阻抗-Y 最小	用欧姆表示的阻抗最小值。 如果该值为空，则采用自动刻度。
	阻抗-刻度	阻抗坐标选项：线性/对数。
	显示环境噪声	如果开启，结果窗口 1 显示环境噪声测量和门限。
	定制颜色	允许根据测量需要修改标准颜色。开启选项则可扩展菜单。

*如果开启监控环境噪声，则必须用传声器 1/线路 1 录音。传声器 2 则用于检测环境噪声。

**由于第二个输入通道要么是感应电流（阻抗），要么是第二只传声器（环境噪声），所以，环境噪声和带有 T/S 参数的阻抗是相互独占的。

章节 *测试配置/测试和门限* 解释了与本测量相关的门限。

Impedance testing

阻抗测试

The fast SPL-Imp Task measures by default current and SPL in parallel.

For impedance testing it is a crucial point to consider the amplifier frequency response. Therefore since only two input channels are available, a pre-measurement will be executed to measure the voltage.

This voltage measurement will be performed **once per login** only. It will double the duration of the first measurement but will ensure the fast testing speed for all following tests.

If the optional measure *Ambient Noise* is enabled, this task can be configured to measure nearfield and ambient noise level in parallel. In this case no impedance can be measured (no current sensing possible). When selecting measures Ambient Noise and one of the impedance related measures (impedance or T/S parameter), an error message will be generated.

快速任务**声压+阻抗**默认为并行测试电流和声压级。

对于阻抗测试，功放频率响应是一个需要考虑的关键点。由于只有两个输入通道可用，所以需要一个预测试来测量电压。

仅需**每次登录做一次**电压测量。第一次测量的时间将加倍，其后的所有测试都应保持快速测试。

如果开启可选测试环境噪声，该任务可配置成并行测量近场和环境噪声级。此时不测量阻抗（不可能检测出电流）。当选择测量环境噪声和一个与阻抗相关的测量（阻抗或 T/S 参数），系统将给出一个错误提示信息。

Differences to SPL and Impedance task

SPL 和阻抗任务的不同之处

There are some differences between the *fast SPL + Imp* and the *SPL* and *Imp* task the user should be aware of:

- Multitone excitation only available in *Imp* task.
- Voltage measurement for each DUT only available in *Imp* task (see notes in section *Impedance testing* above.
- Either *Impedance* measurement or *Ambient Noise* monitoring available.
- In Basic version the *SPL+Imp* task is available only.

用户应该知道*快速 声压级+阻抗*与 *SPL* 和 *Imp* 之间的不同点：

- 多频信号激励仅在 *Imp* 任务中有效。
- 针对每个 DUT 的电压测量仅在 *Imp* 任务中有效（参见以上章节 *阻抗测试* 中的注释）。
- 阻抗测试或环境噪声两者都可监控。
- 在基本版中，只有*声压级+阻抗* 任务是有效的。

SPL

声压级

The task SPL comprises all measures related to microphone sensing.

Measures	Results
Frequency Response	Magnitude of frequency response in Result Window 1. Fundamental of recorded sound pressure signal.

Level	Average level of specified band or at discrete frequencies. **Note:** The realized voltage may be less than the specified voltage due to finite output impedance of the power amplifier. See section *Hardware / Calibration / Amplifier Gain* for details. The resulting level may therefore also be less.
Harmonics	Absolute THD in Result Window 1 or Relative THD in Result Window 3 (depending on mode). Individual Harmonics (2^{nd} – 5^{th}) in Result Window 3.
Rub&Buzz	Rub&Buzz distortion vs. frequency in Result Window 1. Crest factor of Rub&Buzz in Result Window 4.
Meta Hearing*	Isolated Defect Distortion based on Meta Hearing Technology vs. frequency in Result Window 1 (by default hidden, can be activated using context menu of Result Window 1 / Customize / Subsets / IDD; IDD Max. Compensation of regular Rub&Buzz distortion by Meta Hearing Technology in Result Window 4.
Polarity	Acoustical Phase in Result Window 5.
Ambient Noise	Noise floor if enabled (Settings / Category Display) in Result Window 1

* Only available, if optional Meta Hearing License is installed.

任务**声压级**包含了所有与传声器检测相关的测量。

测量	**结果**
频率响应	频率响应的幅值，显示在结果窗口 1。 所记录的声压信号的基频。
声压级	指定带宽或离散频率点的平均声压级。 **注**：因为功放的输出阻抗有限，实际的电压可能小于指定的电压。更详细信息请参阅章节 *硬件/校准/Amplifier* Gain。 作为测量结果的声压级因此也可能会减少。
谐波	绝对 THD 显示在结果窗口 1 或 相对 THD 显示在结果窗口 3）（基于于模式）。 单独谐波失真（2-5 次）显示在结果窗口 3。
异音	与频率相对的异音失真显示在结果窗口 1。 异音的峰值因子显示在结果窗口 4。
超听力*	与频率相对的基于超听力技术的独立缺陷失真（IDD）显示在结果窗口 1（默认是隐藏的，可使用结果窗口 1 / 客户化 / 子设置 / IDD 中的上下文菜单激活； IDD Max。 利用超听力技术对常规异音失真的补偿显示在结果窗口 4。
极性	声相位显示在结果窗口 5。
环境噪声	如果噪声层级开启（设置/种类显示），其显示在结果窗口 1。

*只有安装了选购的超听力证书才可用。

Parameter

参数

The following parameter can be applied to customize this task:

Categories	Parameter	Comments
Stimulus	Signal	SineSweep: Continuous Sine Sweep Multitone: Sparse Spectrum Signal
	Start, Stop, Time	Bandwidth and Length of stimulus

	Voltage	rms level in Volt at the speaker terminals. **Note:** The realized voltage may be less than the specified voltage due to finite output impedance of the power amplifier. See section *Hardware / Calibration / Amplifier Gain* for details. **Note**: Peak value can be more than 10 dB above rms level for Multitone!
	Speed Profile	Variable speed of sinesweep. See section Speed Profile.
	Voltage Profile	Variable Level of sinesweep. See section Level Profile.
Routing	Output	Loudspeaker to be tested, only visible, if *Routing / Output* in *Control Task* is set to *controlled by Task.* See See *Test Configuration / Routing / Output Routing* for details.
	Input*	Used microphone for SPL recording. Only visible, if *Routing / Output* in *Control Task* is set to *controlled by Task.* See See *Test Configuration / Routing / Input Routing* for details.
Measures	Freq. Response Average Level Rub&Buzz ic Polarity Ambient Noise THD 2^{nd} - 5^{th} Harmon	dis-/enable measures individually. If disabled, also the limits are disabled.
Processing	Resolution	points per octave, number of result points
	Response - Smoothing	Private Parameter for Freq.-response: Part per octave for smoothing, no smoothing if value is empty.
	Level – Frequencies	Private Parameter for Level: In Frequency band: Format: f_{min}, f_{max} (separated by comma) At Discrete Frequencies: Format f_1; f_2; f_3 … (separated by semicolon or linebreak)
	RBz – Highpass	Private Parameter for Rub&Buzz: highpass tracking corner frequency rel. to
	RBz – Type	Private Parameter for Rub&Buzz: RMS: repetitive defects (e.g. rubbing) Peak: short, impulsive defects (e.g. loose particle)
	RBz-Metahearing	Enable Metahearing (Improved Rub&Buzz) See section *Appendix / Measurement Technique / Rub& Buzz / Meta Hearing Technology* for Details.
	Harmonics-Type	Absolute: THD and 2^{nd}-5^{th} Harm. in dB SPL Relative (dB) : THD and 2^{nd}-5^{th} Harm. relative to fundamental in dB(rel) Relative (%): Same but in % If Absolute then THD is in Result Window 1 else in Result Window 3.
	Harmonics - Smoothing	Applied for THD and 2^{nd} - 5^{th} Harmonic. Part per octave for smoothing, no smoothing if value is empty.
	Recording Delay	Adjustable delay for considering time delay in the response due to microphone distance or digital delay (in electronics).
	Input Gain 1	Hardware Preamplifier for Mic 1 and Line 1 input to optimize SNR

	Input Gain 2	Hardware Preamplifier for Mic 2 and Line 2 input to optimize SNR
Display	Y-min	minimal impedance value in Ohm, if empty, auto scaled
	Y-max	maximal impedance value in Ohm, if empty, auto scaled
	Harmonics - Ymax	Maximal value for Result Window 3. If empty, auto scaled.
	Harmonics - Ymin	Minimal value for Result Window 3. If empty, auto scaled.
	Y-scale	Lin / Log scale option for impedance axis
	Show Ambient Noise	If enabled, the Ambient Noise measure and limit will be shown in Result Window 1.
	Custom Colors	Allows to modify standard colors for measures. Enable option to expand menu.

* If Ambient Noise monitoring is enabled, SPL must be recorded using Microphone 1. Microphone 2 is used to monitor ambient noise.

The limits belonging to the measures are explained in the respecting section of chapter *Test Configuration / Measures and Limits*.

下列参数可用于定制该任务：

种类	参数	备注
激励	信号	SineSweep： 连续正弦扫频 Multitone： 稀疏谱信号
	开始，终止，时间	激励的带宽和长度。
	电压	扬声器终端的电压有效值（rms） **注**：因为功放的输出阻抗有限，实际的电压可能小于指定的电压。更详细信息请参阅章节 *硬件/校准/Amplifier* Gain。 **注**：对于多频信号，峰值可能大于有效值（rms）10dB。
	速度数据图表	正弦扫频信号的速度变化。参见章节 *Speed* Profile。
	电压数据图表	正弦扫频的电压变化。参见章节 *Level* Profile。
路径	输出	只有在控制任务中将*路径/输出*设置为由任务控制，被测试的扬声器才是可见的。 更详细信息请参阅章节*测试配置/路径/ Output* Routing。
	输入*	为记录 SPL 所用传声器。 只有当在控制任务中将*路径/输出*设置为由任务控制，它才是可见的。 更详细信息请参阅章节*测试配置/路径/ Input* Routing。

测量	频率响应 平均声压 异音 ic 极性 环境噪声 THD 2-5 次谐波	分别开启/关闭测量。 如果关闭测量，则门限也关闭。
处理	分辨率	每个倍频程的点数，处理结果的样点数目。
	频响-平滑	频响的特有参数： 按倍频程平滑，如果该值为空，则不平滑。
	声压-频率	声压特有参数： 在频率带宽内：f_{min}, f_{max} （用逗号分开）。 在指定频率上：格式 f_1; f_2; f_3 …（用分号或换行分开）。
	异音-高通	异音特有参数： 高通跟踪角频率（相对于基频）。参见章节 *优化性能 / SPL 测试 / Optimize* Rub&Buzz detection。
	异音-种类	异音特有参数： 有效值：可重复瑕疵（如摩擦） 峰值：短时、脉冲瑕疵（如松动的部件）
	异音-超听力	开启超听力（改进的异音）。更详细信息参见章节 *附录/测量技术/异音/ Meta* Hearing Technology 。
	谐波-类型	绝对：THD 和 2-5 次谐波（dB SPL） 相对（dB）：相对基频的 THD 和 2-5 次谐波（dB） 相对（%）：同上（ %） THD（绝对）显示在结果窗口 1，其它显示在结果窗口 3。
	谐波-平滑	用于 THD 和 2-5 次谐波。 按倍频程平滑，如果该值为空，则不平滑。
	录音延迟	为应对传声器的距离或数字延迟（电子系统中），所考虑的时间延迟应是可调的。 注：由于延迟会缩短响应时间。假如延迟时间过长，请增加测试时间。
	输入增益 1	为优化 SNR，在 Mic 1 和 Line 1 输入前增加硬件前置放大器。
	输入增益 2	为优化 SNR，在 Mic 2 和 Line 2 输入前增加
显示	Y-最小值	用欧姆表示的最小阻抗值。 如果该值为空，则采用自动刻度。
	Y-最大值	用欧姆表示的最大阻抗值。 如果该值为空，则采用自动刻度。
	谐波-Y 最大	结果窗口 3 显示的最大值。 如果该值为空，则采用自动刻度。
	谐波-Y 最小	结果窗口 3 显示的最小值。 如果该值为空，则采用自动刻度。

	Y-刻度	阻抗坐标选项：线性/对数。
	显示环境噪声	如果开启，结果窗口 1 显示环境噪声测量和门限。
	定制颜色	允许根据测量需要修改标准颜色。开启选项则可扩展菜单。

*如果开启监控环境噪声，则必须用传声器 1/线路 1 录音。传声器 2 则用于检测环境噪声。

章节 *测试配置/测试和门限* 解释了与本测量相关的门限。

Impedance (Imp)

阻抗（Imp）

The task Impedance (Imp) comprises the magnitude of impedance vs. frequency and the Thiele/Small Parameter.

Measures	Results
Impedance	Impedance Magnitude vs. frequency, two signal measurement of Voltage and Current in Result Window 2. Voltage and Current signals in Result Window 6.
T/S Parameter	Calculated parameters from fitted complex impedance. R_e, L_e, C_{mes}, L_{mes}, R_{es}, f_s, Q_{ts}, Q_{ms}, Q_{es}.

The Impedance task is based on parallel measurement of voltage and current. So it compensates automatically for amplifier frequency response and for long-term changes in the amplifier gain.

任务**阻抗**包含了频率对应的阻抗值和 T/S 参数。

测量	结果
阻抗	与频率相对的阻抗值，电压和电流两个信号的测量结果显示在结果窗口 2。 电压和电流信号显示在结果窗口 6。
T/S 参数	由电抗计算得到的参数。 R_e, L_e, C_{mes}, L_{mes}, R_{es}, f_s, Q_{ts}, Q_{ms}, Q_{es}.

阻抗任务是基于电压和电流的并行测量。因此它自动补偿放大器频响和功放增益长时间改变的影响。

Parameter

参数

The following parameter can be applied to customize this task:

Categories	Parameter	Comments
Stimulus	Signal	SineSweep: Continuous Sine Sweep Multitone: Sparse Spectrum Signal
	Start, Stop, Time	Bandwidth and Length of stimulus
	Voltage	rms level in Volt at the speaker terminals. **Note:** The realized voltage may be less than the specified voltage due to finite output impedance of the power amplifier. See section *Hardware / Calibration / Amplifier Gain* for details. **Note**: Peak value can be more than 10 dB above rms level for Multitone!
Routing	Output	Loudspeaker to be tested, only visible, if *Routing / Output* in *Control Task* is set to *controlled by Task.* See *Test Configuration / Routing/ Output Routing* for details.
Measure	Impedance T/S Parameter	dis-/enable measures individually. If disabled, also the limits are disabled.
Processing	Resolution	points per octave, number of result points

	Smoothing	part per octave for smoothing, no smoothing if value is empty.
Display	Y-min	minimal impedance value in Ohm, if empty, auto scaled
	Y-max	maximal impedance value in Ohm, if empty, auto scaled
	Y-scale	Lin / Log scale option for impedance axis
	Custom Colors	Allows to modify standard colors for measures. Enable option to expand menu.

The limits belonging to the measures are explained in the respective section of chapter *Test Configuration / Measures and Limits*.

下列参数可用于定制该任务：

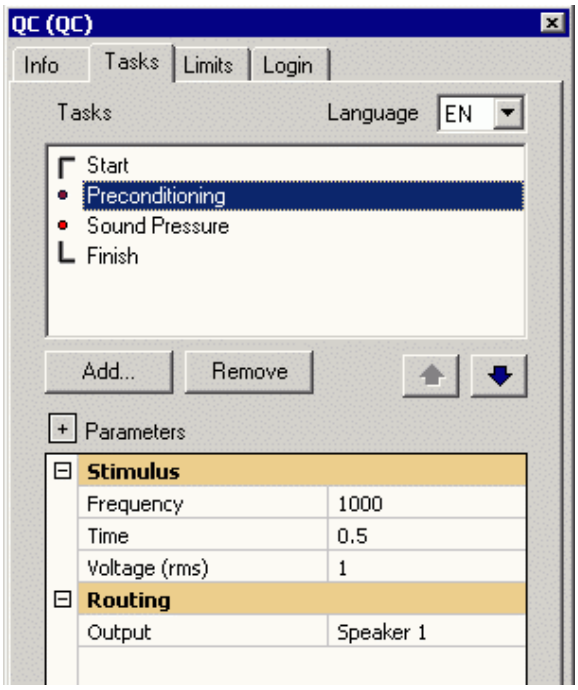
种类	参数	备注
激励	信号	SineSweep： 连续正弦扫频 Multitone： 稀疏谱信号
	开始，终止，时间	激励的带宽和长度。
	电压	扬声器终端的电压有效值（rms） **注**：因为功放的输出阻抗有限，实际的电压可能小于指定的电压。更详细信息请参阅章节 *硬件/校准/Amplifier* Gain。 **注**：对于多频信号，峰值可能大于有效值（rms）10dB。
路径	输出	只有在控制任务中将*路径/输出*设置为由任务控制，被测试的扬声器才是可见的。 更详细信息请参阅章节*测试配置/路径/ Output* Routing。
测量	阻抗 T/S 参数	分别开启/关闭测量。 如果关闭测量，则门限也关闭。
处理	分辨率	每个倍频程的点数，处理结果的样点数目。
	平滑	按倍频程平滑，如果该值为空，则不平滑。
显示	Y-最小值	用欧姆表示的最小阻抗值。 如果该值为空，则采用自动刻度。
	Y-最大值	用欧姆表示的最大阻抗值。 如果该值为空，则采用自动刻度。
	Y-刻度	阻抗坐标选项：线性/对数。
	定制颜色	允许根据测量需要修改标准颜色。开启选项则可扩展菜单。

章节 *测试配置/测试和门限* 解释了与本测量相关的门限。

Preconditioning for Ferrofluid

针对铁流体的预先处理

The task labeled *Precond* is intended to prepare tweeters with ferrofluid for the measurement. Using a fixed sine tone the ferrofluid is to be collected in the gap to achieve a reproducible state. This ensures consisting results in the following measurement tasks. Thus this task should be the first task of a sequence.



The following parameter can be applied to customize this task:

Categories	Parameter	Comments
Stimulus	Frequency	Constant frequency of sine wave
	Time	Duration of stimulus
	Voltage (rms)	Test level in Volt
Routing	Output	Loudspeaker to be tested, only visible, if *Routing / Output* in *Control Task* is set to *controlled by Task.* See ***Fehler! Kein gültiges Resultat für Tabelle.*** */ Routing / Output Routing* for details.

In the Basic version, the preconditioning is included in the *Tweeter* template.

被称为**预先处理**的任务是为带铁流体的高频扬声器测量所准备的。采用固定的正弦单频信号，可在缺口中修正铁流体的影响而达到一个可重复的状态。它保证了下列测试任务中有一致的结果。因而，该项任务可成为一个序列中的首个任务。

（图略）

下列参数可用于定制该任务：

种类	参数	备注
激励	频率	正弦波的固定频率
	时间	激励持续期间
	电压（有效值）	测试电压（V）
路径	输出	只有在控制任务中将*路径/输出*设置为由任务控制，被测试的扬声器才是可见的。 更详细信息请参阅章节*测试配置/路径/ Output* Routing。

在基本版，在高频扬声器模板中包含了预先处理。

Control Task
控制任务

The Control Task and the belonging parameter are split into two groups.
Start Group: Defines settings that are required before running the test
Finish Group: Defines settings that are required after running the test.

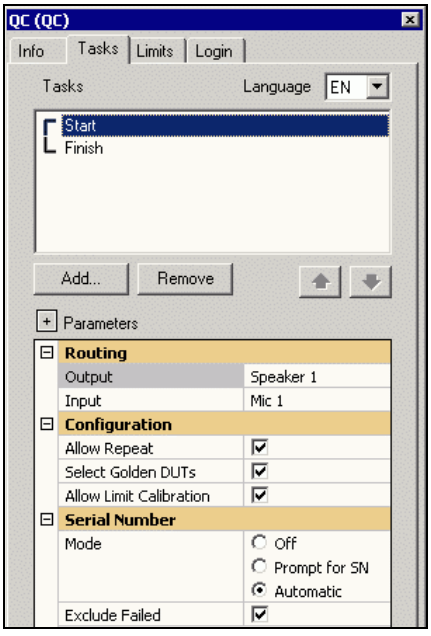
可将控制任务和相关参数分成两个组：
起始组：定义在运行测试之前所需设置。
结束组：定义在运行测试之后所需设置。

Start
开始

The following parameter can be applied to customize the start task:

Categories	Parameter	Comments
Routing	Output	For details see section *Test Configuration / Routing*
	Input	
Configuration	Allow Repeat	Enables additional button to repeat failed measurements for the operator. Using the Repeat button the Serial Number is not changed.
	Select Golden DUT	For details see section *Test Configuration / Golden DUT Handling*
	Allow Limit Calibration	
Serial Number	Mode / Exclude Failed	For details see section *Test Configuration / Serial Number Handling*

Property Page with parameter of the Control Task / Start section:



下列参数可用于定制开始任务：

种类	参数	备注
路径	输出	详情参阅章节*测试配置/Routing*。
	输入	
配置	允许重复	操作员可开启附加按键重测失败的测试。使重复按键不会改变序列号。
	选择黄金 DUT	详情参阅章节 *测试配置/Golden DUT Handling*。
	允许门限校准	

序列号	模式/排除失败	参见章节 *测试配置/ Serial* Number Handling。

控制任务/开始 区域中带参数的属性页面：

（图略）

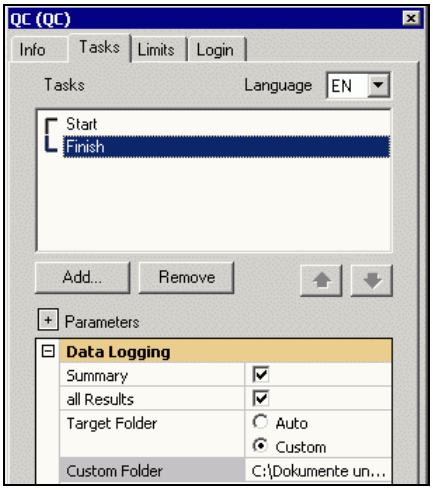
Finish

结束

The following parameter can be applied to customize the start task:

Categories	Parameter	Comments
Data Logging	Summary	Enables short form log file (one line per DUT)
	All Results	Stores one database with all results per DUT
	Target Folder	*Auto*: Subfolder Log below folder of used database *Custom*: Specify folder in file system
	Custom Folder	For *Target Folder* = *Custom* only
	For details see section *Storing Results.*	

Property Page with parameter of the Control Task / Start section:



下列参数可用于定制结束任务：

种类	参数	备注
数据记录	综述	开启短形式日志文件（每个 DUT 一行）
	所有结果	一个数据库保存一个 DUT 的所有结果。
	目标文件夹	*自动：* 纪录在已使用的数据库文件夹下面的子文件夹。 *定制：* 在文件系统中的指定文件夹。
	定制文件夹	针对 *目标文件夹 = 仅定制*
	详情请参阅章节 *存储结果。*	

控制任务/结束 区域中带参数的属性页面：

（图略）

Test Signals

测试信号

Specific properties of different test signals should be considered for creating tests. Here you find an overview which test signal should be used in typical applications. For more information refer to specific Measures and Limits.

Test Signal	Application	Description
SineSweep	THD, Rub&Buzz	For easy separation of harmonics from the fundamental sinusoidal signal must be used.
Multitone	Impedance	Highest energy and best SNR at lowest frequencies. For stable low frequency impedance required
Multitone	Re for Woofers	

创建测试时应考虑不同测试信号的特殊属性。这里给您一个概况，介绍测试信号的典型应用。更详细的信息请参阅章节 *测量和门限*。

测试信号	应用	描述
扫频信号	THD，异音	为了便于从基频中分离出谐波，必须使用正弦信号。
多频信号	阻抗	在最低频率处有最大能量和最好的信噪比。需要较低的频率阻抗以达到稳定的目的。
多频信号	低音扬声器的 Re	

Multitone

多频信号

The *multitone* tests the DUT at discrete frequencies. The energy is concentrated on these frequencies. All frequencies are selected that way that always full periods fit into the whole measurement time. That avoids any smearing in the spectrum and allows analyzing the spectral contamination between the excited lines due to noise and distortion.

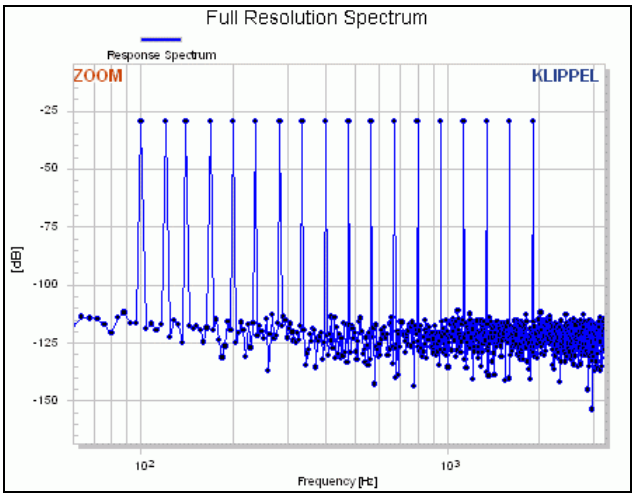
Multitone test signal generates Harmonics and Intermodulation Distortion, whereas *SineSweep* generates Harmonics Distortion only.

多频信号在离散频率点上测试 DUT。能量集中在这些频率点上。所有频率的选取应保证完整周期总是适合整个测量时间。这样就避免频谱中的拖尾效应并允许分析激励谱线间由于噪声和失真而产生的频谱缺陷。

多频测试信号诱发谐波失真和互调失真，而正弦扫频信号只产生谐波失真。

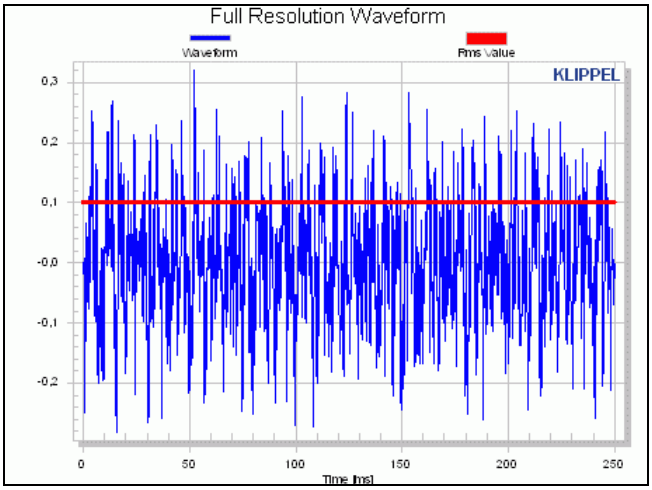
Spectrum

频谱



Waveform

波形



Note: The peak value of the time signal is easily more than 10 dB higher than the rms value! The ratio between peak and rms value, the crest factor, depends on the bandwidth and number of bins. There is no absolute maximal value.

注：时间信号的峰值大约比均方根值高出 10dB 以上！峰值因子（峰值和均方根值的比值）依赖于带宽和样本数目。无绝对最大值。

SineSweep

正弦扫频

The LogSweep is based on a sine sweep continuously changing frequency (logarithmically with time). This enables fast tests since any relative frequency band is equally in time for a sweep with constant speed. This is a considerable advantage over linear sweeps.

对数扫频是基于连续改变频率的正弦扫频信号（与时间成对数）。因为相比固定速度的扫频，相对应的频带在时间上是相等的，所有可以快速测试。这是相比线性扫频的一个重大优势。

Sweep Direction

扫频方向

For each sweep direction there are benefits and drawbacks. Please find a short discussion below.

对于每个扫频方向都有好处和缺点。在下文会有简短的讨论。

Settling time

适应时间

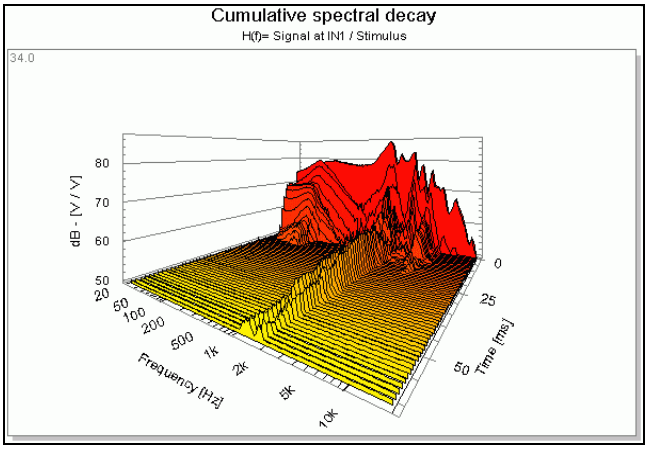
Settling is proportional to a certain number of periods. Since period time is proportional to 1/frequency, it is obvious, that settling is much faster at high frequencies than for low frequencies。

适应时间与周期的某些数目成正比。因为周期时间与 1/频率成正比，所以，显而易见，适应时间在高频要比在低频快很多。

Ringing

阻尼振荡

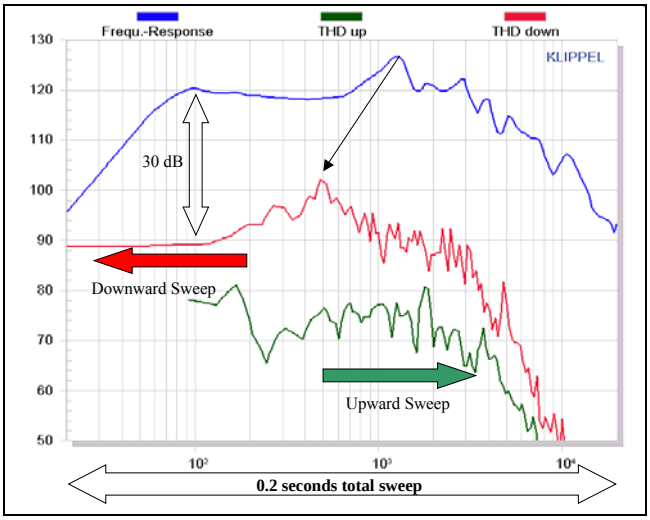
Driver with a higher Q resonance in the frequency response show a characteristic ringing when analyzing the waterfall plot. In the example below, a strong resonance at about 1 kHz oscillates more than 80ms at about 30dB below the fundamental.



If a very fast sweep from high to low frequencies (downward) is used, then the ringing is still active, and the tracking highpass filter for THD is collecting this energy. This energy is wrongly interpreted as THD, which is not true. It is just the ringing from higher frequencies. This effect is due to high speed. It can be omitted if the sweep

- starts below these resonance effects (e.g. 700 Hz in the example)
- the sweep direction is changed from down to up.

This is a linear effect and happens at all amplitudes.



The upward sweep is close to the steady state measurement and does not show this effect. This is caused by the highpass cut off frequency is shifting upwards, leaving the region of resonance, whereas for downward sweeps the highpass pass band in entering the region of resonance.

当分析瀑布图时，在频率响应上具有较高 Q 值共振的发声器表现出一个很独特的阻尼特性。在下面的例子中，在 1kHz 处一个强共振振荡在比基频低 30dB 时间间隔 80ms。

（图略）

假如采用一个从高频到低频的快速扫频，则阻尼振荡将依然存在，用于 THD 的跟踪高通滤波器正在采集能量。该能量被错误地解释为 THD，但它不是正确的。它只是来自较高频率的阻尼振荡。该影响是由于高速产生的。在下列情况下，可以忽略它：

- 假如扫频信号开始比这些共振影响低（如本例 子中为 700 Hz）
- 扫频方向从低到高变化。

有一个线性影响，发生在所有幅度上。

（图略）

向上扫频接近稳态测量，不会显露这一影响。这是由于高通截至频率向上平移，留给谐振区域；反之，对于向下扫频，高通带进入了谐振区域。

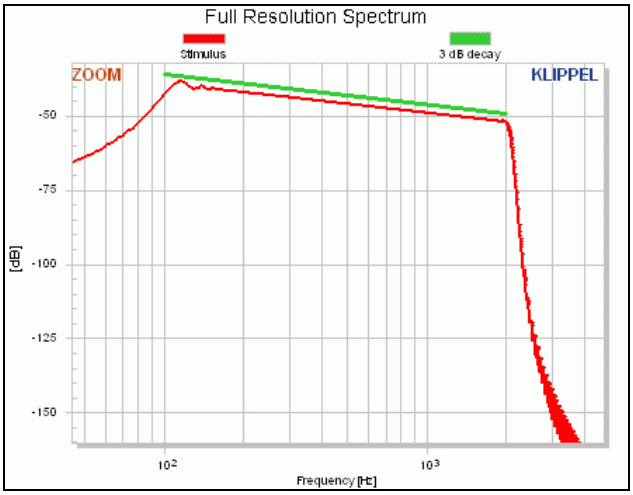
Signal Properties

信号属性

Spectrum

频谱

Using SineSweep no intermodulation can be generated.



The spectrum has a typical –3dB / Octave decay similar to pink noise. This is typical for signal with constant energy in relative bandwidth. The ripple at the start frequency is optimally compromised between fast fading in of the signal and ripple amplitude.

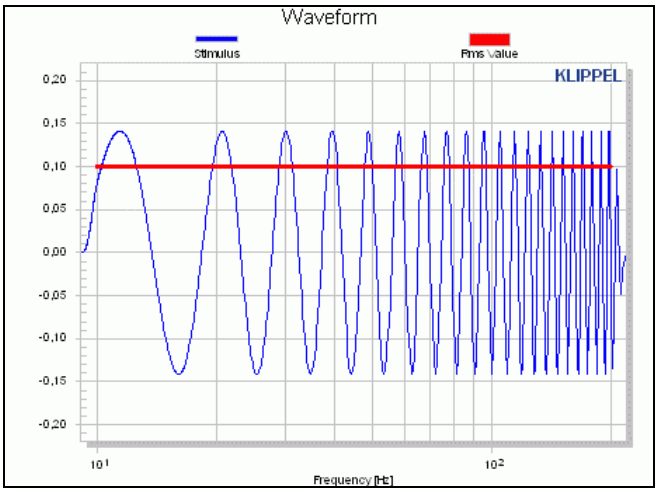
用正弦扫频信号不会产生互调。

（图略）

该频谱类似粉红色噪声有一个典型的每倍频程 –3dB 的衰减。对于在响应带宽内具有稳定能量的信号而言，这是很典型的。在起始频率处的起伏进行了最佳处理，平衡了信号的快速衰减和幅度上的起伏。

Waveform

波形



Time signal of LogSweep vs. instantaneous frequency

The LogSweep stimulus has constant peak values over the whole length. The crest factor (ratio of peak and rms value) is minimal constant 3 dB. Thus minimal excursions (may be used for low frequency protection!) are ensured for a given rms value or power.

The variation of the frequency is continuously at each sample. There is no step or discontinuity in frequency during the test.

Note: Since for all samples the instantaneous frequency is known, it is also possible to draw the waveform vs. frequency (and not vs. time as usual). This allows identifying the exact frequency of possible disturbances or defects.

To optimize that stimulus even more, two profiles may be applied.

（图略）

对数扫频时间信号对瞬时频率。

对数扫频激励信号在整个时间长度范围内具有固定的峰值。峰值因子（峰值和均方根值的比例）为最小常数 3dB。因此，对于给定的有效值或功率最小偏离是确定的（它可用于低频保护）。

每个样本的频率变化是连续的。在测试期间，频率没有跳跃或不连续。

注: 因为对所有样本而言，瞬时频率都是已知的，因此，可以描绘波形对频率曲线（不是像通常一样对时间）这样可识别出可能发生干扰或缺陷的精确频率点。

为进一步优化激励信号，可采用两种曲线。

Level Profile

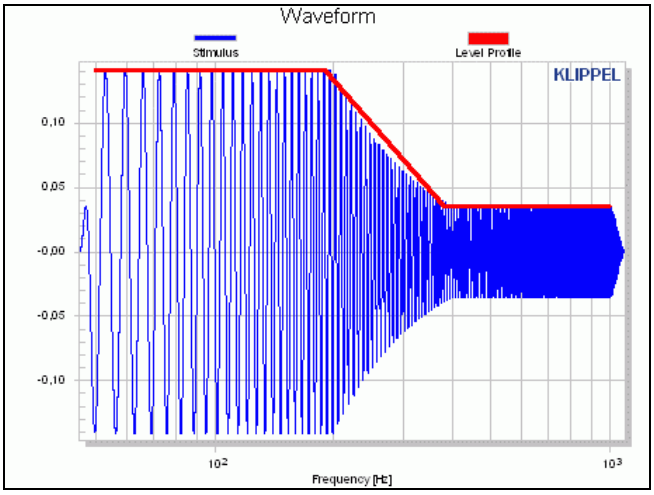
幅度曲线

This profile allows shaping the stimulus level. This may be used for protecting the DUT from exceeding excursion (esp. tweeters) or power. Normally high displacement is needed below resonance to excite critical defects (rub and buzz) but at higher frequencies linear behavior may be desired to avoid distortion or to keep the annoying high frequency signal low in level.

Applications:

- Protecting the DUT from exceeding excursion below resonance
- Thermal protection at higher frequencies
- Optimize SNR during the test

- Avoid unwanted distortion / compression



Note: Very rapid changes of voltage level (such as steps) may generate audible clicks and are therefore not recommended. A warning is displayed, if the rate of level change is too high. Check always THD and Rub&Buzz at these critical frequencies to avoid peaks in these measures due to level profile.

The input parameter for the level profile are

frequency *level.*

Levels between the defined points are interpolated. To generate steps in the level profile the corner frequency should be listed twice:

Example:

```
100 -6
500 -6
500 0
1000 0
```

From 100 to 500 Hz the level is attenuated by 6 dB and from 500 Hz to 10 kHz there is unity gain (0 dB).

该曲线描绘了激励信号的电压波形。它可用于防止 DUT 超出范围（特别是高音喇叭）。通常在谐振频率以下用大位移来刺激特殊瑕疵（异音），但是，为了避免失真，或为了使得会产生干扰的高频信号电平维持在一个低水平上，希望在较高频率段具有良好的线性特性。

应用：

- 防止 DUT 偏离共振峰
- 高频热保护
- 优化测试期间的 SNR
- 避免不期望的变形/挤压。

（图略）

注意： 电压级的非常快速的变化（如跳跃）可能产生可听见的卡塔声，因而不推荐使用。如果电压级变化率太高，则会产生一个警告。经常检查这些特殊频率点上的 THD 和异音，以避免测量在电压曲线出现尖峰。

针对电压曲线的输入参数：

频率　　电压级。

在所定义的频率点之间进行电压级插值。为在电压曲线中产生步进变化，转角频率将出现两次：

举例：

```
100 -6
500 -6
500 0
1000 0
```

从 100 到 500 Hz，电压衰减 6 dB，从 500 Hz 到 10 kHz，增益维持不变（0 dB）。

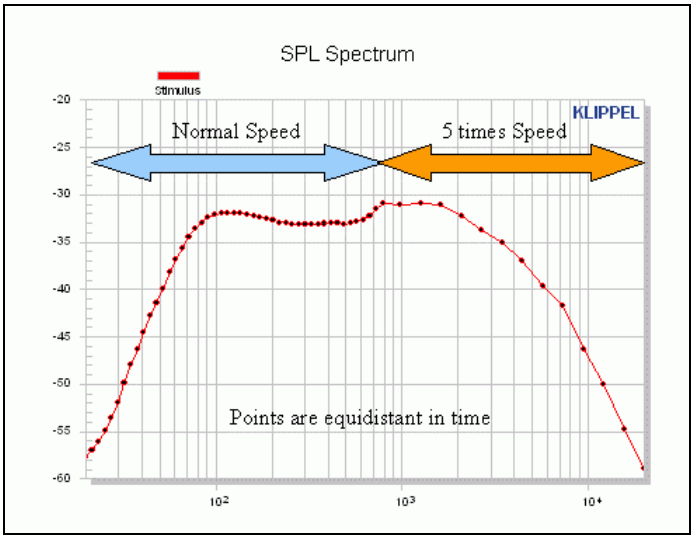
Speed Profile

速度曲线

Although the LogSweep is time efficient, it is very useful to even further shape the speed of the sweep. The Speed Profile allows defining up to 10 sections within the stimulus with different speeds. Thus testing with low speed and high energy at critical sections (e.g. around resonance) uses the main part of the testing time while high frequency response is tested at much higher speed. Shaping the speed allows to create minimal test durations without compromising at critical sections.

Applications:

- Detailed testing of Rub and Buzz around resonance
- Thermal protection at higher frequencies
- Minimizing testing time for high volume / automated lines
- Testing with one sweep only



The input parameter for the speed profile are

frequency_start　　*frequency_stop*　　*relative speed.*

To generate the speed profile of the graph above:

Example:

```
10 800 1
800 20000 5
```

The sweep is from 800Hz to 20kHz five times faster than from 10 to 800 Hz.
Note that the speed factors are relative to each other. The absolute value is no considered.
The frequency ranges must be non overlapping.

虽然对数扫频时间效率高，但进一步制作描绘扫频的速度是非常有用的。速度曲线可最多定义 10 个区间，每个区间的激励具有不同的速度。从而，在关键性部分（如在共振峰附近）测试用低速高能量占据大部分时间。而高频响应则以较快速度测试。描绘速度可以创建最小测试时间区间，而不需要在关键部位妥协。

应用：

- 在共振峰附近对异音进行细致测试
- 高频热保护
- 最小化测试时间得到高电压值/自动布线
- 仅有一个扫频信号的测试

（图略）

速度曲线的输入参数：

频率_开始 *频率_停止* *相对速度。*

为产生上图所示速度曲线：

举例：

```
10 800 1
800 20000 5
```

扫频从 800Hz 到 20kHz 的扫频信号比从 10 到 800 Hz 的速度快 5 倍。

注意，速度系数是相对其他而言的，不考虑绝对数值。

频率范围不允许重叠。

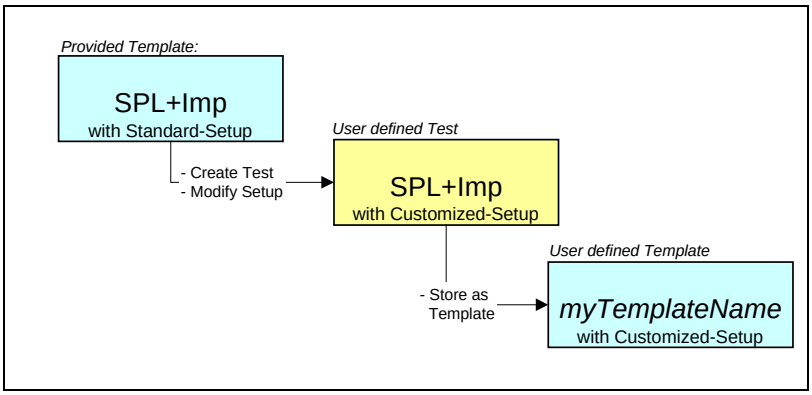
Test Templates

测试模板

With the QC Software always a package of templates is provided.

- For the Basic version tests can only be created based on these templates (see section QC-Start Tool). Test Templates can be modified according to special transducer requirements and stored as tests.
- Using the **Standard Version** templates can be arbitrary composed out of provided Task Files. Test Sequences (e.g. for multi-way box testing) are supported.
- The **Programmable Version** allows to compose new tests using provided tasks or self programmed / modified tasks.

For all versions, any modified / created test can be stored as a template. For details see section *QC-Start Tool / Create a template*. The new template appears in the template selection list and can be later used for creating new tests.



QC 系统软件总是提供一套模板。

- 对于**基本版**，测试只能基于这些模板创建（参见章节 QC-Start Tool）。根据特殊换能器要求，测试模板可以修改并作为测试保存。
- 采用 **标准版** 的模板 可随心所欲地组成所提供的任务文件。支持测试序列（例如用于多种方式的箱体测试）。
- **可编程版**允许使用系统所提供的测试或自己编程/修改的任务来组合新的测试。

对于所有版本，任何修改/创建的测试都可以作为模板保存。详情请参阅章节 *QC-开启工具 / Create* a template。新模板会出现在模板选择列表中，并可用于日后创建新的测试。

（图略）

Basic Version

基本版

In the Basic version two templates are available:

Template	**Description**			
	fs Range [Hz]	Re Range [Ω]	SPL limit range[Hz]	SPL time [s]
Fast Subwoofer	10 – 50	2 – 8	20 – 200	2
Fast Woofer	20 – 150	2 – 8	20 – 1000	1
Fast Midrange	100 – 500	4 – 8	50 – 2000	1
Fast Tweeter	400 – 3k	4 – 8	200 – 20k	0.5
Fast Horn Driver	200 – 2k	4 – 16	400 – 20k	1
Fast Microspeaker	200 – 2k	4 – 30	200 – 5k	0.5
Fast Headphones	30 – 400	10 – 200	20 – 20k	1

In all templates the following measures are included:

- Impedance,
- fs,
- Re,
- Frequency Response,
- Average Level and
- Polarity

The keyword ***Fast*** in the template name stands for reduced measurement time. In the Basic Version always a combined task measuring Impedance and SPL in one task is used. Thus the impedance is measured with high amplitude which is needed for the SPL test. In the standard version this restriction does not exist.

In all templates the task ***Fehler! Verweisquelle konnte nicht gefunden werden.*** is used. See section *Test Configuration / Tasks* for details.

The Tweeter Template consists additionally of an Ferro Fluid Preconditioning task. You may adjust level, duration and frequency of a sine tone or sweep to accumulate distributed Ferro fluid in the gap.

Note: These Templates are basic Templates providing all measures included in the Basic Software Version. Measures can be added to these basic and all derived templates by simply installing the corresponding license. See pricelist for available add-ons.

基本版有两个模板可用：

模板	**描述**			
	fs 范围 [Hz]	Re 范围 [Ω]	SPL 门限范围[Hz]	SPL 时间 [s]
快超低音扬声器	10 – 50	2 – 8	20 – 200	2
快低音扬声器	20 – 150	2 – 8	20 – 1000	1
快中音扬声器	100 – 500	4 – 8	50 – 2000	1
快高音扬声器	400 – 3k	4 – 8	200 – 20k	0.5
快号筒式扬声器	200 – 2k	4 – 16	400 – 20k	1
快微型扬声器	200 – 2k	4 – 30	200 – 5k	0.5
快头戴式耳机	30 – 400	10 – 200	20 – 20k	1

所有模板中都包括以下测量：

- 阻抗
- fs
- Re
- 频率响应
- 平均声压级
- 极性

模板名字中的关键字*快*代表减少测量时间。在基本版中，总可以使用一个组合任务，它在一个任务中同时测量阻抗和 SPL。因此阻抗是用 SPL 测量所需的高幅度来测量的。在标准版中不存在这个限制。

在所有模板中都使用了任务 SPL+阻抗（基本）***Fehler! Verweisquelle konnte nicht gefunden werden.*** 。 详情请参阅章节 *测试配置 / Tasks* 。

高音扬声器模板额外包含了一个铁流体预先处理任务。您可以调节电平、时间长度和正弦信号或扫频信号的频率来累计在缺口处的铁流体。

注：这些模板是提供给包含在基本软件版本中的所有测量的基本模板。测量可被添加到这些基本模板以及根据授权简单保存得到的衍生模板中。参见价目表以获得可能的附购品信息。

Standard Version
标准版

All Templates described here are available using the **Standard Version** as well as the **Programmable Version**.

Additionally to the Basic Templates listed above, the following templates are available:

Template	**Description**			
	fs Range [Hz]	Re Range [Ω]	SPL limit range[Hz]	SPL time [s]
Subwoofer	10 – 50	2 – 8	20 – 200	2
Woofer	20 – 150	2 – 8	20 – 1000	1
Midrange	100 – 500	4 – 8	50 – 2000	1
Tweeter	400 – 3k	4 – 8	200 – 20k	0.5
Horn Driver	200 – 2k	4 – 16	400 – 20k	1
Microspeaker	200 – 2k	4 – 30	200 – 5k	0.5
Headphones	30 – 400	10 – 200	20 – 20k	1

The template name without the *Fast* keyword stands for separated tests of impedance and SPL. Thus different level and test signals may be applied for more accurate testing.

However, when highest speed is required, of cause the *Fast* Templates may be used.

In all the listed templates two tasks:

- *SPL* and
- *Impedance (Imp)* are used as a sequence.

See section Test Configuration / Tasks for details.

所有在这里描述的模板在标准版和可编程版都是可用的。

除了在上述列举的基本模板之外，以下模板也是可用的：

模板	**描述**			
	fs 范围 [Hz]	Re 范围 [Ω]	SPL 门限范围[Hz]	SPL 时间 [s]
超低音扬声器	10 – 50	2 – 8	20 – 200	2
低音扬声器	20 – 150	2 – 8	20 – 1000	1
中音扬声器	100 – 500	4 – 8	50 – 2000	1
高音扬声器	400 – 3k	4 – 8	200 – 20k	0.5
号筒式扬声器	200 – 2k	4 – 16	400 – 20k	1
微型扬声器	200 – 2k	4 – 30	200 – 5k	0.5
头戴式耳机	30 – 400	10 – 200	20 – 20k	1

模板名字中没有关键字*快* 代表独立的阻抗和 SPL 测试。因此采用不同的电平和测试信号以获得更准确的测试。

然而，需要最高速度时，自然就需要使用*快* 模板。

在列出的所有模板中，有两个任务：

- *SPL 和*
- *阻抗（Imp）*是作为一个序列使用的。

详情请参阅章节 测试配置/ Tasks。

Golden DUT Handling
黄金 DUT 处理

Limits are usually created using multiple reference DUT to have average information about statistically varying measures. A golden DUT is a best fit (minimal least square deviation) to the average of the SPL measure. It represents the average and could be therefore used to readjust limits, when ambient conditions (temperature, humidity) have changed the response characteristic of the DUT or when other conditions (test enclosure etc) were changed.

Golden DUT Handling consists of two steps:

1. Selection of Golden DUT.
2. Readjusting / Recalibration of limits using Golden DUT.

Please find more information below.

Note: The Golden DUT Handling is only available in the Standard / Programmable Version of the QC system.

通常采用多个参考 DUT 来创建门限，它考虑了不同测量的统计平均信息。一个黄金 DUT 的最适合（最小二乘误差）SPL 测量的平均值。它表示平均值，当周边条件（温度、湿度）改变带来 DUT 的响应特性改变，或者其他状态（测试箱体等）改变时，黄金 DUT 可以用来调整门限。

黄金 DUT 处理由两个步骤组成：

1. 选择黄金 DUT。
2. 使用黄金 DUT 进行门限的重新调整/重新校准。

请在下文中寻找更多相关信息。

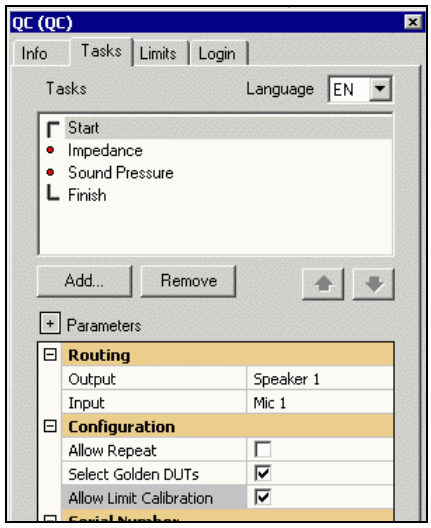
注：黄金 DUT 处理只在 QC 系统的标准/可编程版中有效。

Selection of Golden DUT

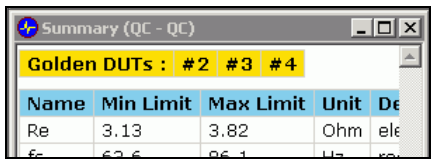
选择黄金 DUT

Golden DUT are selected automatically if

1. at least one SPL task is included (SPL, SPL + Imp)
2. the *Select Golden DUT* switch in the Start Task section on the property page *Tasks* is enabled.



3. when the limits are calculated (see section *Test Configuration / Limit Calculation*). The *Summary* result window shows a list of DUT with the best fit at first position in order of decreasing fitting. The three best fitting DUTs are shown.



The golden units are calculated according to their deviation (min. squared difference) of the SPL measures against the mean curve of the SPL. So the closest matches to the average of the reference DUTs are listed.

Note: If multiple SPL tasks are used, the golden DUT sorting algorithm is based on the last task in the task list having an SPL measure.

假如以下事件发生，则将自动选择*黄金 DUT*。

1. 至少一个 SPL 任务（包括 SPL、SPL+Imp）。
2. 在属性页面的开始任务部分，开启*选择黄金 DUT* 选项。
   （图略）

3. 当选择了计算门限（参见章节 *测试配置/ Limit* Calculation）。综述结果窗口的最前面位置依照合适顺序显示了最适合的 DUT 列表。最适合的前三个 DUT 显示在其中。
   （图略）

黄金单元是根据 SPL 测量的偏差（最小方差，相对于 SPL 的平均曲线）计算得到的。因此，最接近参考 DUT 的平均值的 DUT 将被列出来。

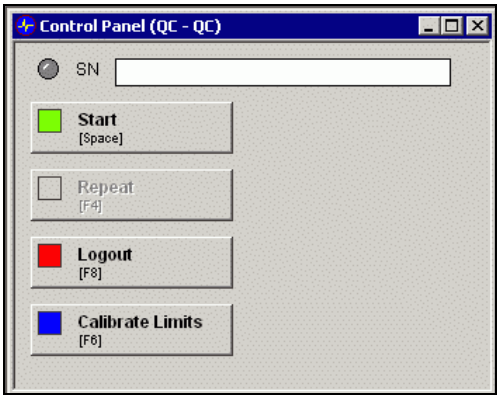
注：如果使用了多个 SPL 任务，黄金 DUT 挑选算法是根据有 SPL 测量任务列表中的最新任务来计算的。

Limit calibration

门限校准

To use the Golden DUT for recalibrating the limits the *Allow Limit Calibration* switch must be enabled. See screenshot in chapter *Selection of*

Golden above. If this switch is set, an additional button appears on the Control Panel *Calibrate Limits [F6]*.



To calibrate the limits connect the "golden DUT" and press the *Calibrate Limits* button at the *Control Panel*. A message box will pop up that asks you to connect the golden DUT. Connect the golden DUT and confirm with OK. Now the golden DUT will be measured and the limits will be automatically adjusted to this reference measurement.

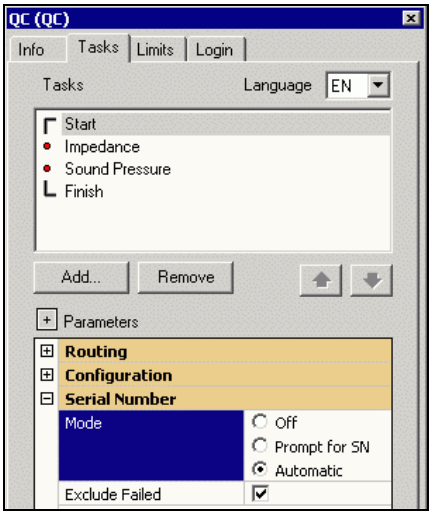
开启 *允许门限校准* 开关才能使用黄金 DUT 来重新校准门限。参阅上节 *Selection* of Golden 的截图。如果设置好这个开关，则控制面板中将出现另外一个按键 *校准门限[F6]* 。
（图略）

为校准门限，请连接"黄金 DUT"并按控制面板上的*校准门限*按键。屏幕会弹出一个消息框要求您连接黄金 DUT，请连接好黄金 DUT 并按 OK 确认。现在开始测量黄金 DUT 并自动为参考测量而调整门限。

Serial Number Handling

序列号处理

There are two different ways to handle serial numbers. Select the mode in the Start Task section on the property page *Tasks*.



The Serial Number is shown on the Summary Page and is stored in the summary log file (see section *Storing Result / Summary (Short form log file)).*

有两种不同的方法处理序列号。在属性页面*任务*中的开始任务中选择模式。

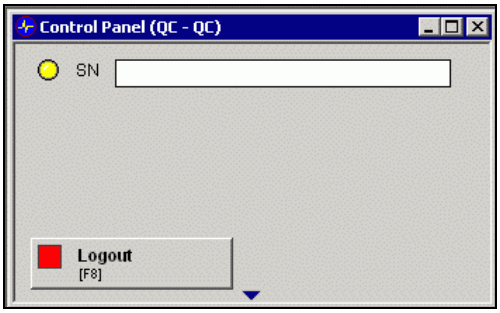
（图略）

序列号将显示在综述页面并存储在综述日志文件中（参阅章节*存储结果/ Summary* (Short form log file)）。

Prompt for SN

序列号提示

If selected, on the Control Panel a text input field appears, where the serial number can be entered. All serial numbers have to be confirmed with ENTER.



Do not use the start button (only available in Engineer Mode). This would ignore the entered serial number.

Note: In the Operator Mode, the Start button is disabled. So the operator is forced to enter a serial number. There is no other way to start the operation.

In the Engineer Mode the Start button is still enabled since it should be used to measure reference Dust for the limit generation.

如果选择了该选项，控制面板上会出现一个文本输入区域，在此可输入序列号。所有的序列号必须使用 ENTER 来确认。

（图略）

请不要使用开始键（仅在工程师模式下有效）。如果使用开始键将会忽视掉输入的序列号。

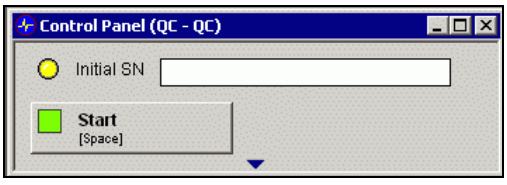
注：在操作员模式下，开始键是无效的。因此操作员必须输入序列号。没有其他方法可以开始操作。

Automatic Mode

自动模式

If the mode is set to Automatic, the serial numbers are increased automatically by one. You may optionally exclude failed Dust (see screenshot above) to have a consecutive numbering of passed Dust.

The operator may enter an initial serial number. However, entering the number does NOT start the test. In this mode the *Start* button must be used.



如果设置模式为自动，则序列号将每次自动加 1。为了有一个通过测试的连续的数字，您可能剔除不合格的点（参见上面的截图）。操作员可输入一个初始序列号。但是输入数字并不代表启动测试，在这个模式下，必须使用*开始*键。
（图略）

Using Barcode
使用条形码

A barcode reader may be used to enter the serial number the first mode *Prompt for Serial Number*. Since Barcode readers normally terminate the scanned string by ENTER, this is identical to the manual input of the serial number.

Note: Any filtering, processing or printing of the scanned barcode (e.g. to exclude characters, using substrings etc.) can be easily implemented in the Programmable Version.

在第一种模式*提示序列号*下，可以使用条形码阅读器输入序列号。因为条形码阅读器通常使用 ENTER 键来结束扫描字符串，这相当于手动输入序列号。

注：在可编程版本中可以很容易地实现任意滤波、处理或者打印扫描的条形码（比如剔除字符，使用子字符串等）。

Routing
路径

The Production Analyzer Hardware as well as the QC software provides flexible options to measure

- one single driver at one channel
- one driver at alternating channels (to optimize speed, measure one DUT while handling other one).
- systems with multiple drivers and up to two microphones.

Select the routing in the Start Task section on the property page *Tasks.*

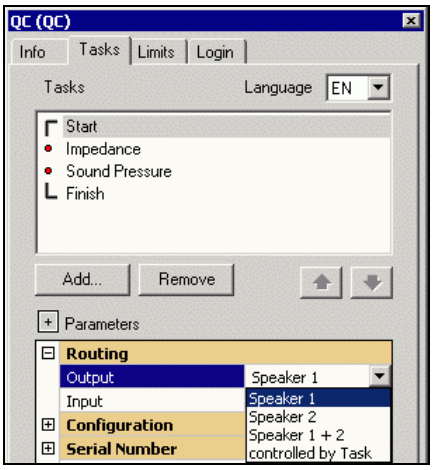
产线分析仪硬件和 QC 软件提供了很灵活的选项进行测量：

- 一个单一发声器在一个通道上。
- 一个发声器在两个交替通道上（为优化速度，测量一个 DUT 的同时处理另外一个）。
- 多个激励的系统和两个传声器。

在属性页面*任务*的开始任务部分选择路径。

Output Routing
输出路径

The Output Routing defines the used Speaker Channel to which the DUT is connected.



输出路径规定了 DUT 所连接的占用的扬声器通道。

（图略）

Speaker 1 or Speaker 2

扬声器 1 或扬声器 2

If the output routing is defined in the Start section of the control task to one single speaker channel (Speaker 1 or Speaker 2), the routing is globally set for all included tasks. There is consequently no option to set up the routing in the individual task setups. Only this speaker channel will be connected to the amplifier during testing. The other channel is switched off using a power relais.

In the Control Panel there is one start button available.

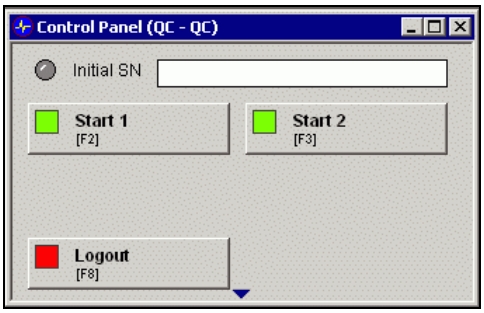
假如在控制任务的开始部分所定义的输出路径为单个扬声器通道（扬声器 1 或扬声器 2），则所有包含在内的任务都设置了该路径。因此在独立的任务设置中没有选项来设置路径。在测试中只有这个扬声器通道才可以连接到放大器。使用电力继电器关闭了另外一个通道。

在控制面板中，有一个开始键有效。

Speaker 1+2

扬声器 1+2

If the output routing is defined in the Start section of the control task to Speaker 1+2, alternating testing becomes possible. The routing is globally set for all included tasks. There is consequently no option to set up the routing in the individual task setups. In the control panel two start buttons are available, one to start the DUT at Speaker Channel 1 and one to start the DUT at Speaker Channel 2.



Note: If the external switch is used to start the test, always the Speaker Channel 1 is started. Using the programmable version, other input pins may be programed to start other channels / combinations.

This setting is used to test one driver at alternating channels (to optimize speed, measure one DUT while handling other one), often together with the input routing *Mic linked to Speaker* (see below).

假如在控制任务的开始部分所定义的输出路径为扬声器 1+2，则可以对两个扬声器进行交替测试。所有包含在内的任务都设置了该路径。因此在独立的任务设置中没有选项来设置路径。在控制面板中有两个开始键有效，一个是用来开启在扬声器通道 1 的测试，另一个是用来开启在扬声器通道 2 的测试。

（图略）

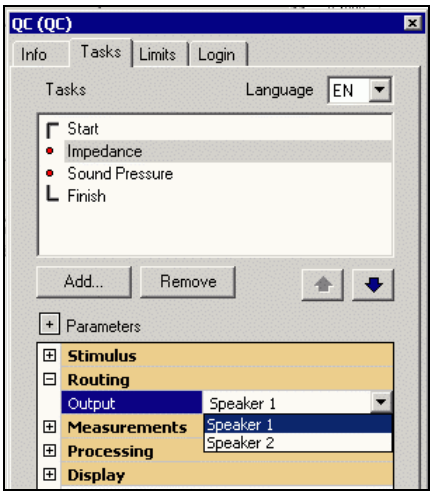
注： 如果使用外部开关来开启测试，则总是开启扬声器通道 1。使用可编程版，另外的输入引脚可能用于编程来开启另外的通道/组合。

该设置用于轮流使用两个通道测试发声器（在测试一个 DUT 的同时处理另一个以提高测试速度），经常还有输入路径 *Mic* linked to Speaker（参见下文）。

Controlled by Task

被任务所控制的

Using this option, all individual tasks have an additional section in the Task Parameter List labeled *Routing* and a new parameter labeled *Output*.



By default the channels are set to Speaker 1. Select the required channel in all used tasks. This mode is used to check systems with multiple drivers in one single test.

使用这个选项，所有独立的任务在任务参数列表中都会多出一个标记为 *路径* 的部分，路经下面有一个新参数 *输出* 。

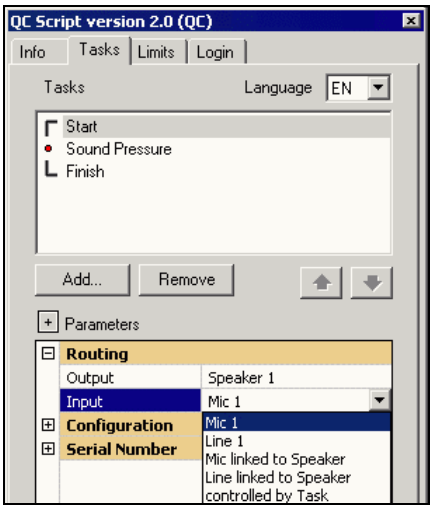
（图略）

默认的通道设置为扬声器 1。在所有使用的任务中选择所需的通道。该模式是用来检查在单个测试中带有多个发声器的系统。

Input Routing

输入路径

The input routing defines which microphone is used to measure the SPL of the DUT. It is also possible to use external microphone power supplies and to connect those to the Line inputs.



输入路径定义了用哪个传声器来测量 DUT 的 SPL。也有可能使用外部的传声器电源并把它连接到线输入。

（图略）

Mic 1

Mic1

Microphone 1 is used for all tasks. This is the default setting. This microphone routing is globally set for all included tasks. There is consequently no option to set up the routing in the individual task setups.

传声器 1 用于所有的任务。这是默认设置。所有包含在内的任务都设置了该传声器路径。因此在独立的任务设置中没有选项来设置路径。

Line 1

Line1

A Microphone with external power supply (e.g. Condensor microphones with 200V supply) is used for all tasks. This microphone routing is globally set for all included tasks. There is consequently no option to set up the routing in the individual task setups.

在所有的任务中可使用带有外部电源的传声器（比如带有 200V 电源的极化传声器）。所有包含在内的任务都设置了该传声器路径。因此在独立的任务设置中没有选项来设置路径。

Mic linked to Speaker

连接到扬声器的传声器

In this case, the microphone channel is selected according to the Speaker Channel. This is also used for all tasks.

When Speaker 1 is tested: measure SPL with Mic connected to Mic 1

When Speaker 2 is tested: measure SPL with Mic connected to Mic 2

This mode allows testing DUT alternatingly using two (almost) identical test stands (or enclosures). It should be used with the Output Routing Setting *Speaker 1+2*.

Note: Alternate testing cannot be used with Ambient Noise testing at the same time. For Ambient Noise testing Mic 2 input is always used. In the programmable version this restriction can be removed.

在这种情况下，传声器通道是根据扬声器通道来选择的。它同样也是用于所有任务的。

当测试扬声器 1 时：将传声器连接到 Mic1 测试 SPL。

当测试扬声器 2 时：将传声器连接到 Mic2 测试 SPL。

该模式允许使用两个（几乎）相同的测试状态（或场所）交替测试 DUT。输出路径应该设置为 *Speaker 1+2*。

注：交替测试不能同时用于带环境噪声的测试。因为总是要使用传声器 2 作为输入测试环境噪声。在可编程版中可以取消这一限制。

Line linked to Speaker
连接到扬声器的线路

A Microphone with external power supply (e.g. Condensor microphones with 200V supply) is used for all tasks. In this case, the input channel is selected according to the Speaker Channel:
When Speaker 1 is tested: measure SPL with Mic connected to Line 1
When Speaker 2 is tested: measure SPL with Mic connected to Line 2

This mode allows testing DUT alternatingly using two (almost) identical test stands (or enclosures). It should be used with the Output Routing Setting *Speaker 1+2*.

Note: Alternate testing cannot be used with Ambient Noise testing at the same time. For Ambient Noise testing Mic 2 input is always used. In the programmable version this restriction can be removed.

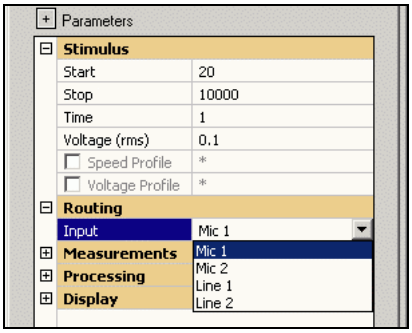
在所有的任务中可使用带有外部电源的传声器（比如带有 200V 电源的极化传声器）。在这种情况下，输入通道是根据扬声器通道选择的：
当测试扬声器 1 时：连接传声器到线路 1 测试 SPL。
当测试扬声器 2 时：连接传声器到线路 2 测试 SPL。

该模式允许使用两个（几乎）相同的测试状态（或场所）交替测试 DUT。输出路径应该设置为 *Speaker 1+2*。

注：交替测试不能同时用于带环境噪声的测试。因为总是要使用传声器 2 作为输入测试环境噪声。在可编程版中可以取消这一限制。

Controlled by Task
被任务控制

Using this option, all individual tasks have an additional section in the Task Parameter List labeled *Routing* and a new parameter labeled *Input*.



By default the channels are set to Mic 1. Select the required channels in all used tasks. This mode is used to check systems with multiple drivers and / or multiple microphone locations in one single test.
All Mic and Line inputs are available as options. Note, that the Ambient Noise Monitoring is always measured using Mic 2. When Mic 2 is required for near field testing (measuring the response, not the Ambient Noise), this cannot be combined with Ambient Noise Monitoring.

In this case disable the measure *Ambient Noise*.

使用这个选项，所有独立的任务在任务参数列表中都会多出一个标记为 *路径* 的部分，路经下面有一个新参数 *输入* 。

（图略）

默认的通道设置为传声器 1。在所有使用的任务中选择所需的通道。该模式是用来检查在单个测试中带有多个发声器和/或多个传声器位置的系统。

作为选择，所有传声器和线路输入都是有效的。注意，总是使用传声器 2 来测量环境噪声。当要求用传声器 2 做近场测试（测量频率响应，而不是环境噪声），测试则不能与环境噪声监控相结合。
在这种情况下，应关闭测量*环境噪声*。

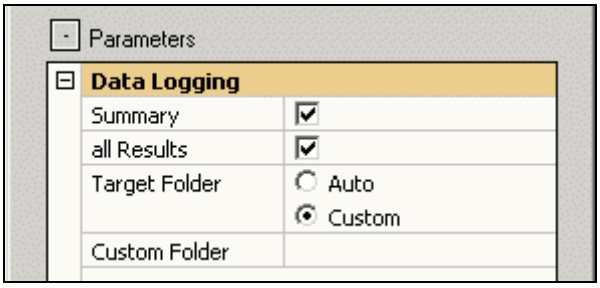
Storing Results

存储结果

Overview

概要

The Control Task / Finish section in all software versions provides the following options to store results.



Please refer to the section Test *Configuration / Tasks / Control Task* on information about the Control Task.

在所有软件版本中的控制任务/结束部分提供了以下几个存储结果的选项。

（图略）

请查阅章节 *测试配置/任务/Control* Task 了解有关控制任务的信息。

Summary (Short form log file)

综述（简短日志文件）

The Summary log file comprises test results in one line for each test. Consequently the number of lines in a log file is equal to the number of logged tests (minus the header line).

For the file location, please refer to section *File Location* below.

Contents:

This short form log file contains the following data:

Group	Description
General Info	Date
	Time
	SerialNumber
	UserName
Pass / Fail verdicts	Verdict-Overall
	Verdicts of all enabled measures
Single Number Results	All enables results (e.g. Re, fs, Level)
Conditions	Temperature
	Humidity
Cpk / Ppk	Cpk, Ppk, CpkLimit, PpkLimit

Format:

The log file does not have a fixed format. Depending on enabled measures only calculated results are stored.

The file is written in plain text format. Each file starts with a header line to identify the columns.

The separation character is a tab stop.

综述日志文件包括每个测试的测试结果（就一行）。因此，在日志文件中的行数等于有记录的测试的数目（去掉首行）。

关于文件位置，请查阅下面章节 *File* Location。

内容：

简短日志文件包括以下数据：

组	描述
一般信息	日期
	时间
	序列号
	用户名
通过/失败的判断	总判断
	所有开启测量的判断
单个数字结果	所有可用结果（如 Re、 fs、电平）
条件	温度
	湿度
Cpk / Ppk	Cpk、Ppk、 Cpk 门限，Ppk 门限

格式：

该日志文件没有固定的格式。只存储开启测试所计算得到的结果。

文件形式为简单文本格式。每个文件开头有一个首行来确定列。

分隔符是移字键。

All Results (Database)

所有结果（数据包）

If storing "*all results*" is enabled, after each performed test the active operation is stored in a database format. These databases can be opened simply by double click on the icon or filename.

The filename is a compound of Serial number, Date and time to identify each tested DUT (Example: DUT SN01234 2007-11-06 10-52-38-3.kdb).

Please refer to section "Getting Started / Viewing Results" to find more details.

The database holds all information of the measurement including results, limits, reference measurements, result graphs, output messages etc. identical to the state just after the test with the following exception:

Note:
1) The contents of the result window *Calibration Spectrum* and *Calibration Waveform* are never stored in a database. This information is lost after logging out.
2) The reference units (used to calculate the limits) are not stored in the saved database for disc space saving reason. They are stored only in the original test database. However, the limits are included in all saved databases.

From these stored databases all displayed information is accessible using the internal export function for curves and data. For details see the dBLab-Manual.

For the file location, please refer to section *File Location* below.

如果开启存储 “*所有结果*”，则在每个测试完成之后，将以数据包格式存储所有有效操作。简单地双击图标或文件名，即可打开这些数据包。

文件名是一个包含序列号、日期和时间的复合句以识别每个测试的 DUT（举例：DUT SN01234 2007-11-06 10-52-38-3.kdb）。

详情请参阅章节 *开始/查看结果*。

数据包中包含了所有测试信息，包括结果、门限、参考测量、结果图表和输出信息等。除了下面的例外，测试之后的状态都是一致的。

注:
1)结果窗口 *校准频谱* 和*校准波形* 中的内容不会存储到数据包。当注销系统，这些信息随即丢失。
2) 为节省硬盘空间，参考单元（用于计算门限）不会存储到数据包。它们只保存在最初的测试数据包中。然而，门限都会包括在所有保存的数据包中。

从这些保存的数据包，使用内部输出功能可以进入所有显示信息以查看曲线和数据。详情请参阅 dBLab 手册。

关于文件位置，请查阅下面章节 *File* Location。

Extracting data from Klippel Database

从 Klippel 数据包提取数据

A much more convenient way to assess the stored data of multiple databases is the Klippel database data extraction Tool *DBextract*.

DBextract is a utility of the QC System, allowing to export selected QC Test Results to widely configurable text files (Excel, Matlab, ASCII etc).

More information can be found in the separate manual of the Extraction Tool. It is part of the online help and also part of the paper version coming with the QC system.

Note: For implementing offline data processing, see also section *Statistics* / *Offline Statistics*.

一个访问多个数据包中存储的数据的更为便利的方式是 Klippel 数据包数据提取工具 *DBextrac*。

DBextract 是 Klippel 系统的一部分，它可以将选择的 QC 测试结果输出为可在很大范围内调配的文本文件（Excel、Matlab、 ASCII 等）。

更多相关信息请参阅另外的单独手册《提取工具》。它是在线帮助的一部分，也是 QC 系统附带的书面版本的一部分。

注：为进行离线数据处理，请参阅章节 统计/ *Offline* Statistics。

Making Reports

制作报告

Using the report function of dB-Lab customized measurement report can be generated. All result windows as well as user defined formatting, logo and style can be used to generate a highly flexible format.

For details see section *The Report System* from the dB-Lab manual.

使用 dB-Lab 的报告功能，可产生定制的测量报告。可以利用所有结果窗口以及用户自定义格式、日志和样式来产生一个非常灵活的格式。

详情请参阅 dB-Lab 手册中的章节 *报告系统*。

File Location

文件位置

The target folder for all log files and databases can be specified in two ways:

Auto:

If the target folder is set to Auto, the log file (summary or database) is stored in a subfolder labeled *Log* created in the folder of the currently used test database.

By default it is {Program Files} / Klippel / DA / QC / tests / {*testname*} / Log.

The storage folder of the currently used database can be defined using the setup of the QC-Start tool (refer to section *Organizing Projects / QC Start tool /QC* Start *)*.

By default it is {Program Files} / Klippel / DA / QC / tests / {*testname*}.

Custom:

Any arbitrary folder can be specified as an absolute path.

Note: You should not use a network drive. This may cause larger delays due to network traffic. A defined cycle time cannot be guaranteed.

所有日志文件和数据包的目标文件夹可以定义为以下两种方式：

自动：

如果目标文件夹设置为自动，则将日志文件（综述或数据包）存储在标记为*日志* 的子文件夹中，该文件夹是在当前使用的测试数据包文件夹中创建的。

默认为：{Program Files} / Klippel / DA / QC / tests / {*testname*} / Log.

).。

可以使用 QC-开启工具的设置来定义当前使用的数据包存储文件夹（查阅章节 *组织工程/QC 开始工具/ QC* Start ）。

默认为：{Program Files} / Klippel / DA / QC / tests / {*testname*}。

定制：

可以使用一个绝对路径来指定任意定制文件夹。

注：您不 能使用网络磁盘。由于网络通信堵塞可能会引起较大延迟，从而不能保证相关处理在规定周期里完成。

Customized formats

定制格式

Almost any format can be generated using the programming features version of the software.

1. It is possible to send Klippel your specification for a specific output format. In this case Klippel would provide you with customized scripts. This is also possible, if you are working with the Standard version (Basic version is not supported with customized export).
2. Using the programmable version you may implement the required export data yourself. There are almost no restrictions but keep in mind that generating long strings and lists as well as hard disc access slows down the complete system.

使用软件的可编程特性，可产生任何格式：

1. 您可发送给 Klippel 一个特殊的输出格式。在这种情况下，Klippel 将提供给您定制脚本。标准版也支持该做法（基本版不支持定制输出）。
2. 使用可编程版，您可自己完成所需的数据输出。系统几乎没有任何限制，但是您要清楚产生长字符串和列表及访问硬盘都将降低整个系统的速度。

Statistics

统计

Online Statistics

在线统计

All statistical evaluations that need to be calculated immediately after processing each DUT are assigned as "online". This is required to derive information about the reliability and reproducibility of the manufacturing process as well as for controlling the production (data exchange with the production line or other computers).

In the QC standard version CPK/PPK as well as a simple Pass / Fail statistics is provided.

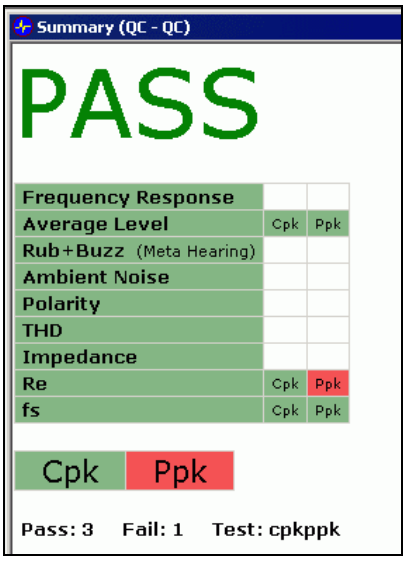
所有需要在测量每个 DUT 之后立即进行的统计估算归为 “在线统计”。这是因为企业需要得到有关制造过程的可靠性和可重复性以及产线控制的的相关信息（产线或不同计算机之间的数据交换）。

在 QC 标准版中提供了 CPK/PPK 以及一个简单的 通过/失败的统计信息。

Cpk / Ppk

Cpk / Ppk

The Production Capability Indices Cpk and Ppk assess the production process (for details and theory see *Appendix / Glossary / Ppk / Cpk*).



All single value results can be subject to a Cpk/Ppk analysis. This can be enabled in the Limit Calculation Mode by checking the appropriate checkbox. The Cpk results of all enabled measures are "and"-linked and displayed in the "Cpk"-box below the result list. The green color of the box indicates a stable process (all single Cpk tests passed) while the red color indicates a problem. This applies to Ppk as well.

生产能力指数 Cpk 和 Ppk 评估生产过程（详情和理论说明请参阅 *附件/术语表 / Ppk / Cpk*）。

（图略）

所有单个测量结果都可做 Cpk/Ppk 分析。可在门限计算模式中选择相应的选择框来开启该功能。所有开启测量的 Cpk 结果都是用“与”关系相连并显示在结果列表下方的“Cpk”方框中。绿色方框表示当前是一个稳定过程（所有 Cpk 测试通过），而红色方框则表示有问题。出现了。Ppk 与此相同。

Pass / Failed DUTs
通过 /失败的 DUT

A simple counter is implemented to show the passed and failed DUTs since the last login. For longer term statistics see chapter *Offline Statistics*.

一个简单的计数器可显示从最后一次登录到当前所测试通过和失败的 DUT 数。更长时间的统计分析请参阅章节 *Offline* Statistics。

Offline Statistics
离线统计

For long term evaluation of tests as well for any post processing that is not used for immediate action on the production process, the offline statistics shall be used.

This separation into online and offline processing keeps the actual production cycle time minimal while providing an extreme high degree of flexibility for almost any evaluation of measured data.

The offline statistics is based on the stored data during the online measurement. Two kinds of storing are available:

- Summary Log file (one line per DUT)
- Complete Database (one file per DUT).

See chapter *Storing Results* for details.

离线统计用于对测试的长时间评价和不是用于生产过程的即时行动的任何后处理。

离线统计分成在线和离线两种处理方式，它既保证了实际产线周期时间最短，又能对所有测试数据进行高自由度的评估。

离线统计是基于在线测量所存储的数据，有两种保存数据格式：

- 综述日志文件（一个 DUT 一行）。
- 完整数据包 （一个 DUT 一个文件）。

详情请参阅章节 *储存结果*。

Extracting data for processing

提取数据进行处理

Klippel QC stores all results in compact binary files (*.kdb). Binary data can be saved much faster than text. This is important if the cycle time of the production line is short. A dedicated tool makes the results accessible in text format. You can scan multiple databases, and select which result to export and process. The output format is widely configurable, so import into statistics tools like Microsoft Excel is smooth and painless.

The data stored in both files, the Summary Log File and the Complete Database, can be extracted to almost any ASCII format using the *DBextract* Tool.

DBextract is a utility of the Klippel System, allowing to export selected QC Test Results to widely configurable text files (Excel, Matlab, ASCII etc).

More information can be found in the separate manual of the Extraction Tool. It is part of the online help and also part of the paper version coming with the QC system.

More information can be found in the separate manual of the Extraction Tool. It is part of the online help and also part of the paper version coming with the QC system.

Some straight forward examples of the usage are:

- Making am Excel Sheet (csv file) with all SPL response data from the last week.
- Making an Matlab compatible data file with a matrix of the impedance curve, *Re* value and *fs* value from the last 1000 DUTs.
- Creating a chart using Excel of the resonance frequency versus measured temperature and humidity
- Correlation of the Cpk / Ppk results with time, date, batch, operator, etc.

This technique allows to access all data **after** the measurement, whereas in other QC systems the contents of the logged data must be defined in advance as a setup parameter.

Klippel QC 系统以压缩二进制数文件（*.kdb）存储结果。存储二进制数据比文本文件快很多。假如产线测量时间很短的话，这一点非常重要。您可以使用一个专门的工具使得结果可以文本方式读取。您可以扫描多个数据包并选择所要导出和处理的结果。输出格式可在很大范围内调整，因而将数据导入统计工具（如 Microsoft Excel）会变得流畅和简单。

数据是以综述日志文件和完整数据包两种形式保存的，它可以用 *DBextract* 工具提取出来并转成几乎任何的 ASCII 形式。

DBextract 是 Klippel 系统的一部分，它可以将选择的 QC 测试结果输出为可在很大范围内调配的文本文件（Excel、Matlab、 ASCII 等）。

更多相关信息请参阅另外的单独手册《提取工具》。它是在线帮助的一部分，也是 QC 系统附带的书面版本的一部分。

直接使用的一些例子如下：

- 把上周的所有 SPL 响应数据做成 Excel 表格 (csv 文件) 。
- 把最近 1000 个 DUT 所得到的阻抗曲线、Re 值和 fs 值所构成的矩阵做成 Matlab 兼容的数据文件。
- 使用 Excel 将相对于温度和湿度变化的共振频率做成一条曲线。
- 计算 Cpk / Ppk 结果与时间、日期、产品批次和操作员的相关性。

该技术允许用户在测量之后访问所有的数据，然而在其他 QC 系统中必须像设置参数一样预先定义好已注册数据的内容。

Implementing my own statistics
实现自己的统计

Also for complex statistical programming the two basic approaches hold valid:

Online statistics (see chapter above) can be easily implemented using the *Programmable Version* of the QC system. This can be done in the *Scilab* high level math language, which provides a very powerful library for statistical functions.

However, this should be restricted to those applications, were the online / real time feedback to the production line is required.

The Offline Statistics can be implemented by any program that provides statistical evaluation such as *Excel, MatLab, Scilab* or even the Klippel *MAT* module (part of the R&D system) etc. Using the data extract tool *DBextract* any results can be extracted from stored summary log file and proprietary database in an almost arbitrary ASCII file format.

See also chapter *Extracting data for processing* above.

Note: You may always provide ideas for features which are currently not included in the QC standard system. Those may be included in future releases.

有以下两种基本方法可以实现复杂的统计程序：

QC 系统的 *Programmable* Version 可轻松实现在线统计（请参阅上节），它由 *Scilab* 高级数学语言完成，该语言提供了丰富的统计函数库。

但是，在线统计都要求生产线在线并实时反馈信息，因而限制了它们的应用。.

可通过任何提供统计估算的程序如 *Excel*、 *MatLab*、 *Scilab* 甚至 Klippel *MAT* 模块 （R&D 系统的一部分）等来实现离线统计。使用数据提取工具 *DBextract* 可从储存的综述日志文件和专属数据库中以几乎任意的 ASCII 文件格式提取任何结果。

请参考上节 *Extracting* data for processing *进行处理* 。

注: 您可以提供新功能的想法，目前 QC 标准系统没有包含的功能可能会在以后的版本中实现。

Basic, Standard, Programmable Version

基本、标准和可编程版本

Differences between versions

各版本间的区别

The KLIPPEL QC system is available in three versions: Basic, Standard and Programmable System. The Basic System supports only one measurement task in a test and has only some basic features included. Furthermore it can only handle one reference device for limit calculation. However it can be upgraded with additional features according to the table below.

The Standard System is a complete QC measurement system that can be upgraded with Meta-Hearing-Technology for advanced Rub&Buzz detection.

The Programmable System has additionally included a high level scripting language that allows a flexible customization (see next section).

Feature:	Basic System	Standard System	Programmable System
Impedance	incl.	incl.	incl.
SPL	incl.	incl.	incl.
Re, Fs, Qts	incl.	incl.	incl.
Polarity	incl.	incl.	incl.
T/S parameter	opt.	incl.	incl.
THD	opt.	incl.	incl.
Rub & Buzz (standard)	opt.	incl.	incl.
Ambient Noise Monitoring	opt.	incl.	incl.
Multiple Reference DUTs Statistical limit generation	—	incl.	incl.
Production indices (Cpk, Ppk)	opt.	incl.	incl.
Meta-Hearing-Technology (incl. Rub & Buzz standard)	opt.	opt.	opt.
Remote Configuration Tool	opt.	opt.	opt.

High level scripting language	—	—	incl.

incl. = feature included opt. = feature optional — = not available

Klippel QC 系统有三种版本：基本版、标准版和可编程版。基本版在一个测试中仅支持一个测量任务，且只包含一些基本特性。此外，基本版的门限计算只能处理一个参考设备。然而，基本版可按下表升级添加特性。

标准版是一套完整的 QC 测量系统，可以升级到支持用于高级异音检测的超听力技术。

可编程版本额外增加了高级脚本语言，使系统可以灵活定制（见下节）。

特性	**基本系统**	**标准系统**	**可编程系统**
阻抗	含	含	含
SPL	含	含	含
Re、fs、Qts	含	含	含
极性	含	含	含
T/S 参数	可选	含	含
THD	可选	含	含
异音（标准）	可选	含	含
环境噪音检测	可选	含	含
多参考 DUT 的统计门限产生	—	含	含
生产指数 （Cpk、 Ppk）	可选	含	含
超听力技术（包括异音（标准））	可选	可选	可选
远程配置工具	可选	可选	可选
高级脚本语言	—	—	含

含 = 包含此特性 可选 = 此特性可选 — = 无

Programmable Version

可编程版本

Background of programming

可编程版本的背景

The programmable version is designed to be most flexible while keeping the effort for customization minimal. This is achieved by supplying

- Especially adopted structure to QC requirements
- Methods to reduce amount of data to be processed to a minimum
- Library functions solving general QC problems
- Preprocessing of acquired data in a kernel to provide standard results (THD, Rub&Buzz, Phase, Magnitude, Spectra, Waveform) in already downsampled resolution to speed up tests

可编程版本是以最小定制成本实现最大灵活性的理念而设计，它通过提供以下几个方面来实现：

- 为满足 QC 需求而特别挑选的结构
- 将处理数据总量减少到最少的方法
- 解决普遍 QC 问题的库函数
- 在内核中对采集到的数据进行预处理，从而以降低采样分辨率来提高测试速度，并提供标准结果（THD、异音、相位、幅度、频谱、波形）

What can be modified?

可以修改什么？

The programmable version can modified almost any properties of the QC system such as:

- Algorithms for calculation of data based on the acquired measurement data.
- Algorithms for limit calculation
- User Interface for Operator and Engineer
- Output of data in any format (binary or text based)
- Visualization of data (colors, style, axis etc.)

可编程版本可以修改 QC 系统的几乎任何属性，例如：

- 对采集到的数据的计算算法
- 门限计算算法
- 操作者和工程师的用户界面
- 以任意格式（基于文本或二进制）输出数据
- 数据可视化（颜色、样式、坐标轴等）

More Information

更多信息

More information about the programmable version can be found in the Programmer Manual.

可编程版的更多信息请参见程序员手册。

Hardware

硬件

Setup and Configuration

安装与配置

For performing the first measurement with the Klippel QC system, please refer to the section *Getting Started*. There the standard routing and PC-connection are explained. In this section you can find background information and details for enhanced usage.

Basically the Production Analyzer could be used to test not only analog components but also any multimedia equipment (USB loudspeaker or USB headsets / microphones). However, in the standard configuration it uses a firewire (IEEE1394) based AD/DA converter (Phase24FW) that is feeding the digital data through the Microsoft multimedia system into the QC software.

要使用 Klippel QC 系统进行第一次测量，请参见章节*开始*。该章节说明了标准的连线和与 PC 连接的方法。本章节您将了解一些背景信息和高级应用细节。

一般来说，本产品分析仪不仅可以测试模拟部件，而且还能测量任何多媒体设备（USB 扬声器或 USB 耳机/麦克风）。在标准配置中，它使用一根基于 AD/DA 转换器（Phase24FW）的火线（IEEE1394）将数字数据通过微软多媒体系统送入 QC 系统。

Calibration / Check of Accuracy

校准/精度检查

A complete system calibration comprises three parts, which are required to perform at different time intervals:

Calibration	Recommended Interval	Verifying
Microphone	daily - monthly	Pistonphon
Amplifier / Internal Calibration	monthly	Automatic check at every startup
Voltage / Current sensors	24 month	not available at customer site

一个完整的系统校准由三部分组成，它们需要在不同的时间间隔内完成：

校准	推荐的时间间隔	校验
传声器	每天 – 每月	活塞发声器
放大器 / 内部校准	每月	每次启动时自动检查
电压/电流传感器	24 个月	用户无法完成

Production Analyzer Calibration

产品分析仪校准

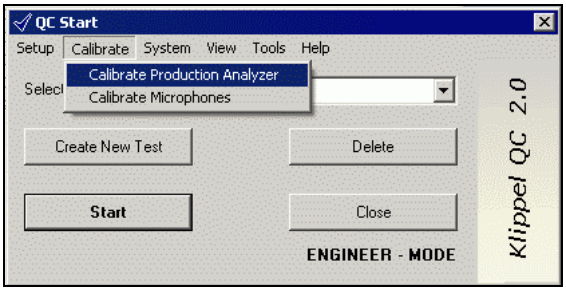
The Production Analyzer Calibration calibrates the analog in- and output using a built in reference signal generator. It also checks digital bypass routing from in- to output and vice versa in the Microsoft multimedia system.

After calibrating the in/outputs, it measures the amplifier gain and highpass characteristics and stores the gain of all found routings. It always checks for a gain from both outputs (OUT1 and 2) to both speaker channels (SPEAKER 1 and 2).

By default the output OUT1 is used to be connected to an amplifier, which may drive both speaker channels with different gains. Using the programmable version it is possible to use the output OUT2 for advanced testing such as cross correlation measurements etc.

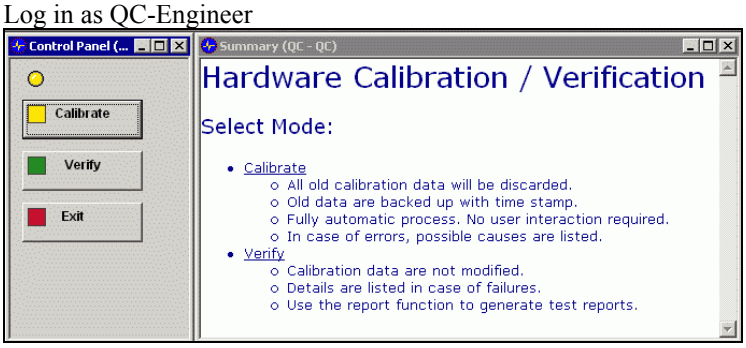
Note: Make sure, that your power amplifier is connected to the system! For the calibration process the same wiring scheme must be used as described in the section *Getting Started / Hardware Installation*. No matter, which speaker channels are used in the final application, both channels are required for the calibration process.

Using the QC-Start tool select System / Production Analyzer Calibration from the menu. If the menu entry is disabled, you need to start the QC start tool in the Engineer mode, see section *Organizing Projects*.



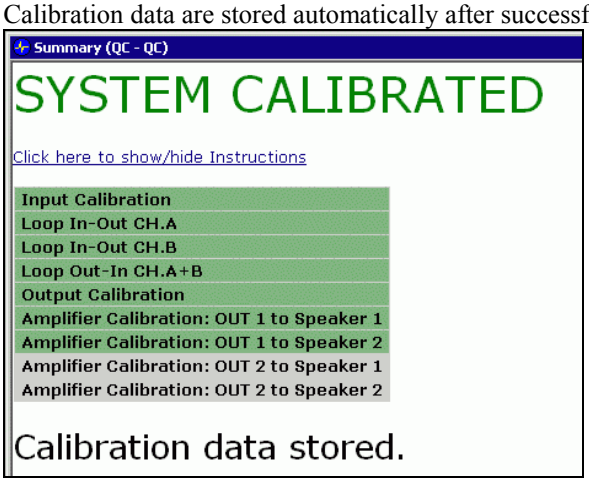
A special calibration test sequence is started. Please follow the steps below.

1. Log in as QC-Engineer



2. Press on "Calibrate" button on the user interface

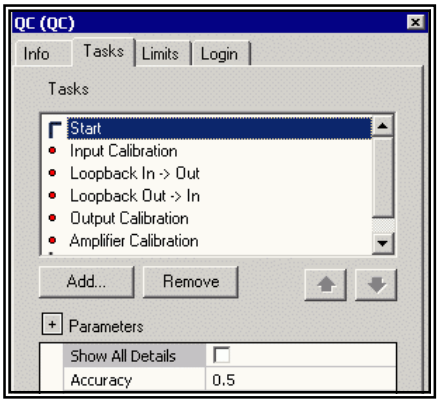
3. In case of a failed calibration follow the instruction on the Summary Window. If you do not see the instructions, click on the link *Click here to show/hide Instructions*. In case of persistent problems, please contact *support@klippel.de*.
4. Calibration data are stored automatically after successful calibration.



5. Press "*Exit*" to return to the QC-Start tool.
6. Close dB-Lab if not exiting automatically.

Note: After calibrating the system also the inputs are recalibrated, thus the microphone input gain might have been changed and therefore always a calibration of the microphones is requested after calibrating the Production Analyzer.

You may later on check a valid calibration by using the "*Verify*" option from the user interface. In this mode you may also adjust the tolerance for checking the accuracy of the parameter (Select Start task in Task list and edit Parameter Accuracy in Parameter List). It is set to 0.5% by default.



产品分析仪校准使用内置的参考信号发生器校准模拟输入和输出。同时还检查微软多媒体系统中的从输入到输出及相反方向连接的数字旁路。

在校准输入、输出之后，它还测量了放大器增益和高通特性，并存储所有发现的连接的增益。此外还检验从两个输出（OUT1 与 OUT2）到两个扬声器通道（SPEAK1 和 SPEAK2）的增益。

缺省情况下，输出 OUT1 连接到一个功放，该功放可能以不同增益驱动两个扬声器通道。在可编程版本中，它可将输出 OUT2 作为互相关测量等的高级测试使用。

注：请确认您的功放已经与系统连接！
在校准过程中，必须使用与章节*开始/ Hardware* Installation 一样的接线方式。
无论在最终应用中使用哪个扬声器通道，两个通道都需要进行校对。

使用 QC-开始工具，从菜单中选择系统/产品分析仪校准。如果菜单项被关闭，您需要在工程师模式下开启 QC 开始工具，请参见章节*组织工程*。

（图略）

一个特定的校准测试序列开始了。请参照下列步骤：

1. 以 QC 工程师登录

   （图略）

2. 在用户界面上按“校准”按键。

3. 若出现校准失败，请跟随摘要窗口的指示进行。如果您无法看到这些指示，请点击链接 *点这里显示/隐藏指示* 。如果问题重复出现，请联系 *support@klippel.de*。

4. 在校准成功后校准数据被自动存储。

   （图略）

5. 按“*退出*”返回到 QC 启动工具

6. 如果不能自动退出，请关闭 dB-Lab。

注：在校准系统之后，输入也被重新校准，传声器输入增益已被改变，因此在校准本产品分析仪之后需要进行一次传声器校准。

在此之后，您可以在用户界面使用“*校对*”选项检查校准结果的有效性。在此模式下，您可能还需要调节检查参数准确性的容差（在任务列表中选择开始任务，并在参数列表中修改参数准确性）。默认值为 0.5%。

（图略）

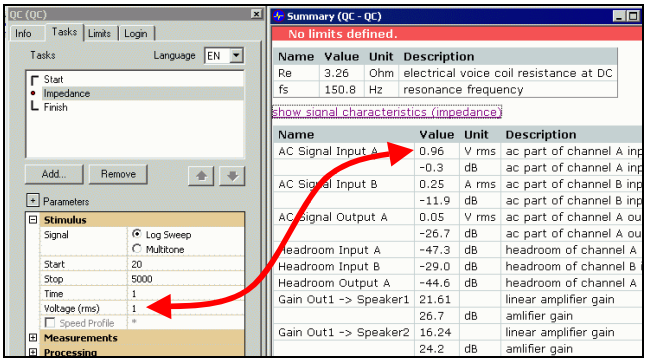
Amplifier Gain

功放增益

The detection of the amplifier gain is part of the Production Analyzer Calibration (see above).

Note: During the calibration the gain of the power amplifier is measured in a unloaded condition. When testing especially low impedance drivers, the achieved voltage at the DUT terminals may substantially be less than the specified target voltage due to a finite output impedance of the amplifier. Although this is not critical in most cases for QC tests since these tests are relative against a golden unit, it should be kept in mind.
In all impedance tasks, a warning will be generated, if the output voltage of the test is 10% below the specified voltage.

If accurate testing levels are required, the actual measured voltage should be checked using the impedance task with identical level and stimulus signal. Open the Summary result window and click on the link "Signal Characteristics" to see the rms and peak voltage of the applied test signal.



In the example above there is a voltage drop of 4% from the specified 1V to the measured 0.96V at the driver terminals.

检测功放增益是产品分析器校准的一部分。

注：在校准过程中，功放增益是空载情况下测得的。当测试阻抗特别低的发声器时，由于功放自身的有限输出阻抗分流，在 DUT 端测得的电压总要小于指定目标电压。虽然因为 QC 测试是参照金单元进行的，所以在大多数 QC 测试情况下，上述现象并不至关重要，但是您仍应该了解记住它。

在所有阻抗测试中，如果输出测试电压低于指定测试电压的 10%，系统将会给出警告。

如果需要准确的测试电压，那么就需要使用具有相同电平和激励信号的阻抗任务来检查实际测试的电压。打开综述结果窗口并点击链接“信号特性”，可以查看所使用的测试信号的电压均方根值和峰值。

（图略）

在上述例子中，在扬声器端测量到的 0.96V 电压较指定 1V 电压有一个 4%的电压落差。

Microphone Calibration

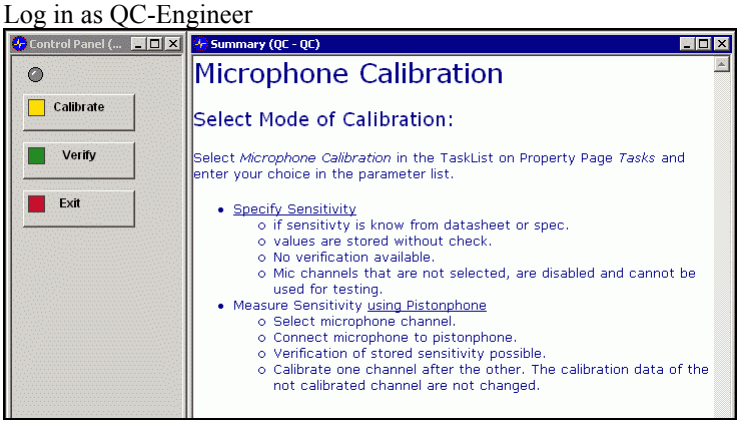
传声器校准

The Microphone Calibration can be performed using a pistonphone or specifying the sensitivity manually from a datasheet.
For microphone calibration a pistonphone / sound calibrator is strongly recommended to achieve absolute and accurate results. The specified sensitivities of microphones vary usually considerably with temperature and pressure.

Note: For any delivered templates / tasks measuring SPL, both microphone channels (MIC1 + MIC2) must be calibrated! This allows Ambient Noise monitoring (optional) as well as testing at two locations.
If you have only one microphone available, calibrate it on both channels.

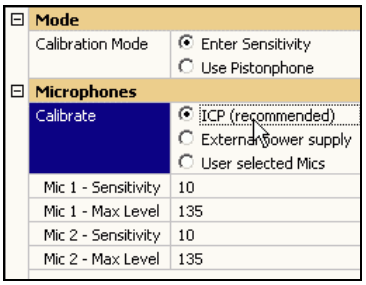
A special calibration test sequence is started. Please follow the steps below.

1. Log in as QC-Engineer



2. Adjust setup parameter on property page *Tasks*. First select the *Calibration Mode*.
3. **Specify Sensitivity**:

   Select microphone(s) for that you would like to enter the sensitivity. Enter the sensitivity from datasheet or third party measurement. It is always required to enter the maximal level, the microphone can measure without clipping or excessive distortion.

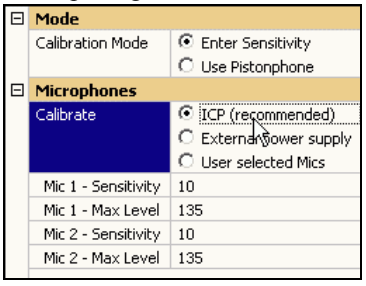


Note: The unselected microphone channels are marked as disabled. This allows to explicitly forbid microphone usage for specific purposes.

OR

Use Pistonphone:

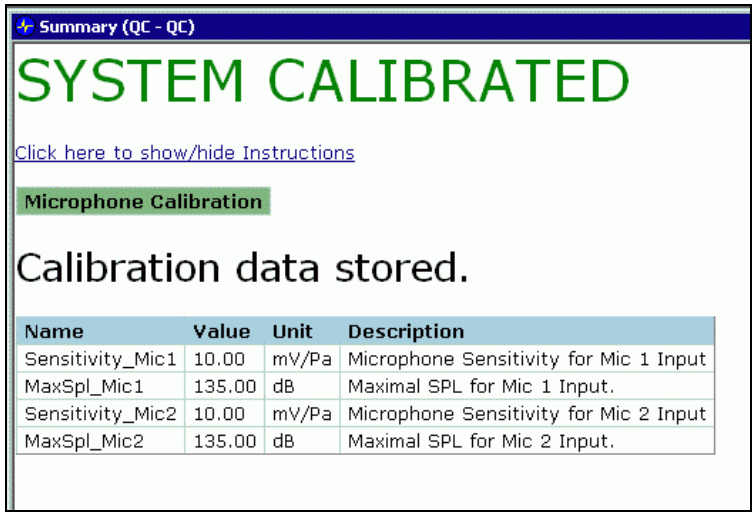
Select microphone channel and always enter the maximal level, the microphone can measure without clipping or excessive distortion. Also enter the test frequency and reference level of the pistonphone / Calibrator. You may specify an analog input gain for handling high / low input signals to ensure best SNR.



It is always required to enter the maximal level the microphone can measure without clipping or excessive distortion:

Microphone Type	Max. Peak Level
MI 17	125 dB
MI 17 HL	135 dB
40BE / 26CB	165 dB

4. Press the *Calibrate* button from the *Control Panel.*
5. For testing the validity of the Mic calibration you may later use the *Verify* function from the *Control Panel*. For the verification accuracy in percent can be specified. (For measurement only.)
6. For checking the signal properties you may enable *Show Details* to obtain SNR, headroom and RMS input values. Response Spectrum and waveform are assessable in Result Chart 1 and 2 resp. (For measurement only.)
7. In case of a failed calibration follow the instruction on the Summary Window. If you do not see the instructions, click on the link *Click here to show/hide Instructions*. In case of persistent problems, please contact *support@klippel.de*.
8. Calibration data are stored automatically after successful calibration.



9. Press "*Exit*" to return to the QC-Start tool.
10. Close dB-Lab if not exiting automatically.

可以使用活塞发声器或根据数据资料手动设定灵敏度来进行传声器校准。强烈推荐您使用活塞发声器/声校准器来进行传声器校准以获得绝对和准确的校对结果。传声器的指定灵敏度通常随温度和压力的变化非常大。

注: 对于任何一个发布的测量 SPL 的模板/任务都必须对两路传声器通道（MIC1+MIC2）进行校准！以此保证环境噪音监测（可选）和测试得以在两处进行。
如果您只有一只传声器，请用它校准两个通道。

一个特定的校准测试序列开始了。请参照下列步骤：

1. 以 QC 工程师登录。
   （图略）
2. 在*任务*属性页面调整设置参数。首先选择 *校准模式*。
3. **指定灵敏度：**
   选择您希望输入灵敏度的传声器。根据数据资料或第三方测量结果输入灵敏度。一般需要输入不会使得传声器测量产生削波或过度失真的最大电平。
   （图略）

注: 未选中的传声器通道将被标记为关闭。这样明确禁止了传声器用于其他未知用途。

或者

使用活塞发声器：

选择传声器通道，并输入不会使得传声器测量产生削波或过度失真的最大电平。再输入测试频率和活塞发声器/校准器的参考电平。为能处理过高或过低的输入信号，您可以指定一个模拟输入增益以保证最佳信噪比。

（图略）

一般要求输入不会使得传声器测量产生削波或过度失真的最大电平：

传声器型号	最大峰值电平
MI 17	125 dB
MI 17 HL	135 dB
40BE / 26CB	165 dB

4. 请在*控制面板*中按*校准*按键。
5. 为检验传声器校准的有效性，您可以在控制面板中使用检验功能。检验将以百分数形式给出精确度（只为测量用）。
6. 为检验信号属性，您可以通过开启显示详情 得到信噪比、动态余量和均方根输入值等。您还可以在结果曲线 1 和结果曲线 2 中分别查看响应频谱和波形。
7. 若出现校准失败，请跟随摘要窗口的指示进行。如果您无法看到这些指示，请点击链接 点这里显示/隐藏指示 。如果问题重复出现，请联系 *support@klippel.de*。
8. 在校准成功后校准数据被自动存储。
9. （图略）
10. 按“退出”返回到 QC 启动工具
11. 如果不能自动退出，请关闭 dB-Lab。

Hardware Calibration
硬件校准

Hardware Calibration is to be performed by Klippel and authorized distributors only. If required, send in the Production Analyzer unit. Hardware Calibration comprises sensor calibration, climatic tests and updates of firmware and / or hardware, if applicable.

Note: A calibration interval of 24 month is recommended to ensure precise operation for the measurement system.

只有 Klippel 和授权经销商可以做硬件校准。如有需要，请将产品分析仪寄来。硬件校准包括传感器校准、环境测试与固件和/或硬件升级（假如合适的话）。

注: 为确保测量系统精确工作，建议您每 24 个月校准一次。

FAQ about calibration
校准的常见问题

Q1.How often Hardware Calibration should be performed?

A1: A period of 2 years is recommended. Do not mix that with the Production Analyzer Calibration, which can be run from the QC Start Tool (See section *Organizing Projects / QC-Start Tool*).

Q2: What exactly is to be calculated during the Production Analyzer Calibration?

A2: Using an internal high precision signal generator, the input and output sensitivities of the converters and the involved windows software mixers can be calibrated and checked at the customer site. This should be done on a

monthly period. It is NOT required to send the hardware unit in for this calibration. Furthermore the amplifier gain and high pass characteristics are measured. The Production Analyzer Calibration checks also for digital feedback loops within the Windows software mixer system.

It is an ON-SITE calibration.

Q2: What exactly is to be calibrated during the Hardware Calibration? Is this just the Production Analyzer Hardware or also the measurement PC?

A2: All transfer functions from all sensor inputs to the digital input stream (including converters, multiplexer etc.) are calibrated. Also the internal reference signal generator will be calibrated. This is the reference signal for the Production Analyzer Calibration. For that calibration the measurement PC is not required.

It is an OFF-SITE calibration.

Q3: What about the microphone calibration?

A3: The microphones can be calibrated separately to measure the whole chain from SPL to digital input using a pistonphone. This can be done at the customer site without the need to send the system to Klippel.

This microphone calibration depends on temperature and humidity and should be done daily or even more often, if higher variation occur at the production site.

The Microphone Calibration can be simply initiated using QC-Start .

Q4: Is there any possibility to perform the Hardware Calibration at the customers place?

A4: Depending on the quantity of units it is possible that Klippel sends a specialist for calibration with all equipment. However, when the Hardware Calibration is done at Klippel, the systems are also long term checked (2x 24h).

After hardware modifications all units are subject to a 8 hour heating cycle test to up to 55°C.

This is not possible at the customers place.

Q5: Is it possible to calibrate the units within a standard calibration laboratory?

A5: No, unfortunately special hardware is required to calibrate the units.

Q6: Do you provide a Traceability Chart for your calibration?

A6: Yes, a certificate of Traceability to calibration standards of the highest Calibration standards of Germany (DKD/PTB) can be delivered on request.

Q1：需要多长时间该进行一次硬件校准？

A1：建议每 2 年校准一次。请不要将硬件校准与产品分析仪校准混淆，后者可以在 QC 启动工具中运行（参见章节 *组织工程 / QC-Start* Tool ）。

Q2：在产品分析仪校准中到底计算了什么？

A2：使用内部的高精度信号发生器，可在客户所在地校对和检查转换器和相关连的 Windows 软件混音器的输入输出灵敏度。该校对和检查工作应该每月进行一次，但并不需要将硬件系统寄来。此外校准时还测量了功放增益和高通特性。产品分析仪校准还检查了 Windows 软件混音系统中的数字反馈环路。

产品分析仪校准是一个在客户场地的校准。

Q2：在硬件校准中到底校准了什么？是仅仅校准了产品分析仪硬件？还是同时校准了测量 PC？

A2：校准了从所有传感器输入到数字输入流（包括转换器、复用器等）的所有传递函数。同时还校准了内部参考信号发生器。这是用于产品分析仪校准的参考信号。对于该校准，不需要测量 PC。

校准是一个不在客户场地的校准。

Q3：关于传声器校准？

A3：使用一个活塞发声器，传声器校准包括独立测量从 SPL 到数字输入的整个链路环节。传声器校准可以在客户场地完成，而无需将系统寄给 Klippel 公司。

传声器校准受温度和湿度的影响很大，应该每天进行一次，如果工厂环境变化很大的话校准频率应更高。

在 QC-启动时可以方便地进行传声器校准。

Q4：是否可以在客户所在地完成硬件校准？

A4：这取决于仪器的数量。如果有可能，Klippel 将派专家带上所有仪器进行现场校准。不过在 Klippel 公司做硬件校准，系统也需要经过很长时间检查（2x24 小时）。

在硬件修改后，所有的仪器要进行 8 小时的高达 55°C 的热循环测试。

在客户所在地无法完成上述测试。

Q5：是否可以在标准校准实验室校准？

A5：不可以。很遗憾，校准仪器时需要使用特殊设备。

Q6：是否需要为您的校准提供一份追溯表？

A6：是的。如有需求，可以给您寄一份德国最高校准标准机构（DKD/PTB）颁发的校准标准追溯证书。

Firmware Update

固件升级

There are basically two hardware units inside the Production Analyzer that have independent firmware. Both firmware versions are checked during the installation process. If a new firmware version is required, the install process will guide you to the corresponding tool and instructions are given.

Note: Do not update the firmware outside the installation procedure. This may make the complete system inoperable.

在产品分析仪里面主要有两个带有独立固件的硬件单元。在安装过程中要检查两个固件的版本。如果需要更新固件版本，安装过程中将引导您到对应的工具并给您指示。

注: 请不要在安装过程外进行固件升级。这可能导致整个系统不能工作。

Accessories

附件

Microphones

传声器

Several microphones are available from Klippel. All have ICP power supply (also known as IEPE).

Microphone Type	Sensitivity	Max. Peak Level
MI 17	50 mV/Pa	125 dB
MK250+MV201 (Pro Mic Set)	50 mV/Pa	135 dB
MI 17 HL	10 mV/Pa	135 dB
40BE / 26CB	2mV/Pa	165 dB

For details, please refer to the specification *A4 – Microphones*.

Note:
Using the LINE inputs also phantom powered Mics as well as condensor mics with a high polarization voltage (200V) may be connected, if an external power supply is used.

Also third party microphones can be used with the Klippel QC System:

- ICP powered microphones (supply current ≈ 3mA)
- All other microphones with an external power supply (to be provided by the customer) can be connected to the *Line* inputs of the Production Analyzer Hardware.
- Note: Phantom powered Microphones can not be directly used at the *Line* inputs! An additional power supply is required.

Please see the Specification *A4 – Microphones* and *H4 QC Production Analyzer* for more details.

以下几款传声器可以从 Klippel 买到。它们都是 ICP 供电（也称作 IEPE）。

传声器型号	灵敏度	最大峰值电平
MI 17	50 mV/Pa	125 dB
MK250+MV201 (Pro Mic Set)	50 mV/Pa	135 dB
MI 17 HL	10 mV/Pa	135 dB
40BE / 26CB	2mV/Pa	165 dB

更多细节请参考 *A4 – 传声器* 说明书。

注:
如果使用外部供电，使用线输入可以连接需要幻象供电的传声器和需要高极化电压（200V）的电容传声器。

也可以在 Klippel QC 系统上使用第三方传声器：

- ICP 供电的传声器（供电电流 ≈ 3mA）。
- 所有其他需要外部供电的传声器（电源需用户自己提供）可以连接到产品分析仪硬件的*线*输入。
- 注: 需要幻象供电的传声器不能直接接入系统*线*输入！需要另外一个供电电源。

详情请参考 *A4 –传声器* 说明书和 *H4 QC 产品分析仪* 说明书。

Footswitch

脚踏开关

To start the test, simple foot or other manual switches can be used. It is recommended to use the optional available switch interface that can be connected to any closing switch for starting.

Note: Connecting Start Pin 7 to ground (Pin 1) at the I/O connector can be used for starting the test.
TTL compatible logic must be ensured, if connected to external circuits.

可以采用简单的脚踏或其他手动开关开始测试。建议您使用任何可买到的开关接口，这些接口可以连接任意闭合开关以启动测试。

注：连接 I/O 连接插头的开始引脚 7 到地（引脚 1）即可开始测试。
如果连接外部电路，必须保证 TTL 兼容逻辑。

Temperature and Humidity Sensor

温度和湿度传感器

For tracking environmental production conditions an external sensor for temperature and humidity is optionally available. The sensor must be connected to the I/O port and uses input 2 and output 4. These both signals must not be used (and are not provided at the output) for any other external use.

Although the sensor is connected to the Production Analyzer, it does not use the port exclusively. All other I/O lines can be used, simply using the D-SUB output of the sensor.

Note:
1. The sensor hardware should be fixed at a representative location in the production environment. Keep away from power amplifier and computer. Mount the sensor in about the same height as the production testing if the absolute temperature is needed.
2. Always connect the temperature / humidity sensor directly to the Production Analyzer. Do not loop any other peripheral device in between.

可以选购外部温度和湿度传感器来跟踪周围生产环境。传感器必须连接到 I/O 接口，使用输入引脚 2 和输出引脚 4。这两个信号都不可用于其他外部用途（并且在输出端口不提供这些信号）。
虽然传感器连接在产品分析仪上，但它不会独占该端口。只要使用传感器的 D-SUB 输出接口，其他所有 I/O 端口连线仍能使用。

注:
1. 应该在生产环境中具有代表性的地方固定传感器的硬件。远离功放和计算机。如果需要确切的温度，应将传声器安装在与产品测试点一样的高度。
2. 始终直接将温度/湿度传感器连接到产品分析仪。不要在它们之间转接其他外设。

Bar Code Reader / Printer

条形码扫描器/打印机

Bar code reader can be used to scan serial numbers or production code and to mark the results with this number. In the Standard and Basic version the plain scanned string, terminated by a linefeed, is used as serial number. Using the programmable version, it is simple to extract any information from the scanned string such as batch number, date, type etc.

It is also possible to print barcode labels from within the programmable version as long as the printer can be controlled using a command line.

Any reader that emulates keyboard actions can be used with the QC system.

条码阅读器可以用于扫描序列号或产品代号，并以该号码标记结果。在标准版本和基本版本中，直接将扫描得到的字符串（以换行结束）作为序列号使用。使用可编程版本，则可以方便地从扫描到的字符串中提取产品批号、日期、类型等信息。

只要可以由命令行控制打印机，使用可编程版本还能打印条码标签。

任何可以仿真键盘动作的扫描器可以与 QC 系统一起使用。

I/O Connector

输入/输出连接器

Start switch

启动开关

To start tests, connect start pin 7 to ground pin 1 of the I/O connector for at least 20ms.

连接 I/O 连接插头的开始引脚 7 到地（引脚 1）至少 20 毫秒即可开始测试。

Pin description

引脚描述

The pin numbers correspond the standard D-SUB 25.

Keyword OPTO indicates galvanically discoupled ports using optocouplers. For these in/outputs an external supply is required! See hardware specification for details. Examples for using the I/O port are given below.

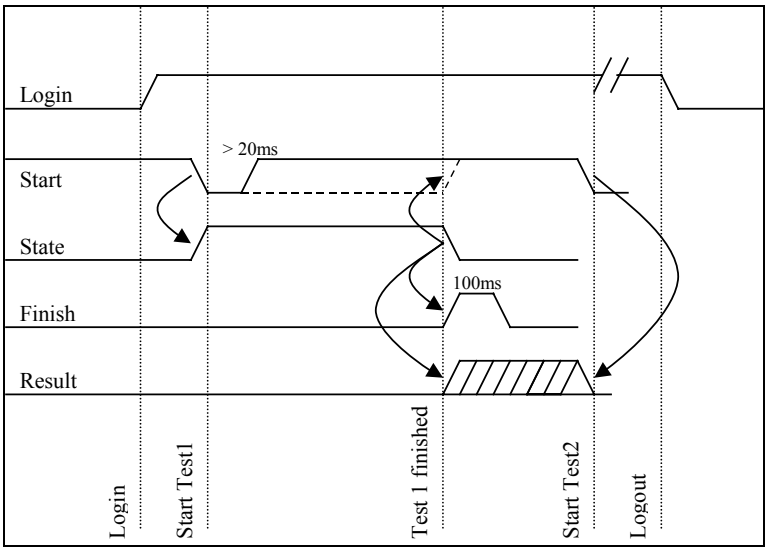
Name	Pin	Dir	Description
Login	18	OUT	high, if any user logged in (refered to ground pin 1 or 6)
Start	7	IN	start 20ms after rising edge (spike tolerant) (refered to ground pin 1 or 6)
State	13	OPTO OUT	HI: test is running Lo: system is in idle mode, waiting for start (refered to ground pin 12, shared with Finish)
Finish	25	OPTO OUT	HI: test finished (duration: 100ms) Lo: else (refered to ground pin 12, shared with State)
Result	24	OPTO OUT	HI: Test passed, Lo: Test failed and during test (refered to ground pin 23, shared with Sensor Out)
Sensor Out	11	OPTO OUT	Reserved for Temperature and Humidity Sensor (refered to ground pin 23, shared with Result)
Sensor In	19	IN	Reserved for Temperature and Humidity Sensor
not used	5,17 4,16 3,15 2	OUT	Configurable outputs in programmable version
not used	10,22	OPTO IN	Configurable inputs in programmable version (refered to commen ground pin 9)
not used	21,8	OPTO IN	Configurable inputs in programmable version (refered to commen ground pin 20)
Power	14	PWR	+5V Logic supply voltage. Max. current: 50mA
Ground	1,6	PWR	Digital System Ground, do not use for analog circuits or opto-coupled I/O !

引脚编号与标准 25 针 D 型接头一致。

关键词 OPTO 表示使用光耦的无电流耦合端口。这些输入/输出端口需要外部电源！请参见硬件说明书。下面将给出使用 I/O 端口的例子。

名字	引脚	方向	描述
登录	18	输出	任何用户登录则为高电平 （相对于地引脚 1 或 6）
开始	7	输入	上升沿（可允许尖脉冲）后 20 毫秒开始测试 （相对于地引脚 1 或 6）
状态	13	OPTO 输出	高电平：正在测试， 低电平：系统空闲，等待开始 （相对于地引脚 12，和结束引脚共用）
结束	25	OPTO 输出	高电平：测试结束（脉宽 100ms） 低电平：其他情况 （相对于地引脚 12，和状态引脚共用）
结果	24	输出	高电平：测试通过， 低电平：测试失败和正在测试 （相对于地引脚 23，和传感器输出引脚共用）
传感器输出	11	OPTO 输出	温度和湿度传感器的保留引脚 （相对于地引脚 23，和结果引脚共用）
传感器输入	19	输入	温度和湿度传感器的保留引脚
未使用	5,17 4,16 3,15 2	输出	在可编程版本中，为可配置输出。
未使用	10,22	OPTO 输入	在可编程版本中，为可配置输入 （相对于共地引脚 9）
未使用	21,8	OPTO 输入	在可编程版本中，为可配置输入 （相对于共地引脚 20）
电源	14	电源	+5V 逻辑电源。最大输出电流 50mA。
地	1,6	电源	数字系统地，请勿用于模拟电路或光耦 I/O。

Timing
时序

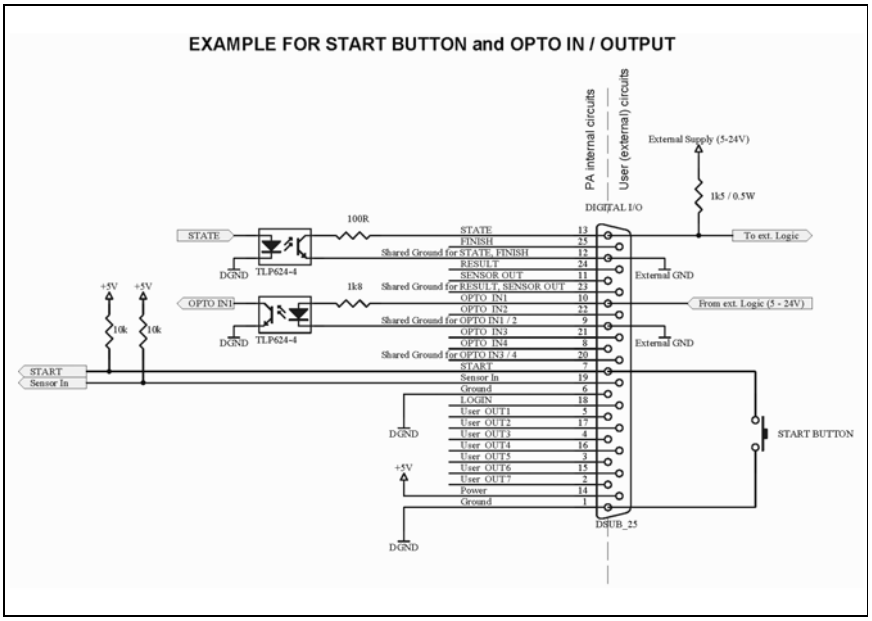


Connection of Opto-coupled In- / Outputs

光耦输入/输出的连接

Opto-coupled in- and output provide a robust barrier between Production Analyzer and external Hardware. However, since no power can be carried across this barrier, these in- and outputs need external power to be functional.

Recommended circuit for optocoupled input, output and start button:



光耦输入和输出为产品分析仪与外部硬件之间提供了一个可靠的屏障。然而，由于功率不会在屏障两端传输，使用这些输入和输出接口就需要外接电源。

光耦输入、输出和开始按键的推荐电路图：
（图略）

Optimizing Performance

优化性能

Overview

概要

Before optimizing the system the careful reading of the chapter *Test Configuration* is strongly recommended as well as some practical experience using the system.

This chapter is not a step by step guide but gives valuable information on increasing speed and reliability of tests. It is measure oriented. However, some facts are useable generally.

在优化系统之前强烈建议您仔细阅读章节*测试配置*并建议您应具有一些实际使用该系统的经验。

这章并不提供逐一步骤的指导，而是提供一些提高测试速度和可靠性的有用信息。它是以测试为导向的。然而，一些实例非常有用。

SPL Tests

SPL 测试

Microphone Selection

传声器选择

For QC testing it is very important to select the right microphone. The complete input signal range should be used to detect smallest failures that may be 80-100 dB below the fundamental. Therefore the microphone must

- not be clipping (a warning will be generated, if the microphone max SPL value has been specified correctly during calibration).
- should provide sufficient output. Recommended sensitivities are

Driver Type	Sensitivity
Subwoofer	2mV/Pa (very high pressure in box)
Woofer, Tweeter, Midrange	2mV/Pa – 10mV/Pa depending on Box size and testing level
Headphone, micro speaker	10mV/Pa - 50mV/Pa

Please refer to section *Hardware / Accessories / Microphones* for available microphones.

选择合适的传声器对 QC 测试来说是非常重要的。需要使用完整的输入信号范围以检测出比基频低 80-100dB 非常小的瑕疵。因此传声器必须：

- 不能削波（如果在校准传声器时正确地指定了传声器最大 SPL 值，系统将会给出警告）。
- 应该给出足够大的输出信号。建议的传声器灵敏度为：

发声器类型	灵敏度
超低音扬声器	2mV/Pa（消音箱内声压很高）
低音、高音、中音扬声器	2mV/Pa – 10mV/Pa 取决于消音箱的尺寸和测试声压级
耳机、微型扬声器	10mV/Pa - 50mV/Pa

请参考章节 *硬件/附件/ Microphones* 来选择合适的传声器。

Measurement Box

测试箱

For testing in a production environment an test enclosure for shielding the production noise is strongly recommended. Especially for Rub&Buzz testing typically a box is required.

1. When testing Rub&Buzz with the Ambient Noise detection, the box attenuation of production noise should be known. A default value may be used but well constructed enclosures may have considerably better isolation than the default value of 15 dB. Find a procedure for the measurement of the box attenuation curve below.
2. The pressure inside a box is much higher than in free air. It is important to keep the pressure within microphone range. If the maximal pressure has been specified correctly during Mic Calibration, a warning will be given, when exceeding the Mic limit. For an estimation of the pressure inside a test box, please refer to section *Appendix / Maximal SPL*

为在产线环境下测试，强烈建议使用一个能屏蔽噪声的测试箱体。尤其是在做异音检测时必须使用消音箱。

1. 当使用环境噪声监测做异音测试时，必须知道消音箱对产线噪声的衰减。系统将使用一个默认衰减值 15dB，但是一个好的消音箱应该会有一个比该值更大的噪声隔离效果。您将会在下面的内容中找到测量消音箱衰减曲线的步骤。
2. 测试箱内的声压将比自由空间中的大很多。必须保证测量声压在传声器的工作范围内。如果在校准传声器时正确地指定了传声器最大声压级，当超过此值时，系统将会给出警告。要估计测试箱内的声压，请参考章节 *附录/ Maximal SPL*

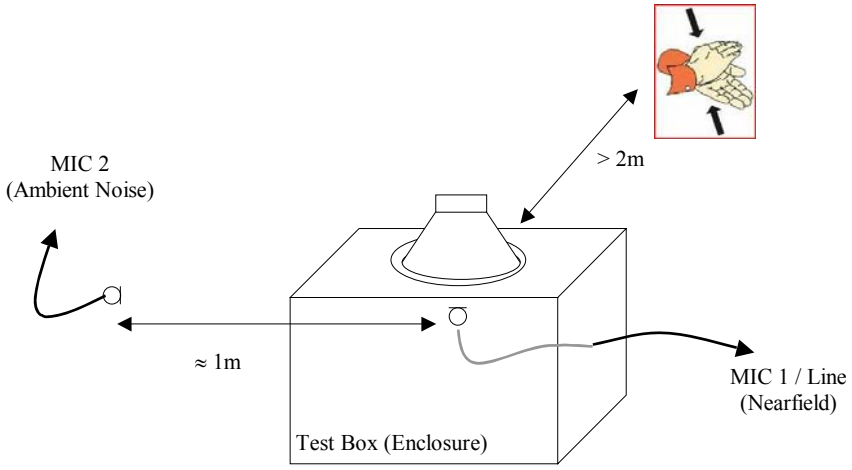
How to obtain the box attenuation curve

如何得到消音箱衰减曲线

When testing with Ambient Noise detection, it is important to know, how much the production noise is attenuated by the box enclosure in order to reliably predict a possible impact on the driver test caused by production noise.

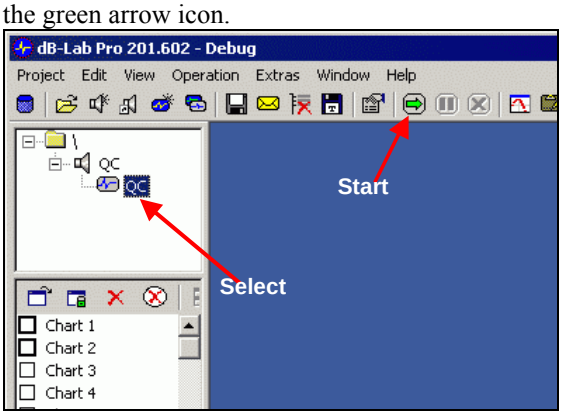
Basically the transfer function from the Ambient Noise Microphone (MIC2) to the Nearfield Microphone (MIC1) has to be measured. Unfortunately, the box attenuation can't be measured using the driver as excitation of the system, since the driver itself is part of the shielding. So external excitation is required. A high level, broad band noise can be easily generated by clapping hands. Drums, castanets or other percussion instruments are also fine.

The following setup is required for measuring the attenuation of the box enclosure vs. frequency:



Please follow the steps to calculate the box attenuation:

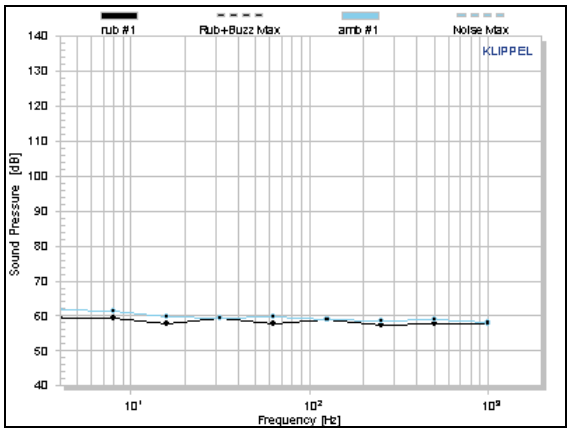
1. Start the QC-Start program in the Engineer mode.
2. Open the *Example Folder* from the *View* menu. An Windows explorer window will be opened.
3. Select the database *BoxAttenuation.kdb* and double click it. dB-Lab will start. If the *Open Project* dialog appears, confirm with OK.
4. Select the QC operation with the mouse and start it with a click on the green arrow icon.



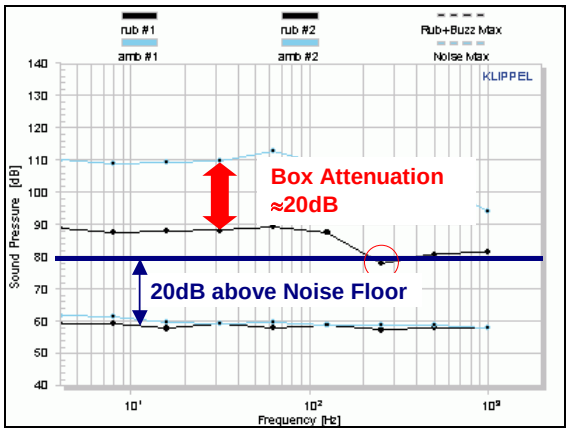
5. Login as usual.
6. Although not critical, adjust the level, if the default value is too high. The test sweep level has no influence on the measurement, it is

for monitoring only. Perform a measurement.

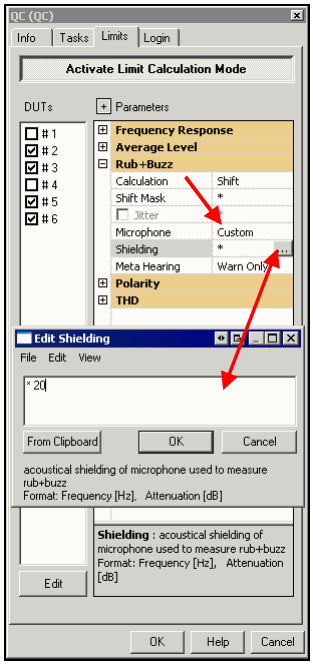
7. Activate the *Limit Calculation Mode*.
8. Do a first measurement without external excitation, try to minimize the production noise for this test. If the microphones have similar sensitivities, the ambient noise and the Rub&Buzz curve are very close.



9. Perform a second measurement with external noise. The easiest way is to clap you hands very loud and fast (approx. 3 per second) during the measurement.
10. Ignore the *Warning: Measurement corrupted by noise*. Press YES to keep the data.
11. Now you have two sets of data. The second one should be at least 20dB above the noise floor of the Rub&Buzz curve (black curve). The points which do not have that distance (red circled point) should not be considered as valid.



12. The ambient noise must be higher than the Rub&Buzz signal measured inside the box. The attenuation (shielding) of external noise is the difference (red arrow).
    Read the distance of the second set. In this example it is more or less constant at about 20dB.
13. Logout and close dB-Lab.
14. Start your current test driver using QC-Start. Login as usual.
15. Activate the Limit Calculation Mode.
16. Set the Microphone selection to Custom and enter the attenuation value (or a curve, if required) in the field Shielding.



17. In this example the value is constant for all frequencies (* stands for "all frequencies"). You may also specify a curve
    frequency1 *attenuation1*
    frequency2 *attenuation2*
    …
18. Proceed with your regular work.

Note: It is good practice, to store this attenuation characteristcs in a text file and import it via the clipboard into the *Shielding* parameter.
Just press CTRL-A and CTRL-C in the text file and use the *From Clipboard* button in the edit dialog for the *Shielding* value.

当使用环境噪声监测做测试时，为了可靠地预测产线噪声对发声器测试的影响，知道消音箱能衰减多少产线噪声是非常重要的。

一般来说，必须测量出环境噪声监测传声器（MIC2）到近场传声器（MIC1）的传递函数。不幸的是，不能用发声器作为系统的激励信号来测量消音箱的衰减，因为发声器本身也是声屏蔽的一部分。因此需要一个外部的激励信号。拍手可以轻易地产生一个高声压级、宽带噪声。鼓、响板或其他打击乐器也不错。

为测量消音箱衰减与频率的关系曲线需要以下步骤：
（图略）

请按照下列步骤计算消音箱衰减：

1. 以工程师模式启动 QC 开启程序。
2. 在*视图*菜单里打开*样例文件夹*，此时将打开视窗浏览器的一个窗口。
3. 选择数据包
   BoxAttenuation.kdb 并双击它。dB-Lab 将启动。.
   如果*打开工程*对话框出现，按 OK 键确定。
4. 用鼠标选择 QC，并点击绿色键图标启动。
   （图略）

5. 像通常一样登录。
6. 如果默认值太高了，就调整声压值，尽管这并不很关键。测试扫频信号的幅值对测量没有影响，它只是起到监视的作用。
   进行测量。

7. 激活*门限计算模式*。
8. 进行一个没有外部激励的测试，为本测试试图最小化产线噪声。如果两个传声器具有相似的灵敏度，那么测得的环境噪声曲线和异音曲线将非常接近。
   （图略）
9. 进行带有外部噪声的第二次测量。最简单的方式就是在测量过程中快速且响亮的拍手（每秒约 3 次）。
10. 忽略*警告：测量被噪声干扰*，点击**是**保留数据。
11. 现在您有了两组数据，第二组数据的异音曲线应该至少比异音曲线（黑色曲线）的噪声水平高 20dB，那些高出不到 20dB 的数据（红圈点）不能被视为有效。
    （图略）
12. 环境噪声一定比在消音箱内测得的异音信号高，对外部噪声的衰减（遮挡）就是这一差值（红色箭头所示）。
    从第二组数据中读取这个差值，在这个例子中，这个值差不多是 20dB。
13. 退出并关闭 dB-Lab。
14. 使用 QC 开启开始您现在的发声器测量，像通常一样登录。
15. 激活*门限计算模式*
16. 将传声器选择设置为“自定义”并在屏蔽区域中输入衰减值（如果需要，可以是一条曲线）。
    （图略）
17. 这个例子中对所有频率来讲衰减值都是常数（*号代表所有频率），您也可以指定一条曲线：
    频率 1　衰减值 1
    频率 2　衰减值 2
    …
18. 进行您的常规的工作。

注: 一个好的做法是将这些衰减特性存储为文本文件中，并通过剪贴板导入到*屏蔽*参数中。
为了导入*屏蔽*值，只要在文本文件中按 CTRL-A 和 CTRL-C，并在编辑对话框中使用 *来自剪贴板* 按键即可。

Frequency Range
频率范围

If no values are specified, the following table might be a good starting point for the frequency range. Using the 96kHz sample frequency you may measure up to 40kHz. On the sample frequency refer to section *User Modes / Engineer / Property Page Tasks / Sound Device & Sampling Rate*.

The values in the table are use in the templates for the specified driver types.

Driver Type	Start [Hz]	Stop [Hz]
Subwoofer	20	200
Woofer	20	1000
Midrange	50	2000
Tweeter *	200	20 kHz
Horn Driver *	400	20 kHz
Mircospeaker *	200	5 kHz

Headphones *	20	20 kHz

* make sure that Xmax is not violated at low frequencies

Note:
The frequency range for the sound pressure measurement depends strongly on the final application (cross-over, etc.) and should be set according to the desired working range. Do not sweep from high to low frequencies. On sweep direction see also section *Test Configuration / Test Signals / SineSweep / Sweep Direction*.

如果没有指定数值，下表可能是针对频率范围一个好的进入点。当使用 96k 采样频率时您可以测量到 40kHz 的信号。关于采样频率请参考章节*用户模式/工程师/ 属性页面任务/Sound* Device & Sampling Rate。

不同发声器类型在模板中使用的值如下表所示。

发声器类型	**起始 [Hz]**	**终止 [Hz]**
超低音扬声器	20	200
低音扬声器	20	1000
中音扬声器	50	2000
高音扬声器*	200	20 kHz
号筒扬声器*	400	20 kHz
微型扬声器*	200	5 kHz
耳机 *	20	20 kHz

* 确保在低频范围内不会超出线圈最大位移 Xmax 。

注:
声压测量的频率范围主要依赖于最终的应用（混合音乐，等等），因此应根据所希望的工作范围来设定。不要从高到低扫频。关于扫频方向请参考章节*测试配置/测试信号/正弦扫频/ Sweep* Direction。

Optimize Rub&Buzz detection

优化异音检测

For the Sound Pressure task the most critical measurement is the reliability of the Rub&Buzz defect detection. Thus it is strongly recommended to have some (≥ 10) critical DUTs whith typical defects (Rub&Buzz, THD, …) that are hard to detect and cover most of the possible (known) symptoms. Furthermore DUTs, which are known to be OK, are needed as reference devices. It is good practice to check them by listening test using the Manual Sweep.

The optimization is basically a compromise of measurement time and excitation level. The following sequence is recommended:

1. set the **Rub&Buzz parameter** (Type, Rub&Buzz Highpass order). Well adjusted default values are always set in the templates for the corresponding driver types.
2. Adjust the **Level**, if not specified yet.
3. Minimize Measurement **Time** to get fastest production test.

The **Meta Hearing** Technique for most sensitive Rub&Buzz detection is automatically adjusted according to the Rub&Buzz settings. There are no special parameter for Meta Hearing.

在声压任务中最关键的测试是异音缺陷检测的可靠性。因此强烈建议收集一些（10 个以上）最关键的 DUT。这些 DUT 具有典型缺陷（异音、THD、 …），它们难以被检测并且包含了所有可能的（已知）症状。另外，您还需要有一些知道是好的 DUT 做为参考设备。一个好的做法是用手动扫频信号人工听音的方式来检验这些良品与不良品。

优化综合考虑了测量时间和激励幅值两方面因素，建议采用以下顺序：

1. 设置 **异音参数** （类型、异音高通滤波器阶数）。仔细调试过的参数值都做为的默认值设置在不同发声器所对应的模板里。
2. 如果没有指定，请调整**幅值**。
3. 最小化测试**时间**以得到最快的产线测试。

针对最敏感的异音检测的**超听力**技术是根据异音设置自动调整的。并不需要为超听力技术指定参数。

How to adjust RBZ parameter?

如何调整异音参数？

There are two dedicated parameters for the Rub&Buzz detection that should be adjusted before optimizing level and time:

1. Rub&Buzz High Pass Order
2. Rub&Buzz Type

在优化幅值和时间之前需要调整两个异音检测的专用参数：

1. 异音高通阶数。
2. 异音类型 。

What is the Rub&Buzz High pass?

什么是异音高通？

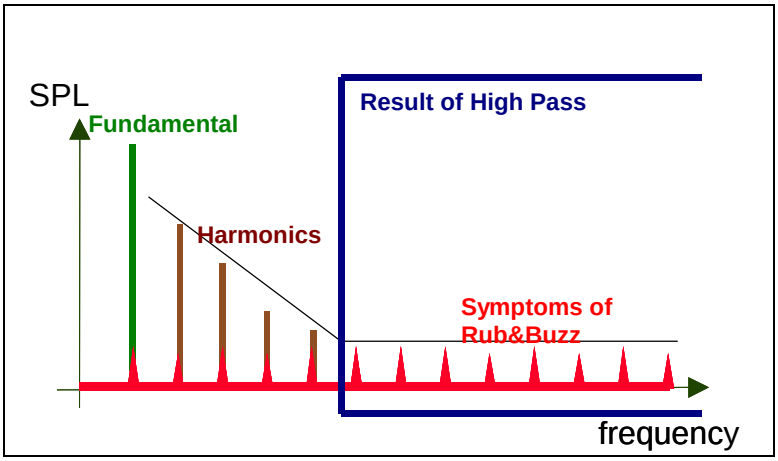
Typical Rub&Buzz defects are 80-100dB smaller in level than the **fundamental** and also 40-60 dB smaller then the **harmonics** and THD.

See the graph below for an illustration.

To analyze the Rub&Buzz defects it is crucial to separate them from the fundamental and harmonics to avoid the inherent masking of these much higher components.

Using a high pass is a very efficient method to suppress the fundamental and lower order harmonics. In a good loudspeaker, the harmonics decay with the order rapidly.

In a defective loudspeaker the **symptoms of Rub&Buzz** defect spreads its energy over the whole frequency range (red). Using the Rub&Buzz high pass higher order harmonics (having the unmasked information of the defect) can be separated from the lower order harmonics, were the information of the defect is masked (**Result of High Pass**, range marked by blue lines).



The order of Rub&Buzz high pass markes the first harmonics, which is used for Rub&Buzz detection. Note that this is relative to the frequency of the fundamental (tracking filter) and not constant.

All frequencies above the cut off frequency (harmonic and non-harmonic) are summed up and are used for Rub&Buzz detection.

典型的异音缺陷会比**基波**小 80-100dB，同样比**谐波**和 THD 小 40-60 dB。

请看下列图解说明。

分析异音缺陷最重要一步的就是将它们与基波和谐波区分开来以避免被那些具有更高能量的成分所掩盖 。

使用高通滤波器是一种有效的抑制基波和低次谐波的方法。一个好的扬声器，随着谐波次数的增加谐波会迅速衰减。

一个有缺陷的扬声器，**异音缺陷的症状**是能量分布在整个的频率范围内（红色）。使用异音高通，高次谐波（包含没有被屏蔽的缺陷信息）可以从低次谐波分开出来，在低频处缺陷信息被掩盖（**高通的结果**，蓝线标识区域）。

（图略）

异音高通的阶数标示用于异音检测的第一谐波。 注意，它与基频的频率（跟踪滤波器）有关，不是固定的。

所有高于截至频率的成分（谐波和非谐波）都被相加用于异音检测。

Adjust the Rub&Buzz Highpass order

调整异音高通阶数

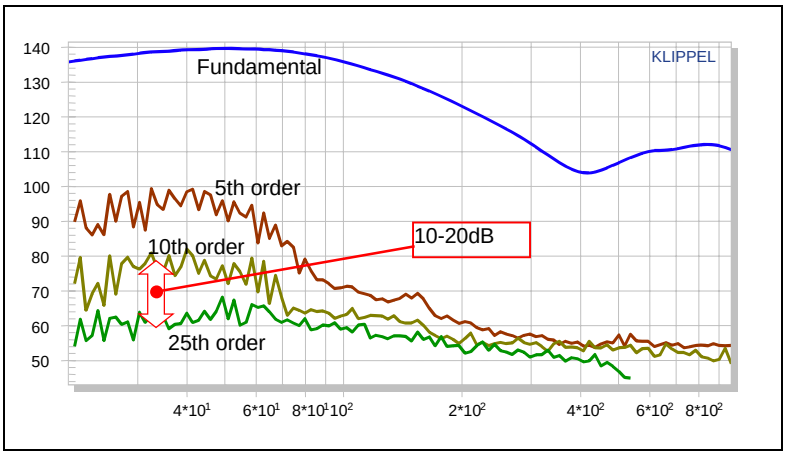
According to the following driver types typical high pass parameter should be used:

Driver Type	High Pass Order
Subwoofer	20
Woofer	10
Midrange	10
Tweeter	6
Horn Driver	10
Mircospeaker	6
Headphones	6

The following section is for illustration of the individual setting and of the check, if the order is set correctly:

Here is an example of a good driver with no Rub&Buzz defect, when the Rub&Buzz order is changed:

- If the **order is too high** (Example: green curve, 25th order), the Rub&Buzz response is dominated by the noise floor (flat characteristics). So valuable information from Rub&Buzz defects may be cut off by the high-pass.
- If the **order is correct**, the Rub&Buzz level is about 10-20 dB above the noise floor (olive curve, 10th order).
- If the **order is too low**, the regular harmonics, originating from the suspension and moter nonlinearities (which are inherenent also in good drivers), masking the Rub&Buzz level too much. So small rub&Buzz defects may be not detected due to this high level.



Summary: A good value for the Order of the Rub&Buzz high pass is characterized by a Rub&Buzz curve which is 10-20 dB above the noise floor.

根据下列发声器类型，应该使用典型的高通参数为：

发声器类型	**高通阶数**
超低音扬声器	20
低音扬声器	10
中音扬声器	10
高音扬声器	6
号筒扬声器	10
微型扬声器	6
耳机	6

假设正确设置好阶数，以下小节将图解说明其设置和检验：

下面例子中的发声器是一个没有异音的好的发声器，当异音高通阶数改变时：

- 如果**异音高通阶数过高**（例子：绿线，25 阶），异音相应将被噪声级主导（平坦特性）。有用的异音缺陷可能被高通给滤除了。
- 如果**异音高通阶数设置正确**，异音曲线会比噪声曲线高出大约 10-20 dB（橄榄色曲线，10 阶）。
- 如果**异音高通阶数过低**，由扬声器悬吊系统和磁回路的非线性（即使在好的发声器中也是固有的）产生的常规的谐波将大大遮蔽异音信号。因此，小的异音缺陷将因为这些高幅值的信号而无法检测出来。

（图略）

总结： 一个好的异音高通阶数会使得异音曲线比噪声曲线高 10-20 dB 。

Rub&Buzz Type

异音种类

As in the section above explained, the Rub&Buzz detection is based on a specific range of the measured SPL spectrum. All the energy passing the high pass will be transformed to the time domain to restore typical Rub&Buzz peaks.

The Type of Rub&Buzz detection characterizes the method, how to evaluate the restored time signal.

Peak provides the highest instantaneous value according to the selected resolution. This is good for very short clicks and loose particles. This is sensitive to ambient production noise. A well shielded test chamber or box is highly recommended, when using Peak method.

Rms provides the average energy in the interval defined by the resolution. This is good for broad band defects like a heavy rubbing of the coil. Due to the average effect in the rms calculation it is not as sensitive as the peak method.

Summary: It is recommended to set the Rub&Buzz Type to **PEAK**. With this setting the defect detection is more sensitive for very short clicking noises e.g. caused by lose particles or wire beats.

正如上节所解释的那样，异音检测是基于所测量的 SPL 频谱的一个指定范围。所有通过高通的能量都将被转换到时域从而恢复典型的异音峰值。

异音检测种类描述了怎样估计被恢复的时域信号的方法的特性。

峰值 根据所选择的精度提供最高瞬态值。这样做有利于检测出短时滴答声和杂质。它对产线环境噪声很敏感。因此使用该方法时强烈建议使用一个好的消音间或消音箱 。

有效值根据精度提供所定义的一段时间内的平均能量值。这样做有利于检测出像严重擦圈的宽带瑕疵。因为计算有效值有平均的作用，所以它没有峰值方法那样灵敏。

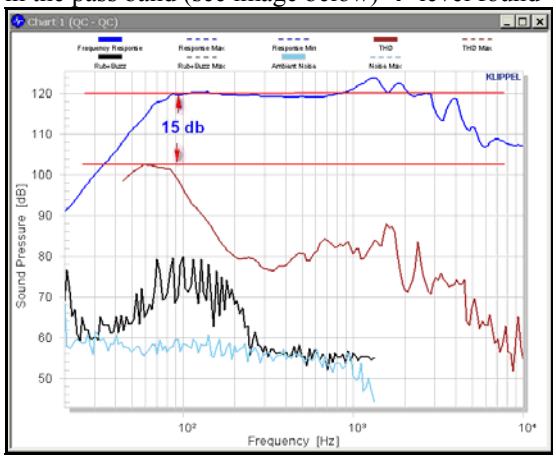
总结： 建议将异音种类设置为**峰值**。在该设置下，缺陷检测对由杂质或碰线造成的短时滴答噪声更灵敏。

Find most critical level
找到最合适的幅度

The maximum stimulus voltage should be optimized, if not specified. This level should be chosen as high as possible without damaging the DUT.

It is necessary to drive the DUT with high excursion and thus activate substantial harmonic distortion and all possible Rub&Buzz defects.
Please use the following steps to optimize the level:

1. Start at a known, save level. The maximum specified continuous operating level is a good starting point.
2. Increase the voltage carefully in 3dB steps until one of the following limits is reached
   - max(THD) is about 15 dB below the average sound pressure level in the pass band (see image below) → level found



   - any hard limiting of the DUT can be heard acoustically → reduce level or use the level profile to attenuate the excursion

below the resonance frequency (see section *Using Level Profile* below).

- Rub&Buzz changes significantly compared to the previous voltage step → reduce level

Note!
Make sure that the working range of the microphone is not exceeded. See section *Optimizing Performance / SPL Tests / Optimal Signal Noise Ratio (SNR)* for adjusting the headroom.
If the maximum sound pressure of the microphone is exceeded, change the microphone type or use a bigger test box.

It is good practice to check good units at the optimized level.

Listen to one selected DUT (if possible, with the attached box enclosure). Use the *manual sweep* feature of the QC system (see section *User Modes / Operator / Manual Sweep*).

如果没有指定，应该择优选取最大激励电压。只要不损坏 DUT，应选择尽量大的幅值。

有必要驱动 DUT 使其有大的位移，激励出真实的谐波失真和所有可能的异音缺陷。
请使用下列步骤来优化幅值：

1. 从一个已知并保存的幅值开始，指定的最大连续使用幅值是一个好的开始值。
2. 小心地每次增加 3dB 电压直到以下情况之一出现。
   - 在通带范围内的 THD 最大值 max（THD）仅比平均声压低了 15 dB（如下图所示）→ 幅值找到了。
     （图略）
   - DUT 的“硬门限”可以用人工听音方式听出来
     → 减小幅值，或者使用幅值曲线来衰减位移至共振频率以下（请参阅下节 *Using* Level Profile）。
   - 相对于上一步调整电压，异音有明显变化→ 减小幅值。

注意!
确保没有超过传声器的工作范围，*参考章节 优化性能/SPL 测试/ Optimal* Signal Noise Ratio (SNR) 来调整动态余量。
如果超过传声器的最大声压，请更换传声器或使用更大的消音箱。

一个好的做法是使用好的单元来确认优化的幅值。

人工监听一个被挑选的 DUT（如果有可能，使用其附属的消音箱）。使用 QC 系统的*手动扫频*特性 （参请参阅章节 *用户模式/操作员 /Manual* Sweep*)*。

Optimize Time / Use Speed Profile

优化时间/使用速度曲线

Before optimizing the speed, the level should be set to detect defective DUTs reliably. Although measurement time and level are strongly interacting, it is recommended to start with the level (which is also specified very often and not variable).

Speed Profile

Before adjusting the overall time, it is recommended to set the speed profile.

The Speed Profile is to be used to save overall measurement time. The frequency range can usually be split in two regions:

1) Low frequency region, were rub&buzz defects occur. Using a slow speed in this region provides more energy and time to excite possible defects.

2) Higher frequency regions, were no rub&buzz defects occur anymore (since displacement is very low and higher order harmonics are beyond measurement range). Here the sweep speed can be extremely fast, since typically the fundamental only is measured in this range.

For a typical measurements it is recommended to set a speed profile, which is 5 times faster above 10 times the resonance frequency:

```
speedProf = [     fstart      10·fs       1
                  10·fs       fstop       5]
```

Overall Time

The following procedure is recommended to find the optimal overall speed.

1. Find **good** units. Use manual sweep to check them carefully.
2. Find **5-10 defective** driver with small and hard to find defects (as most critical selection).
3. Start with a long measurement time (5 seconds or more)
4. Measure the good driver(s) as reference.
5. Calculate limits. To do so, press the *OK* button or release the *Activate Limit Mode button*.
6. Check defective drivers.
   If all drivers are detected as failed, you may decrease (halve) the measurement time and repeat this sequence. Use the latest duration were all defective DUTs were recognized.

Note: When decreasing measurement time, it is crucial to check, that all failed units are detected as such. When measuring too fast, possible defects may not be excited since the energy is too small, which is required to develop that defect.

在优化速度之前，应该设置好能可靠检测出 DUT 缺陷的幅度值。尽管测试时间和幅度相互影响非常严重，还是建议先设置幅度（应经常设定幅度使之维持不变）。

速度曲线

在调节整个测试时间之前，建议先设定好速度曲线。

设置速度曲线可以节约整个测试时间。测试频率范围通常可分为两个区间：

1) 产生异音的低频区间。在这个区间内使用慢的扫频速度以提供更多的能量和时间去激励可能存在的缺陷。
2) 不再会产生异音的高频区间（因为此时线圈位移很小，产生的高次谐波在测量范围以外）。因为在这个区间一般只测量基频，所以扫频速度可以非常快。

建议在一个典型的测量中使用如下速度曲线，在 10 倍的共振频率以上使用 5 倍的扫频测量速度：

```
speedProf = [     fstart      10·fs       1
                  10·fs       fstop       5]
```

测试时间

建议使用下列步骤确定最优测试时间。

1. 找到**好的**单元，使用手动扫频仔细验证。
2. 找到 **5-10 个有缺陷的**发声器，这些缺陷是很小而难以发现（作为最关键的精选品）。
3. 启动一个较长的测量时间（5 秒或更长时间）。
4. 测量好的发声器做为参考。
5. 计算门限。点击 *OK* 键或松开*激活门限模式* 键以实现门限计算。

6. 检查有缺陷的发声器。
   如果能检测出所有有缺陷的单元，您应该减少（减半）测量时间并重复以上步骤。采用最后一个能检测出所有有缺陷的 DUT 的时间做为整个测量时间。

注: 当减少测量时间时，确认能检测出所有缺陷单元是至关重要的。当测量太快时，激励信号的能量就很小而不足以激发某些可能的缺陷，这时就需要减慢测量速度以增加激励信号的能量来激发小瑕疵。

Using Level Profile

使用幅度曲线

The Level profile has two major applications:

- protecting the driver, when mechanical limiting may appear (tweeters, headphones, microspeaker)
- modeling a crossover response
- protecting the operator at high frequencies. Rub&Buzz defects are often produced at lower frequencies, so the high level may be attenuated at higher frequencies to save the operators listening capabilities for more important tasks.

For details on the input parameters, see section *Test Configuration / Test Signals / SineSweep / Level Profile*.

幅度曲线有两个主要运用：

- 当达到机械极限时，保护发声器（高音扬声器、耳机、微型扬声器）。
- 建立交叉频响。
- 在高频测量时保护操作员。低频处经常产生异音缺陷，所以，在高频处减小幅值可以减轻操作员的听音负担去完成更重要任务。

关于输入参数的细节，请您参阅章节*测试配置/测试信号/正弦扫频/ Level* Profile。

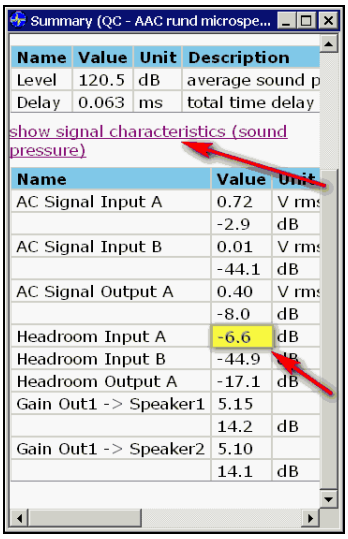
Optimal Signal Noise Ratio (SNR)

优化信噪比（SNR）

For good Rub&Buzz tests it is crucial to use the complete signal input range, since defects may be likely 80-100dB below the fundamental signal. For that purpose a programmable hardware amplifier scales the analog input signal to be close to the full scale input. Thus the noise floor masking defects is as low as possible.

To optimize the SNR:

1. perform a typical measurement
2. Open / Select the Summary Window
3. expand the link *show signal characteristics (sound pressure)* in the Result Window *Summary*. A table will be shown with the signal properties of the recorded signals. Look for the value in the line *Headroom Input A.*
4. This value should be between –10 and –3 dB (0dB corresponds to a full scale input).



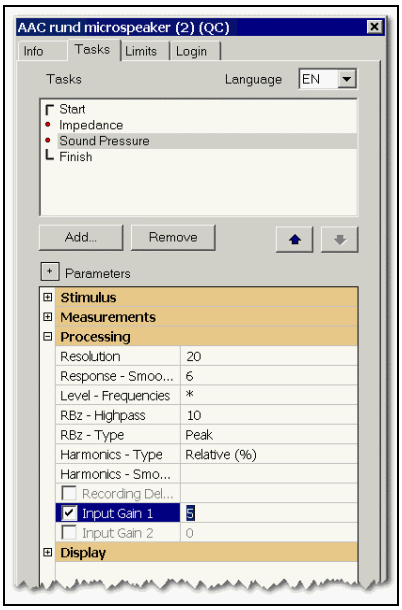
Read the value of *Headroom Input A*
If the Headroom is smaller the –10 dB, adjust the *Input Gain 1* parameter on the Property Page *Tasks*.

If the value is not in this range, adjust the parameter *Input Gain 1* by the following rule:

Add abs(*Headroom Input A* + 6dB) to *Input Gain 1* parameter.

Or use the following table. Note that the Input Gain range is restricted from –70 to +30 dB.

Headroom Input A	Add to Input Gain 1
0 dB (marked red) → overloaded input	Reduce Input Gain by 20dB!
-6	0 (Ok)
-20	14
-30	24
-40	30 (max. gain)



5. Make a new measurement and check the Headroom. If the headroom exceeds –3dB, a warning is generated.

Note: If the input headroom is below 30dB, it is strongly recommended to use a more sensitive microphone (for headphone and micropseaker testing). There are several options available.
See also section *Hardware / Accessories / Microphones*.

因为异音信号一般比基频信号小 80-100dB，所以一个好的异音检测关键在于使用完整的输入信号范围。因此要使用一个可编程硬件放大器可调整输入模拟信号到满量程输入。这样使得掩盖异音的噪声水平降到很小。

优化信噪比：

1. 执行一次典型的测量。
2. 打开/选择摘要窗口
3. 在*摘要窗口*结果中展开链接 *显示信号特性（声压）*。会出现一张表格显示录音信号的属性，在*动态余量输入 A* 一行中找到数值 。
4. 该数值应该在-10 到-3dB 之间（0dB 为输入的满量程）。
   （图略）

   读取*动态余量输入 A* 的数值
   如果此值小于–10 dB，在属性页面*任务*中调整参数*输入增益 1*。

   如果此数值不在这个范围内，请按下列规则调整参数*输入增益 1*：

   加 绝对值（*动态余量输入 A*+6dB）到参数 *输入增益 1* 中

   或者使用下列表格。注意输入增益范围为–70 到 +30 dB。

动态余量输入 A	加入输入增益 1
0 dB（红色标记） → 输入过载	输入增益降低 20dB!
-6	0 （Ok）
-20	14
-30	24
-40	30 （最大增益）

   （图略）

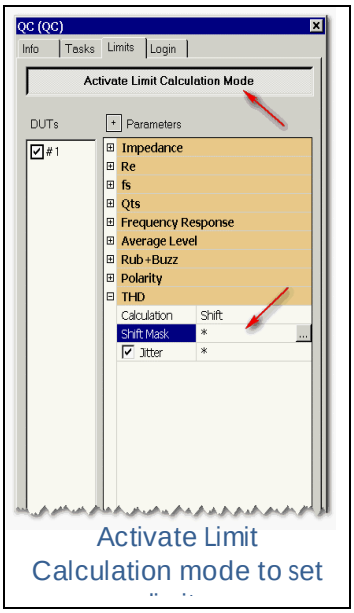
5. 执行一次新的测量，并再次确认*动态余量*的数值。如果该值超过 –3dB，系统将会产生一个警告。

注: 如果*动态余量 A* 低于-30dB，强烈建议使用一个灵敏度更高的传声器（为了耳机和微型扬声器的测试）。这里有一些可选传声器，请参阅章节*硬件/附件/ Microphones*。

SPL Task Limits
SPL 任务门限

In this section some short comments are given how to setup the limits. These should be applied only, if no limits are specified by any other party.

Activate the Limit Calculation Mode and select the corresponded parameter:



本节将对如果设置门限给出一些间短的注释，如果在其他地方没有设置过的门限，那么这些设置可用。

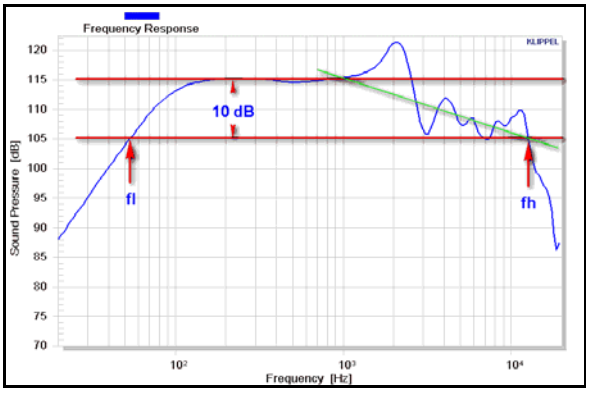
激活门限计算模式，选择相关参数：
（图略）

Frequency Response

频率响应

Test the frequency response only in a meaningful frequency range. Use a frequency range according to the following recommendation:

- Determine SPL_{av} (Average Sound Pressure Level in the Passband of the DUT) or read the Level from the Summary Result Window.
- Determine f_l (lower frequency) where SPL drops -10db below SPL_{av})
- Determine f_h (high frequency) where SPL drops -10db below SPL_{av})



Use the Shifting method and adjust the Shift Mask. It is recommended to open up the limit at higher frequencies a bit to allow some more variation.

If there is no or few smoothing of the response curve applying Jitter is recommended to widen up limits at narrow peaks and dips.

See section *Test Configuration / Limit Calculation*.

只在有意义的频率范围内测量频率响应。根据下列建议确定频率范围：

- 确定 SPL_{av}（DUT 在通带内的平均声压级） 或者从综述结果窗口中读取声压级 。
- 确定 f_l （低频），此处 SPL 比 SPL_{av} 低-10dB。
- 确定 f_h （高频），此处 SPL 比 SPL_{av} 低-10dB。

（图略）

使用平移门限法并调整**平移遮掩**，建议在高频处放宽门限一些来允许更多的变化。

如果响应曲线没有经过平滑或平滑很少，那么建议使用抖动门限在窄峰谷处放宽门限。

请参阅章节*测试配置/ Limit* Calculation。

THD, 2nd Harmonic, 3rd Harmonic

THD, 2 次谐波, 3 次谐波

For harmonics and THD it is important to check at higher frequencies, if the fundamental is well above noise. If the fundamental has decayed considerable, disable the limit check in this frequency range.

By default there is no smoothing applied to the Harmonics / THD, so setting a Jitter of about 20% is recommended. This widens the limits around peaks and dips.

When applying limits to the individual harmonics, it is recommended to separate them visually in order to have a more clear graph.
See section *Test Configuration / Measures and Limits / Harmonics / THD / Separating Harmonics* visually.

如果基频远大于噪声，那么在高频处检测谐波和 THD 是非常重要的。但是如果基频有相当的衰减，请在这段频率范围内禁用门限检测。

默认设置中是不对谐波/THD 做平滑的，因此建议设置 20%的抖动，这样可以在峰值和谷值处放宽门限。

当对个别的谐波使用门限检测时，为了得到一个更清晰的图形，建议在视觉上分开谐波。
请参阅章节*测试配置/测量和门限/谐波/THD/*
Separating Harmonics visually。

Rub & Buzz

异音

The headroom for Rub&Buzz Limit should be set close to the measurement. A default value of 6dB is recommended. Smaller headrooms are critical, since the Rub & Buzz is generally a noisy parameter.

There is no smoothing parameter for Rub&Buzz, since any kind of average would degrade the detection capability of small and very short defects.

That's why setting a Jitter of about 20% is recommended. This widens the limits around peaks and dips. Especially when using the Rub&Buzz Peak mode (see section *Optimize Rub&Buzz detection* above) extensive Jitter should be used.

The limit for the **Meta Hearing** Technology (Isolated Defect Distortion IDD) is automatically derived from the Rub&Buzz limit. No special parameter is required for Meta Hearing.

异音门限的动态余量应设置接近测量值。建议使用默认值 6dB。因为异音一般为噪声参数，所以较小的动态余量是很重要的。

因为任何平均都将降低对微小、短促缺陷的检测能力，所以异音没有平滑参数。

这也是推荐设置 20%的抖动门限模式的原因。这样可以在峰值和谷值处放宽门限。尤其是在使用峰值异音检测模式时，应该使用较大的抖动门限（请参阅前面章节 *Optimize* Rub&Buzz detection）。

超听力 技术（孤立缺陷失真，IDD）的门限是从异音门限自动得来的，并不需要为超听力设置特别参数。

Impedance

阻抗

How to find optimal excitation level and time

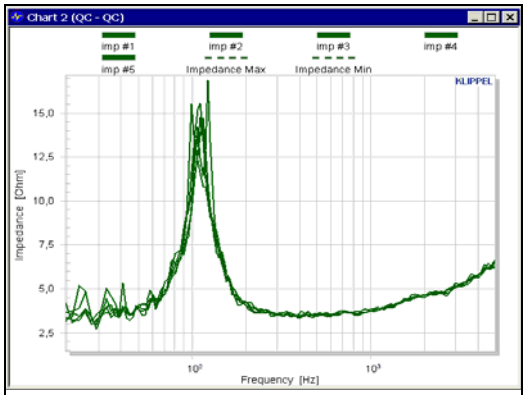
如何找到最佳激励幅度和时间

For the impedance task the main criterion for the appropriate choice of the measurement time is the shape of the impedance curve. A short measurement time can impair the measurement in two ways:

- The curve is too noisy
- The curve is deformated due to a too short measurement time that allows no steady state vibration of the DUT

Subsequently the level is always a compromise between noise and distortion.

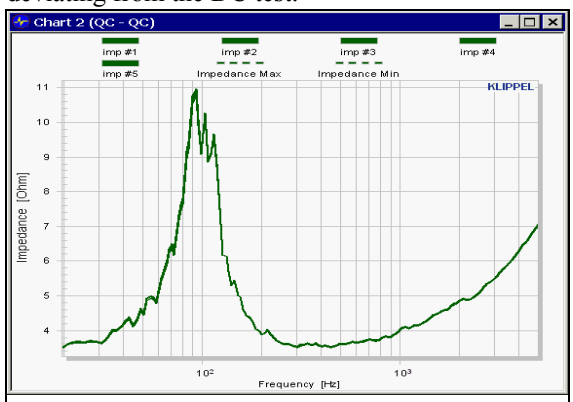
- If the test level is too low, the impedance curve is noisy and the results are NOT reproducible. Use the limit mode to overlay the curves as reference DUTs. In this case Re is not stable!



Voltage too low → noise

Remedy: **Increase level**

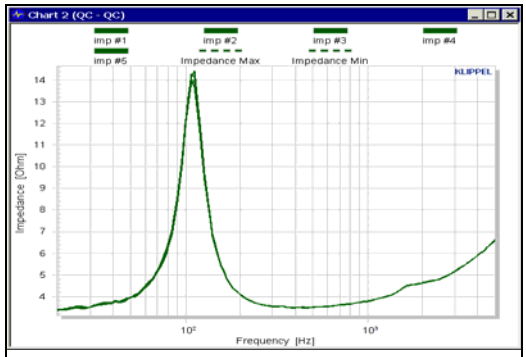
- If the test level is to high, the impedance curve is also not smooth but the shape is reproducible. In this case Re is stable but can be deviating from the DC test.



Voltage too high → distortion

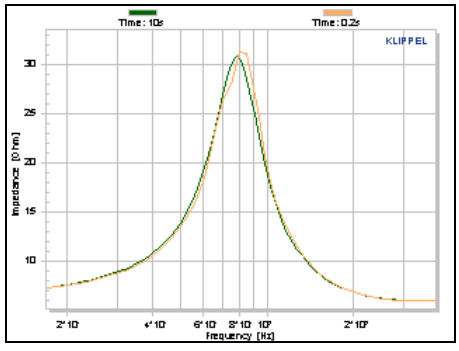
Remedy: **Decrease level**

- If the level is ok, the curve is smooth and reproducible. In this case the calculation of all T/S parameter is optimal.



Voltage OK

- In some applications a reduction of the voltage to the linear range of the DUT may lead directly from a distorted to a noisy impedance curve or unstable Re (too low SNR). In this case **increase the measurement time**.
- For very fast tests, it is also good practice, to check the influence of the measurement time. Perform two tests, one for the target time and one for 10s duration. You may copy one result in the clipboard (CTRL-C after selecting the curve with mouse), doing the second test and paste the copied curve into the result window. Normally this effect is not critical on the parameters.



Note: For a DUT with a nominal impedance above 30 Ohm it is recommended to use a special modification of the Production Analyzer hardware with more sensitive current sensors in order to have a lower noise level in the impedance curve and thus to allow a shorter measurement time.

对于阻抗任务而言，评价是否选择了合适的测量时间的主要标准是阻抗曲线的形状。太短的测量时间会在以下两方面影响测量：

- 曲线充满噪声
- 因为太短的测量时间导致 DUT 没有进行稳态振动，因而测得的曲线变形。

其后，幅度总是需要考虑噪声和失真两方面因素。

- 如果测试电压太小，那么阻抗曲线会有噪声，同时结果**不可**重复。使用门限模式像参考 DUT 一样叠加测试曲线。在这种情况下 Re 不稳定！
  （图略）

  改进方法： **增加幅度。**

- 如果测试电压太高，阻抗曲线也还是一样不平滑，但却是可重复的。这种情况下 Re 是稳定的，但是会在直流测试中偏移。
  （图略）

  改进方法： **减小幅度**

- 如果幅度合适，阻抗曲线是平滑且可重复的。这种情况下所有 T/S 参数的计算是最理想的。
  （图略）

- 在一些运用中，降低激励电压在 DUT 的线性范围内将直接导致阻抗曲线由变形到和有噪声，或不稳定的 Re（信噪比太低）。这种情况下，请**增加测量时间**。
- 对于快速测量而言，可以评估测量时间对测量结果的影响。执行两次测量，一个设置为目标测试时间，另一个设置为 10s，您可以将其中一个结果拷贝到剪贴板中（在鼠标选定曲线后按住 CTRL-C），执行另一个测量并将已拷贝曲线粘贴到这时的结果窗口中，正常情况下，测量时间对参数的影响并不严重。
  （图略）

注： 当被测单元的标称阻抗大于 30 欧姆时，建议使用增加了更灵敏电流传感器的产线分析仪硬件（Production Analyzer hardware），这样可以在阻抗曲线中有更低的噪声影响，从而可以设置更短的测试时间。

Frequency Range
频率范围

The frequency range should be chosen in such a way that the resonance frequency fs is in the middle of the displayed graph. This is necessary for a good fitting of the measured curve with the theoretical curve from the linear driver model. The following settings are recommended.

Set Start: $f_s/10$ [Hz]

Set Stop: f_s*10 [Hz]

Note: If a precise measurement of Le is required, the Stop frequency should be increased to 20*Fs or higher in order to measure a sufficient part of the high frequency branch for inductance fitting.

Using the 96kHz sample frequency you may measure up to 40kHz. On the sample frequency refer to section User Modes / Engineer / Property Page Tasks / Sound Device & Sampling Rate.

选择合适的频率范围应该使得共振频率在显示图的中间，这对于以线性发声器模型拟合测试曲线与理论曲线是必要的。建议采取下列设置。

起始频率： $f_s/10$ [Hz]

终止频率： f_s*10 [Hz]

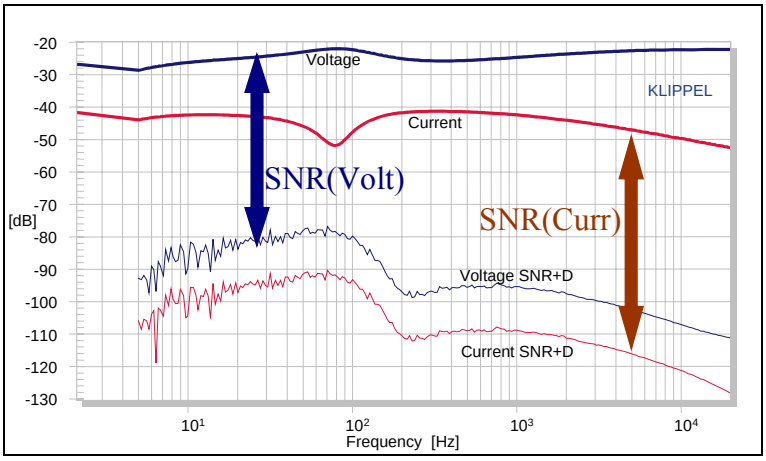
注：如果需要测量精确 Le，则终止频率应该增加到 20*Fs 或更高，以便在高频部分有足够的测量数据来拟合电感值。

当使用 96k 采样频率时您可以测量到 40kHz 的信号。关于采样频率请参考章节*用户模式/工程师/ 属性页面任务/Sound* Device & Sampling Rate。

Checking Signals and Fitting

检查信号和拟合

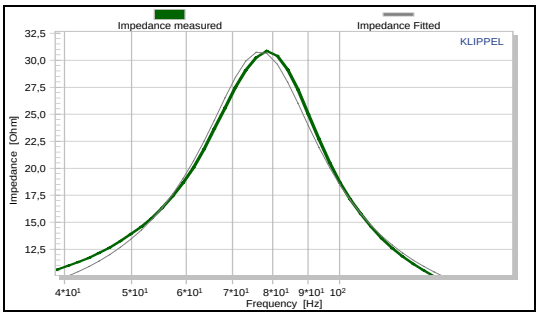
In Result Window 6 there are shown the fundamentals as well as the noise floor inclusive distortion. Please check the Signal Noise Ratio (SNR) of the voltage and current in case of any problems. 0dB corresponds to 1V / 1A rms.



The rms values and headroom may be read from the summary window expanding (click) the link *show signal characteristics (impedance).*

Note: The headroom can't be improved using the input gain. This is available only for MIC and LINE inputs.

The Thiele / Small Parameter calculation is based on a fitting algorithm of the impedance curve. It is also possible to check the fitting, The fitted impedance curve is included in Result Window 2 as a hidden curve and can be enabled by double clicking on the graph, selecting the *Subset* page and selecting also *Impedance Fitted*. The fitting should be accurate especially around the resonance peak.



在结果窗口 6 中显示了基频以及包含失真的噪声频谱。如果有任何问题请检查电压和电流的信噪比（SNR）。0dB 对应于 1V / 1A 有效值。

（图略）

有效值和动态余量可以从摘要窗口中读取，展开（点击）链接*显示信号特征（阻抗）*。

注：用输入增益不能改善动态余量。它只能用于 MIC 和 LINE 输入。

计算 T / S 参数是基于对阻抗曲线的拟合，它也可以检查拟合的结果。在结果窗口 2 中包含了默认不显示的拟合阻抗曲线，通过双击曲线，或选择 *子设置* 页并选择 *拟合的阻抗* 可显示拟合阻抗曲线。曲线应该很精确，特别是在共振峰周围拟合的很好。

（图略）

Calculation of Re

计算 Re

All Thiele / Small parameter are calculated based on the fitting of the impedance curve. A special handling is required for the Re value. Since there is no DC input coupling, the DC value of Re cannot be measured.

Independent on the setting of f_{start} (lowest frequency) the Re is always measured around the frequency: $f = 1 / t_{measurement}$. This is the lowest frequency which can be assessed during the measurement.

Using that technique, it is ensured that the increase of impedance due to the resonance does not affect the Re value.

Note: Check Amplifier DC Offset
Be aware that some Power Amplifier have a considerable DC offset. When testing low current, high impedance driver (telecommunication driver), this offset may degrade your measurement (esp. impedance and R_e). Please measure the DC offset with no input signal using a standard DC-voltmeter and compare it with the required testing level. It should be less than 3% for normal testing.

所有 T / S 参数都是基于对阻抗曲线的拟合计算而得的。对 Re 值需要特别处理。因为没有直流输入耦合，所以不能测量出 Re 的直流电阻。

独立于 f_{start} （最低频率） 的设置，Re 常在频率点： $f = 1 / t_{measurement}$ 处测量。这是在测量中能作估算的最低频率。

使用这一技术，可以确保由于共振而增加阻抗时不会影响 Re 值。

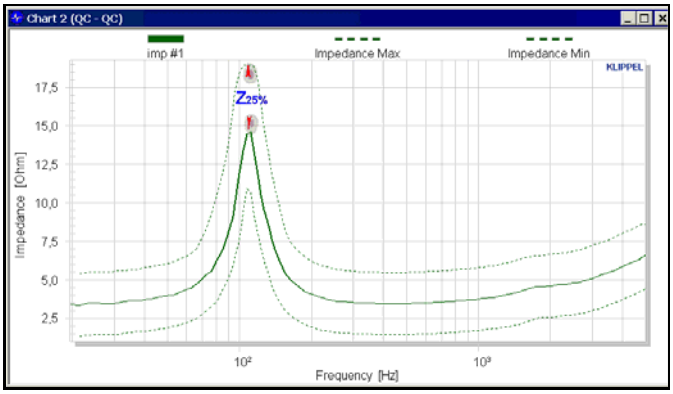
注: 检查功放的直流偏置
请注意某些功率放大器有相当的直流偏置。当测量小电流、高阻抗发声器（通讯发声器）时，直流偏置将降低您的测量质量（特别是阻抗

和 Re）。请在没有输入信号时用 DC 伏特表测量功放的直流偏置，并将此值与所需要的测量电压作比较。正常测量时，差值应小于 3%。

Impedance Limits

阻抗门限

Around the resonance it is desirable to have a wider tolerance range than at low frequencies. The top of the impedance curve is dominated by the mechanical damping and can vary without too much influence on the performance of the driver.



To achieve that, a **relative** headroom (certain percentage of the impedance) should be used instead of simple shifting the curve by some Ohms.

It is also highly recommended to use the Jitter function for less sensitivity of slight changes in fs. Especially for high Qts driver, increasing the Jitter parameter should be considered.

Please see section *Test Configuration / Limit Calculation* for more details.

在共振峰附近应该有一个比低频更宽的公差范围。阻抗曲线的顶部阻抗值受控于机械阻尼，但它的变化对发声器性能的影响不大。

（图略）

为了实现此目的，应该使用一个相对的动态余量（阻抗的百分比值），而不是简单的将曲线平移几个欧姆做为门限。

对于在 fs 处低灵敏度、轻微变化的情况，强烈建议使用抖动门限功能。尤其是对于高 Qts 的发声器，应该考虑增加抖动参数 。

详情请参阅章节*测试配置/ Limit* Calculation。

Troubleshooting

故障处理

Hardware Problems

硬件问题

Self Check at test start fails

在测试开始时自检失败

Before each test in Engineer mode and at the first measurement in the Operator Mode a hardware self test is performed. This self test includes:

1. Analog loop back check:
   Is the returned voltage equal to the excitation voltage?
   This test indicates problems with the internal analog circuits and does not indicate external hardware problems.
2. Amplifier gain and clipping check:
   Did the amplifier gain change since the last calibration of the amplifier? Did somebody change the volume knob or does the amplifier clipping at high signal level?
   This test indicates a variation of the amplifier properties since the last amplifier calibration. The power amplifier may be switched off, the gain could be changed or it reached the maximal voltage (clipping). See next chapter for details.

If the first item occurs, a recalibration is required (see section *Hardware / Calibration / Check of Accuracy*)

在工程师模式每次测试之前，以及在操作员模式的第一次测量时都会进行一次硬件自检。自检包括：

1. 模拟环路检查：
   返回电压值等于激励电压吗？
   该测试将指出内部模拟电路的问题，但并不能指出外部硬件的问题。
2. 功放增益和削波检查：
   自上次功放校准以来功放增益改变了吗？是否有人调节了音量旋钮或者放大器对大信号是否削波了？
   该测试将指出自上次功放校准以来放大器特性所发生的变化。

功放可能被关掉，增益可能被修改，或者功放达到了最大电压（产生了削波）。详情请参阅下一小节。

若发生第 1 项，就需要进行一次重校正（参阅 *硬件/ Calibration* / Check of Accuracy）。

Amplifier Check Errors

功放检查错误

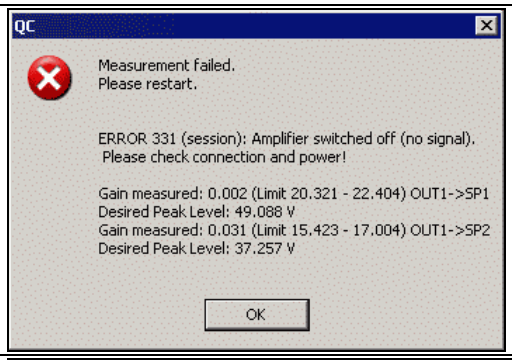
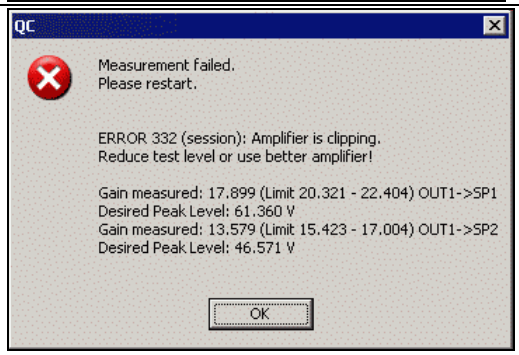
The following errors may occur during the power amplifier check.

Note: The Amplifier Check is always performed with the highest peak voltage that shall be used during the test. Especially when using Multitone-Excitation, the peak voltage is about 5…6 times higher than the rms value. Make sure that the used power amplifier is capable to provide the required peak voltage!

In all cases, please also check the Result Window

- Calibration Spectrum (Amp Response 1, 2) and
- Calibration Waveform (Amp Response 1, 2)

in the result window list (available in Engineer mode only). This provides you with the detailed test waveform and spectrum during the amplifier check.

	The Power Amplifier is switched off. Check also the Switch on the amplifier and check proper routing.
	The Power Amplifier does not have a correct gain due to clipping. The desired amplifier output peak voltage is displayed. Note: for Multitone excitation this may be about 5..6 times the rms level due to the higher crest factor of this test signal. Use an amplifier with higher gain and power, if the test level can't be reduced.
	The Power Amplifier has a correct gain but the SNR is worse than 34dB. This may be due to clipping, overloading or a defect. Use a better amplifier, if the test level can't be reduced.

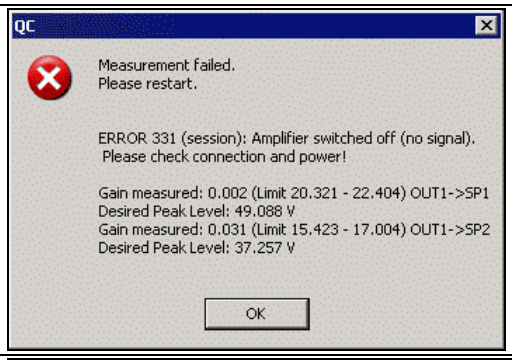
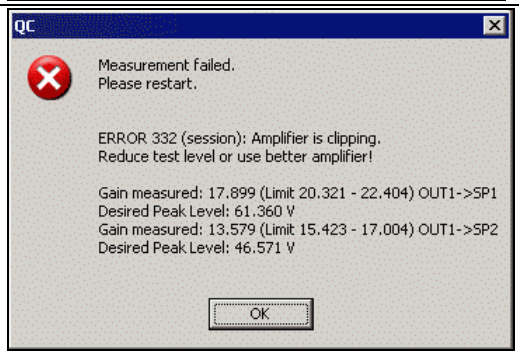
在功放自检时可能发生以下错误：

注：功放检验总是采用测试中要使用的最大峰值电压。特别是当使用多频信号激励时，峰值电压约为均方根值的 5~6 倍。请确认所使用的功放能够提供所需的峰值电压！

在所有情况下，请同时在结果窗口列表（仅工程师模式有效）检查结果窗口：

- 校准频谱（放大器响应 1, 2）和
- 校准波形（放大器响应 1, 2）

该列表向您提供了在功放检查中所得到的详细测试波形和频谱。

	功放电源被关闭。请检查功放电源开关及连线是否正确。
	由于削波功放不以正确增益放大。显示所希望的功放输出峰值电压。注：对于多频激励，由于测试信号的高峰值因子，电压可能是均方值电平的 5~6 倍。 如果测试电平无法减小，请使用高增益和大功率的放大器。
	功放具有正确增益，但信噪比低于 34dB。这可能是削波、过载或缺陷所致。 如果测试电平无法减小，请使用更好的放大器。

Signal Drop Out

信号丢失

Signal drop out effects, audible cracks or either may cause related problems

- insufficient performance of the PC or
- disturbance by other software (most likely hardware device drivers).

To identify these problems and to ensure proper, stable operation over a long time a special tool QC Perfomance Test was developed.

Note: Do not ignore these problems! Run the tests and ensure a successful run of the *Production Test*.

See sections below for help on running the performance test and how to fix problems.

信号失去效果、可听见的破裂声或者两者中的任何一个都可能产生相关问题：

- PC 性能不满足要求
- 被其他软件干扰（最有可能是硬件设备的驱动程序）。

为了识别这些问题并确保长时间正常、稳定的工作，我们开发了专用工具 **QC 性能测试**。

注：请不要忽略这些问题！务必运行*产线测试*并确保其运行成功。

请参阅下列章节，您将了解如何运行性能测试，并如何解决问题。

Performance Test Overview

性能测试概述

Due to stability requirements of a production environment, and the flexibility and fast operation of the Klippel QC System, you need a high performance PC to run the software.

During testing, we encountered very few hardware configurations that cause problems, even though there is no difference in the specification.

The QC Performance Test tool helps to evaluate whether a PC can run an uninterrupted QC Test, and can give some troubleshooting hints.

Note: The test tool simulates the typical load of an average QC Script. Due to the free choice of PC hardware and the multitude of possible QC configurations, a passing performance test does not guarantee that all configurations run successfully on the PC.

During actual QC testing, these errors may require to repeat the test, and increase the time of a test. So for some applications, infrequent errors may be acceptable.

There are three common reasons for errors during the test:

- Bad hardware or hardware drivers, e.g. WLAN or LAN
- Too much background activity (Virus scanner, etc.)
- Performance of the PC is limited

根据产线环境的稳定要求，以及 Klippel QC 系统的适应性和快速操作等需求，您需要一台高性能 PC 来运行系统软件。

在测试中，我们遇到过极少数产生问题的硬件配置，即使在规范说明书上没有差别。

QC 性能测试工具帮助我们评估一台 PC 是否能够不受干扰地运行 QC 测试，并给出一些故障处理建议。

注：测试工具模拟一个平均 QC 脚本的典型负载。由于选择 PC 硬件和 QC 配制的多种可能，性能测试通过并不能保证所有配置均可在此 PC 上能够成功运行。

在实际的 QC 测试中，可能需要重复测试并且增加测试时间。因此对于某些应用场合，罕见的错误可能被接受。

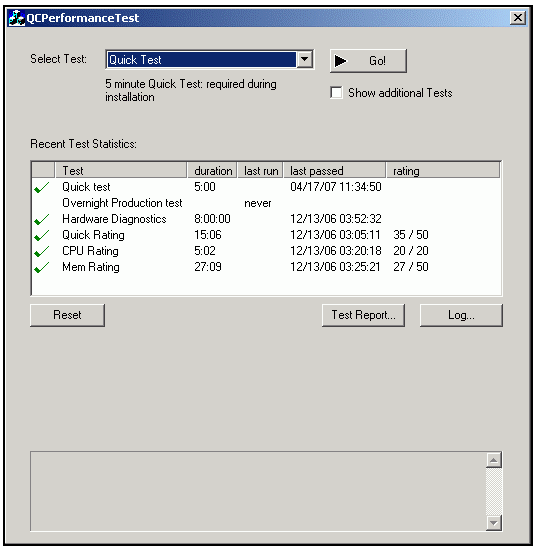
以下是测试中 3 种常见的导致错误的原因：

- 不良硬件或硬件驱动程序，例如 WLAN 或 LAN
- 后台运行的应用程序过多（杀毒软件等）
- PC 性能受限。

Using the Performance Test Tool

使用性能测试工具

Start the "QC Performance Test" from the installation *CD / tools / Performance Check* folder or select *System / QC Performance Test* from the QC-Start Tool.



From the drop down box, you can select the test configuration to run:

- Quick Test (5 minutes)
  This test discovers the most problems and is required during installation of the QC System. It indicates all types of errors, but it may miss infrequent dropouts that occur on some systems.
- Overnight Production Test (8h)
  indicates all types of errors and how often they occur. If possible, the PC should be in the production environment already.
  It is strongly recommended to run this test in the production environment before using the Klippel QC System for production purposes.
- Hardware Diagnostics
  This test is used for troubleshooting hardware and driver problems. It tests with no additional load, to detect presence of a faulty component (hardware or driver).
  The test needs not complete every time it runs, it can be used to monitor for errors for a certain time.

The checkbox "Show Additional Tests" makes the following configurations available. They are mainly intended for support and troubleshooting.

- Quick Rating (ca. 20 minutes)
  Tests the PC at different load levels, and determines overall performance. This can be used to test whether demanding QC setups can run on the system
- Full Rating Sequence (ca. 40 minutes)
  Provides a more detailed rating, to expose specific performance limits

- Full Diagnostics Sequence (ca. 9h)
  Provides the full rating, plus a long term monitoring under low load, to expose infrequent dropouts.

Select the test configuration you wish to run and click **GO** to start it.

Note: Do not use the PC for other purposes during the test. Depending on the hardware configuration, the PC may appear unresponsive for minutes. You can click **STOP** anytime to cancel the test, but cleanup may still take a while.

While the test is running the LED-style indicator shows the errors that occurred during the test. For a good system, no error should occur.

There are two types of errors shown: "Sync error" and "BCO error". They help support identifying the source of problems. Normally, hardware problems cause only "BCO errors", while performance problems cause both types of errors.

Click **Report** to show a report of the last test or test sequence. For a longer history, click **Log…** to show the log file.

从安装 CD 的*/ tools / Performance Check* 文件夹启动“QC 性能测试”，或者从 QC-启动工具中选择*系统 / QC 性能测试*。

（图略）

从下拉列表中，您可以选择运行测试配置：

- 快速测试（5 分钟）
  该测试可以发现大多数问题并要求在安装 QC 系统过程中进行。它可以指出所有类型的错误，但可能遗漏发生在某些系统上的罕见错误。
- 通宵产线测试（8 小时）
  给出所有错误类型及错误发生频率。如果可能，测试 PC 应已经安装在产线环境中。
  将 Klippel QC 系统投入生产之前，强烈建议在产线环境中运行该测试。
- 硬件诊断
  该测试用于发现并处理硬件和驱动程序的问题。测试在无额外负载下进行，检测有缺陷部件（硬件或驱动程序）的存在。
  此测试无须完全执行，某些时候可用于监测错误发生。

选择框“显示附加测试”可使下列配置有效。这些选项主要用于提供支持和故障处理。

- 快速等级评定（约 20 分钟）
  在不同负载水平测试 PC 并裁定整体性能。此测试用于判断所要求的 QC 设置能否在此系统运行。
- 完整等级评定测试序列（约 40 分钟）
  提供更为详细的等级评定，以暴露某些特定性能限制。
- 完整诊断测试序列（约 9 小时）
  提供完整的等级评定，另加在低负载情况下长时间监视，以发现罕见的故障。

选择您希望执行的测试配置，点击 **GO** 开始。

注：在测试过程中不要将 PC 用于其他用途。根据硬件配置，PC 可能会出现长达数分钟的无响应。在任何时候您都可以点击**停止**取消测试，但清理工作可能仍要持续一段时间。

在测试运行时，LED 样式的指示灯会显示测试中所发生的错误。对于一个好系统，不会发生任何错误。

有两种类型的错误会被显示：“同步错误” 和“BCO 错误”。它们用于区别问题的根源。通常，硬件问题只导致“BCO 错误”，而性能问题则会导致上述两种错误。

点击**报告**可以显示上一个测试或测试序列的报告。需要更长时间前的历史记录，请点击**日志...**显示日志文件。

Identifying the Problem

识别问题

If the Quick Test or Production Test shows errors, you should first determine what kind of problem it is. After that, see "Fixing the problem" below for specific solutions.

Hardware Diagnostics

Run the *Hardware Diagnostics* Test (you can stop it after appropriate time, depending on how frequent the errors occur in the other tests).

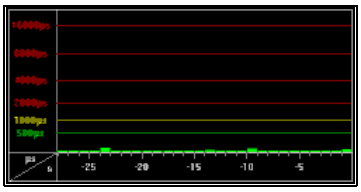
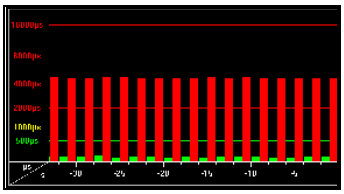
Conclusion: If *Hardware Diagnostics* runs fine, but *Quick Test* or *Production Test* still fail, you likely have a performance problem. In this case, continue with "Performance Problem" below.

Latency Check

Run the "Latency Checker" from the installation *CD / tools / Performance Check* folder or select *System / Latency Check* from the QC-Start Tool.

This program may also be downloaded from http://www.thesycon.de/deu/free_download.shtml or http://www.thesycon.de home page, and look for "free utilities".

Red bars indicate problems typically caused by other software drivers.

	
good: all bars are green, and below 1ms	bad: high latency spikes cause dropouts. **Note**: the spikes can be much more infrequent.

Conclusion: If *Latency Checker* runs ok, but *Hardware Diagnostics* fails with BCO errors, you likely have a hardware problem with the Firewire adapter, the cable or the ADC. Continue with "Hardware Problems" below.

If *Latency checker* fails, likely a driver for one of the hardware components of your PC is the cause. Continue with "Device Driver problems" below.

Test	Quick Test / Production test	Hardware Diagnostics	Latency Checker	**Suspected Cause:**
Result	**FAIL**	**FAIL**	**FAIL**	device driver
	FAIL	**FAIL**	PASS	hardware
	FAIL	PASS	PASS	performance

Other causes

This simple table can classify not all problems indicated by the performance test. If the remedies listed to not help, and the problem persists, it may be an option to try a different PC. If you contact Klippel Support, please include dB-Lab support information (click on the yellow envelope icon in the dB-Lab icon bar), and the performance test log file (save it from within the Performance Check Software using the buttons *Test Report* and *Log*…).

如果快速测试或产线测试出现错误，您应该首先判断是什么类型的错误。之后，阅读下面的“修复问题”找到特定的解决办法。

硬件诊断

运行*硬件诊断*测试（您可以在适当时间后停止它，取决于其他测试中发生此错误的频率）

结论：如果*硬件诊断*运行良好，但*快速测试*或*产线测试*仍然失败，很可能是您的 PC 存在性能问题。若如此，请继续阅读下面的“性能问题”。

潜在因素检查

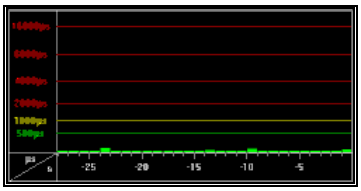
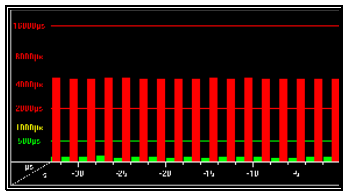
从安装 CD 的*/工具/性能检查*文件夹运行“潜在因素检查器”，或从 QC-启动工具中选择*系统/潜在因素检查*。

该程序也可从以下链接下载

http://www.thesycon.de/deu/free_download.shtml

http://www.thesycon.de 主页，寻找“免费工具”。

红色棒表示有通常由其他软件驱动所导致的问题。

	
好：所有棒都是绿色的，且低于 1 毫秒。	坏：高潜在因素穗状花序将导致信号丢失。 **注：**穗状花序非常罕见。

结论：如果*潜在因素检查器*运行 OK，但*硬件诊断*失败并提示 BCO 错误，很可能是您的硬件有问题，如火线适配器、电缆或 A/D 转换器。请继续阅读下面的“设备驱动问题”。

测试	快速测试 / 产线测试	硬件诊断	潜在因素检查器	**可能的原因:**
结果	**失败**	**失败**	**失败**	设备驱动程序
	失败	**失败**	通过	硬件
	失败	通过	通过	性能

其他原因

上张简单表格不能区分所有由性能测试发现的问题。如果所列出的修复措施不起作用，且问题持续发生，可以考虑换一台 PC 试试。如果您要联系 Klippel 技术支持，请您附上 dB-Lab 支持信息（在 dB-Lab 图标条中点击黄色信封图标）和性能测试日志文件（在性能检查软件中使用***测试报告***和***日志…***按键保存）。

Fixing the Problem

修复问题

Hardware Problems

硬件问题

If you identified a hardware problem, the following steps may help:

- If available, use a different Firewire / USB port
- Use a different Firewire / USB cable

- Use a different Firewire adapter card. If the original adapter is on the main board, disable it in the BIOS.

Run the *Hardware Diagnostics* test again to see if the problem is solved.

假如您识别了一个硬件问题，下列步骤可能会有帮助：

- 如果可能，请使用一个不同的火线/USB 口。
- 使用一条不同的火线/USB 电缆。
- 使用一块不同的火线适配卡。如果原来的适配器集成在主板上，请在 BIOS 中关闭它。

再次运行*硬件诊断*测试，看问题是否已解决。

Performance Problems

性能问题

Today, PCs are often limited by the amount of memory that is readily available. While for normal applications additional memory can be simulated on disk, this is not fast enough for the real time acquisition required by the Klippel QC System.

- Disable background tasks, such as Virus scanners, automatic "real-time" backup etc.
- Make sure the PC matches the minimum specification
- If available, try a different PC.
- If they occur only for a particularly demanding QC Test setup, it usually helps to add more RAM to the PC.

If you want to contact Klippel Support, please include the results of one of the Rating Tests in QC Performance Test (enable "Show Additional Tests" to make them available).

To store the results, save it from within the Performance Check Software using the buttons *Test Report* and *Log*….

当今，PC 常常被其内存量限制，而内存可以轻易地得到。对于一般的应用来说，可以从磁盘虚拟得到额外的内存，而对于要求实时采集的 Klippel QC 系统来说是不够快的。

- 关闭诸如病毒扫描器、自动“实时”备份等后台任务软件。
- 确保 PC 达到最低标准要求。
- 如果可能，试试另一台 PC。
- 如果仅在特殊需求的 QC 测试设置中发生问题，增加 PC 的内存往往能够有所帮助。

如果您想联系 Klippel 技术支持，请附上 QC 性能测试中的一项评分测试（可选择“显示附加测试”得到评分测试）。

要保存结果，请在性能检查软件中使用***测试报告*** 和***日志…***按键保存。

Device Driver Problems

设备驱动问题

Some device drivers can block the PC bus for such a long time that real time acquisition becomes impossible.

Note: To avoid permanently damaging the windows installation, it is recommended to make a complete backup and/or set a System Restore Point.

The first step is to identify the device driver or drivers that cause the problem. To do that, open the Windows "Device Manager" list and disable suspect device drivers step by step as described below. Run *Latency Checker* to see if the problem is gone. For infrequent problems, you can use the *Hardware Diagnostics* instead, as this provides a longer memory.

If disabling one particular driver does not completely solve the problem, but reduces the frequency of errors, keep this driver disabled and continue with other drivers.

Note: Do not disable vital drivers like keyboard or mouse!
If a particular driver does not affect the performance, don't forget to re-enable it again!
If you accidentally disabled one of the vital drivers, and the system is not accessible anymore, reboot, press [F8] after the BIOS diagnostics, and select "boot in safe mode". Then, re-enable the important devices.

Disabling driver in Device Manager:

To open Device Manager, right-click on "My Computer", select "Properties", go to the "Hardware" tab, and click "Device Manager" you see a tree of devices.

Start with drivers in this order:

- WLAN Network adapters
- Ethernet / LAN Network adapters
- Sound device drivers (except those labeled "PHASE 24")
- Other non-standard components

Right-Click on the driver and select "Disable" from the popup menu. The driver icon is displayed with a small red "stop" sign.

To enable the driver, right click again, and select "Enable".

After identifying the offending driver

If you have identified a driver as the cause of the problem, you can

- Try to update the driver through the "Device Manager" panel Right-click the device, and select "Update Driver". Allow the Driver Update Wizard to connect to the Internet
- Check the web site of the manufacturer of the PC or the offending component for a driver update, or contact their support. Some PC manufacturers offer "Update packs" with driver updates for multiple components.
- Exchange the offending component. If it is on the motherboard, disable it in the BIOS settings otherwise remove it.

一些设备驱动会在很长一段时间内阻塞 PC 总线，使得实时采集无法完成。

注：为避免永久损坏 Windows 安装，推荐您做完全备份和/或设置系统还原点。

第一步要确定产生问题的某个或某些设备驱动。打开 Windows“设备管理器”列表，按下面的描述一步一步关闭可疑的设备驱动。运行*潜在因素检查器*查看问题是否消失。对于不经常出现的问题，您可以使用*硬件诊断*，因为它提供了较长的记录功能。

假如关闭某一驱动不能完全解决问题，但减少了错误概率，请您仍然关闭该驱动并继续检查其他驱动。

注：不要关闭键盘或鼠标这些必不可少的驱动
如果某个驱动不影响性能，不要忘记再重新开启它！
如果您意外地关闭了一个必要的驱动，且不能再进入系统，重启，在 BIOS 自检后按[F8]，并选择“以安全模式启动”。然后，重新开启该重要的驱动。

在设备管理器中关闭驱动：

打开设备管理器：对“我的电脑”点右键，选择“属性”，找到“硬件”标签，点击“设备管理器”，您能看到设备的树形图。

以下列顺序开始各个驱动：

- WLAN 网络适配器

- 以太网/LAN 适配器
- 声音设备驱动（除了那些标有“PHASE 24”的）
- 其他非标准部件

在驱动上右击，并在弹出菜单中选择“关闭”。显示的驱动图标加上了小的红色“停止”标记。

要开启该驱动，请再次右击，并选择“开启”。

在识别引起问题的驱动之后

如果您已经识别了一个引起问题的驱动，您可以

- 通过“设备管理器”面板尝试更新驱动
  右击设备，并选择“更新驱动”。允许驱动更新向导连接因特网。
- 在 PC 或引起问题的硬件的制造商的网站查找驱动更新，或联系他们的技术支持。一些 PC 制造商提供“更新包”，它包含多个部件的驱动更新。
- 更换引起问题的部件。如果它集成在主板上，请在 BIOS 设置中关闭它，否则删除它。

Support Information for Performance Problems

性能问题的支持信息

When you contact support with performance problems, please include:

- **dB-Lab Support information**
  In dB-Lab, select *Extras/Zip&e-mail*. In the dialog, select both *Installation and licence doagnostics* and *Log files*.
  Click "Send as e-mail" to start collecting an e-mail right away.
  (If you can't send e-mail from the production system, use "Save as .zip" instead.)

- **QC Performance test results**
  Start QC Performance Test, enable *Show additional tests*, run *Quick Test* and *Full Rating Sequence.* Click "Test Report", and add the information of the report. (You can click *Copy* to copy the text to the clipboard, and then paste it into your e-mail)

- **Screenshot of latency after running for a while**
  Compare to screenshots above.
  Also, add a verbal description if you see erratic behavior (e.g. infrequent spikes)

- **Additional Software installed on the computer**

当您需要联系技术支持询问性能问题，请您提供下列信息：

- **dB-Lab 支持信息**
  在 dB-Lab 中，选择 *Extras/Zip&e-mail*。在对话框内将 *Installation and licence doagnostics* 和 *Log files* 都选中。
  点击“作为 e-mail 发送”立即开始处理电子邮件。
  （如果您不能在产品系统中发送电子邮件，请使用“作为 .zip 保存”，然后将保存文件再发送。）
- **QC 性能测试结果**
  开始 QC 性能测试，选中 *显示附加测试*，运行 *快速测试* 和 *完整等级评定测试序列*。点击“测试报告”，并添加报告的信息。
  （您可以点击 *Copy* 将这些文本复制到剪贴板，然后粘贴到电子邮件中）。
- **运行一段时间之后的延时时间屏幕截图**
  与上面截图相比较。
  另外，如果您看到不稳定的现象请加上文字叙述（例如不经常出现的穗状花序）。

- 安装在计算机上的其他软件

Software Problems
软件问题

Task Files not found
任务文件找不到

The Task files of the Standard version are installed in the following folder by default:

C:\Documents and Settings\All Users
Application Data\Klippel\QC\Scripts\Klippel\Qc\Standard

Note: The task files must not be moved to a different location. In this case the operation will not find the task scripts anymore.

标准版的任务文件默认安装在以下文件夹：

C:\Documents and Settings\All Users
Application Data\Klippel\QC\Scripts\Klippel\Qc\Standard

注：不允许将任务文件移到其他位置。在这种情况下，操作将找不到任务脚本。

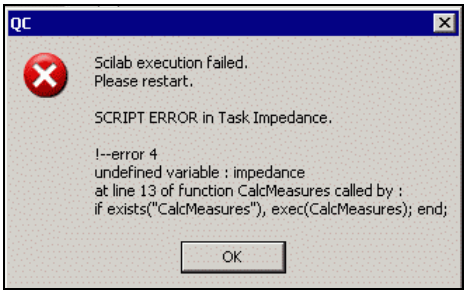
Installation failed
安装失败

In case of an error in the installation process, please send e-mail to support@klippel.de and attach the log file. You can store the log file by starting the installation program *QC-InstallGuide* and go to *Diagnostics* on the first page. Then open the current log file and store it.

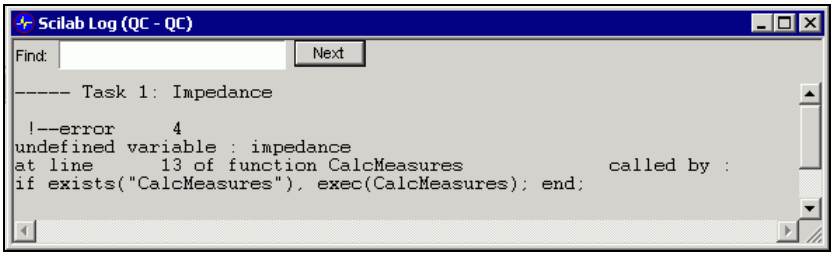
在安装过程中出现错误，请发送电子邮件至 support@klippel.de，并附上日志文件。您可以运行安装程序 *QC-InstallGuide* 并在第一页进入*诊断*方式，之后打开当前的记录文件将其保存。

Script Error messages
脚本错误信息

In case of an script error message (see an example below),



Please copy the contents of the result window Scilab Log into e-mail and send it to support@klippel.de.



若出现脚本错误信息（见下面例子）

（图略）

请复制结果窗口 Scilab Log 的内容到电子邮件中，并发送到 support@klippel.de。

（图略）

Appendix

附录

Glossary

词汇表

DUT / Batch / Type

DUT / 批次 / 类型

The device under test (**DUT**) designates the particular test object. It is usually part of a production batch (also called lot).

A **batch** stands for a certain production period.

The **type** describes the geometry and parameter of a transducer and is normally manufactured in several batches.

被测件（**DUT**）定名为特定的测试对象，它通常是一个生产批次中的一部份。

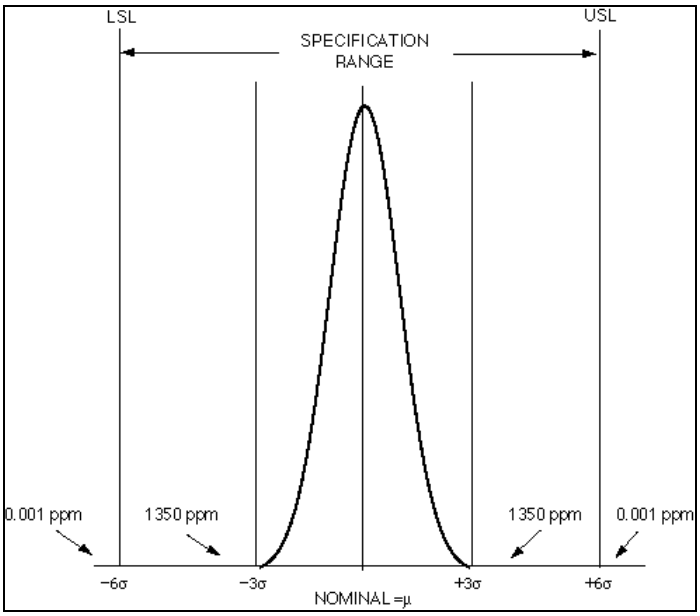
一个**批次**代表某一生产周期。

类型描述了一个换能器的几何尺寸和参数，它通常在几批次中生产。

Ppk / Cpk

Ppk / Cpk

Statistical indices are used to predict as early as possible a change in quality.



The process capability index, or Cpk, measures a process's ability to create product within specification limits. Cpk represents the difference between the actual process average and the closest specification limit over the standard deviation, times three.

By convention, when the Cpk is less than one, the process is referred to as incapable. When the Cpk is greater than or equal to one, the process is considered capable of producing a product within specification limits. In a 4-sigma process, the Cpk equals 1.33 and in a 6-sigma process, the Cpk equals 2.0.

The Cpk is inversely proportional to the standard deviation, or variability, of a process. The higher the Cpk, the narrower the process distribution as compared with the specification limits, and the more uniform the product. As the standard deviation increases, the Cpk index decreases. At the same time, the potential to create product outside the specification limits increases.

Cpk can only have positive values. It will equal zero when the actual process average matches or falls outside one of the specification limits. The Cpk index can never be greater than the Cp, only equal to it. This happens when the actual process average falls in the middle of the specification limits.

(excerpted from The Complete Guide to the CQE *by Thomas Pyzdek. 1996. Tucson: Quality Publishing Inc.)*

统计指数是用来尽早预报质量变化的。

（图略）

过程能力指数（Cpk）测量在规格门限内生产产品的过程能力。Cpk 描述了实际过程平均值与最接近规格门限值差值比上 3 倍标准方差。

一般来说，当 Cpk 小于 1 时，被认为过程能力不足。当 Cpk 大于等于 1 时，认为过程能够在规格门限内制造产品。在 4σ过程中，Cpk 等于 1.33，在 6σ 过程中 Cpk 等于 2.0。

Cpk 与过程标准方差成反比。 Cpk 越高，过程分布相对于规格门限就越窄，产品就越一致。当标准方差增加时，Cpk 指数就减小。与此同时，产品超出规格门限的可能性就增加。

Cpk 只可能是正值。当实际过程平均值超出规格门限时，Cpk 将等于 0。Cpk 值不可能大于 Cp，最大只能等于它。当实际过程平均值降至规格门限的中间时，Cpk=Cp。

(摘自 The Complete Guide to the CQE， *作者 Thomas Pyzdek. 1996.（美国）土桑市：质量出版有限公司。)*

Process Capability Index (*Cpk*):

过程能力指数 (*Cpk*):

$$CpK = \min\left(\frac{L_{up} - E_c}{3\sigma_c}, \frac{E_c - L_{low}}{3\sigma_c}\right)$$

using

L_{up} upper specified limit

L_{low} lower specified limit

C number of DUT investigated

E_C expected value of test results X_i within the last C measured DUT

$$E_C = \frac{1}{c}\sum_{i=1}^{c} X_i$$

σ_c Standard deviation of test results X_i within the last C measured DUT

$$\sigma_C = \sqrt{E_C\left[\left(X - E_C(X)\right)^2\right]}$$

Cpk is defined as the distance between the average of a fixed number *c* of samples (short term) and the closest limit divided by half of the process width. The process width is usually six times the standard variation.

$$CpK = \min\left(\frac{L_{up} - E_c}{3\sigma_c}, \frac{E_c - L_{low}}{3\sigma_c}\right)$$

公式中：

L_{up} 指定门限的上限

L_{low} 指定门限的下限

C 考察的 DUT 数量

E_C 在最新 C 个测量 DUT 中，测试结果 X_i 的期望值

$$E_C = \frac{1}{c}\sum_{i=1}^{c} X_i$$

σ_c 在最新 C 个测量 DUT 中，测试结果 X_i 的标准差

$$\sigma_C = \sqrt{E_C\left[\left(X - E_C(X)\right)^2\right]}$$

定义 Cpk 为 c 个固定数目的样本的平均值与最接近门限的差值再除以过程宽度的一半，过程宽度通常等于 6 倍的标准方差。

Process Performance Index (Ppk):

过程性能指数 (Ppk):

$$PpK = \min\left(\frac{L_{up} - E_P}{3\sigma_P}, \frac{E_P - L_{low}}{3\sigma_P}\right)$$

using

$_P$ number of DUT in total production

E_P expected value of all test results X_i

$$E_P = \frac{1}{P}\sum_{i=1}^{P} X_i$$

σ_P Standard deviation of all test results X_i

$$\sigma_P = \sqrt{E_P\left[\left(X - E_P(X)\right)^2\right]}$$

Ppk is the overall process performance similar defined as *Cpk* but based on the total process variation of a batch (all samples used) where *Cpk* only takes into account a fixed number of samples.

$$PpK = \min\left(\frac{L_{up} - E_P}{3\sigma_P}, \frac{E_P - L_{low}}{3\sigma_P}\right)$$

公式中

$_P$ 全部产品中 DUT 的数目

E_P 所有测试结果 X_i 的期望值

$$E_P = \frac{1}{P}\sum_{i=1}^{P} X_i$$

σ_P 所有测试结果 X_i 的标准方差

$$\sigma_P = \sqrt{E_P\left[\left(X - E_P(X)\right)^2\right]}$$

Ppk 的定义类似于 *Cpk*，*Ppk* 反映的是全部过程性能，它是基于一个批次（所有用到的样本）的全部过程差异，而 *Cpk* 仅考虑一个固定数目的样品。

Quick Klippel-QC Setup Guide

Klippel-QC 快速设置指南

Together with the printed manual comes a laminated, two pages short guide, that should be placed near the Klippel QC System for reference and help.

On the next two pages this guide is reproduced (printed manual only, not included in online help). However, there is also a PDF version installed in the Help folder, which is by default:

```
c:\Documents and Settings\All Users\
   Application Data\Klippel\QC\Help\
   Quick Klippel-QC Setup Guide.pdf
```

Please use the pdf document for printing.

Note: A commented version of this setup guide is included in this manual in section *Getting Started / First Measurement.*

#

印刷的 QC 手册和二页简短快速指南可以一起放在 Klippel QC 系统的附近以便于参考和获得帮助。

您可以复制下面两页指南（只在打印版手册里有，在线帮助中没有）。同时，在帮助文件夹里安装有 PDF 版本，它的默认路径 为：

```
c:\Documents and Settings\All Users\
   Application Data\Klippel\QC\Help\
   Quick Klippel-QC Setup Guide.pdf
```

请您使用该 pdf 文件打印。.

注： 这个设置指南的注释版本在本手册的章节 *开始 / First* Measurement 。

#

ENGINEER

Quick Klippel-QC Setup Guide

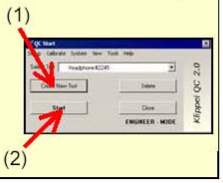
Use specification data, if available. Use this guide for missing parameters only.

1 Select the Template for your Driver

Start **QC-Start Engineer**

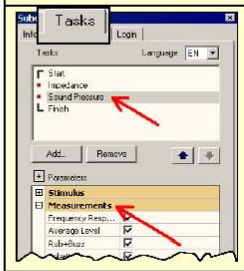
Template	fs Range [Hz]	Re Range [Ω][1]	SPL limit range [Hz]	SPL time [s]
Subwoofer	10 – 50	2 – 8	20 – 200	2
Woofer	20 – 150	2 – 8	20 – 1000	1
Midrange	100 – 500	4 – 8	50 – 2000	1
Tweeter	400 – 3k	4 – 8	200 – 20k	0.5
Horn Driver	200 – 2k	4 – 16	400 – 20k	1
Microspeaker	200 – 2k	4 – 30	200 – 5k	0.5
Headphones	30 – 400	10 – 200[2]	20 – 20k	1

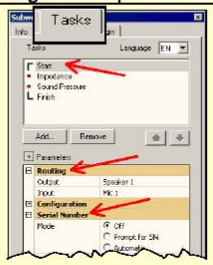
Create new test (1), select **Template**, enter **test name** and **Start** (2).

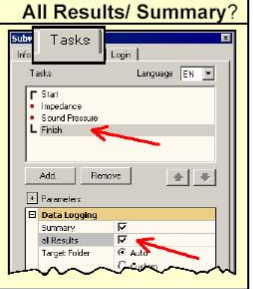


2 Configure Test

Measurements enabled?	Speaker + Mics **Routing**?	Use **Serial Number**?	Data Logging: **All Results/ Summary**?

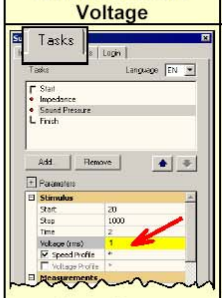




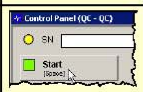


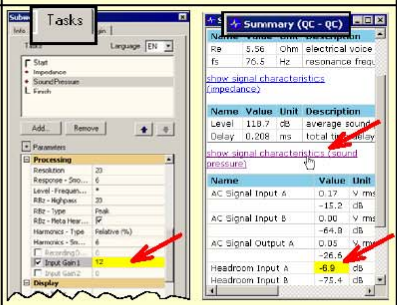
3 Adjust Voltage

Set **Sound Pressure Voltage**	Press **Start**	Adjust Mic Headroom	Check **Impedance**

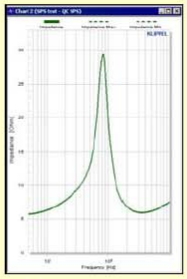


According to specification





Adjust **Input Gain** until **Headroom Input A** is in –10…-3 dB range.



Curve smooth? If not, adjust voltage.

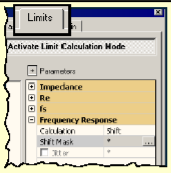
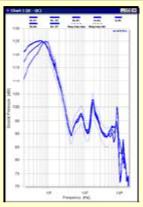
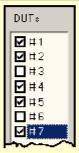
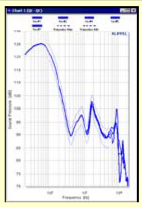
Now, the measurement setup is complete.

[1] If Re is outside this range, please scale level relative to the middle specified value of Re (the higher Re, the higher the level). See Manual section Optimizing Performance.

[2] For Re>30 Ohm, special hardware version required.

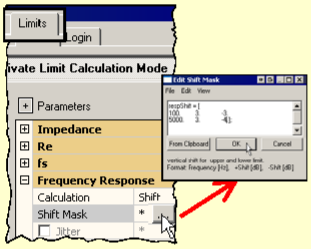
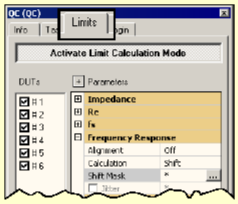
ENGINEER

4 Setting Limits

Activate **Limit** Mode	Measure Reference **DUTs**	Calculate Limits	Remove strongly deviating **DUTs**	Check Limits
 Press button **Activate Limit Calculation Mode**.	 Press **Control Panel – Start** button. 	 Press **OK** button on Property Page Limits.	 Deactivate Reference **DUTs** (#3, #6 in the example), which are corrupted by noise or defects; Press **OK** button.	 Are all Reference DUTs inside limits?

no

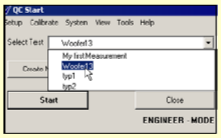
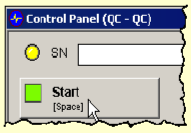
yes

Adjust Limits (only if required)	Exit **Limit** Mode	Trial Run
 Edit **Parameter** Enlarge headroom or restrict frequency range.	 Disable button **Activate Limit Calculation Mode**.	Press **Control Panel** – **Start** button  Good unit / Defect unit All bad drivers should be detected as FAIL.  Logout as Engineer; Exit QC-Start Engineer.

Now, the whole setup is complete and ready for production.

OPERATOR

5 Run Production

Launch **QC-Start Operator**	Select and start prepared Test	Press **Start** or enter **Serial Number** to check production
		

KLIPPEL

www.klippel.de

Links to Manual for more information:

Commented version of this guide	Getting started
Select the Template	Test Configuration / Test Templates
Configure Test	Test Configuration
Adjust Level	Optimizing Performance
Settings Limits	Test Configuration / Limit Calculation
Run Production	User Modes / Operator

Quick Klippel-QC Setup Guide page 2/2

工

程

师

Klippel QC 快速设置指南

若有产品规格说明书，请使用其中的数据。仅在说明书遗失时才使用本指南的数据。

1 为扬声器选择模板

点击**QC-Start Engineer**

模板	fs范围 [Hz]	Re范围 [Ω][1]	SPL标称范围 [Hz]	SPL时间 [s]
Subwoofer	10 – 50	2 – 8	20 – 200	2
Woofer	20 – 150	2 – 8	20 – 1000	1
Midrange	100 – 500	4 – 8	50 – 2000	1
Tweeter	400 – 3k	4 – 8	200 – 20k	0.5
Horn Driver	200 – 2k	4 – 16	400 – 20k	1
Microspeaker	200 – 2k	4 – 30	200 – 5k	0.5
Headphones	30 – 400	10 – 200[2]	20 – 20k	1

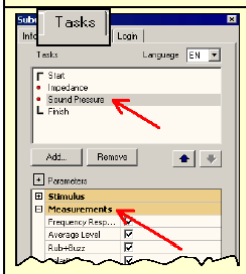
创建新的测试(1)，选择**模板**,输入**测试名称**并**开始**(2).

(1)

(2)

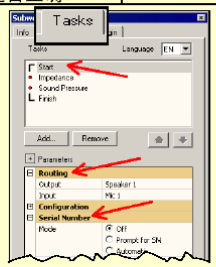
2 测试配置

开启**测量**了吗?

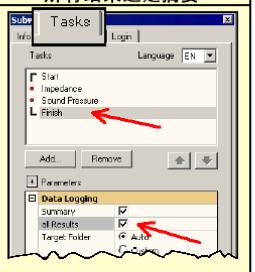


扬声器和Mic的**连线**是否正确?

是否使用**序列号**?

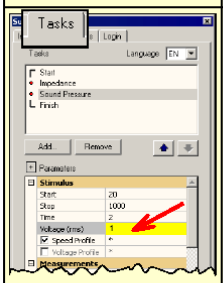


数据日志是选择**所有结果**还是**摘要**?



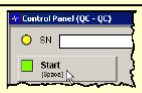
3 调整电压

设置**测试电压**

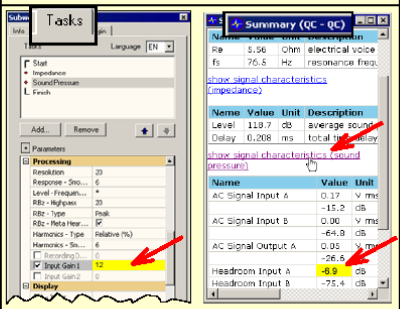


参照产品规格说明书设置

点击**开始**

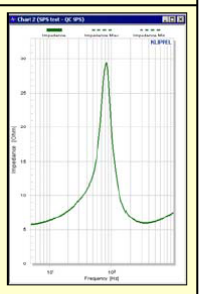


调节传声器的动态余量



调节**输入增益**，直到**动态余量输入A**在-10dB~-3dB范围内.

检查**阻抗**曲线



曲线是否平滑?
若不平滑，请调节测试电压。

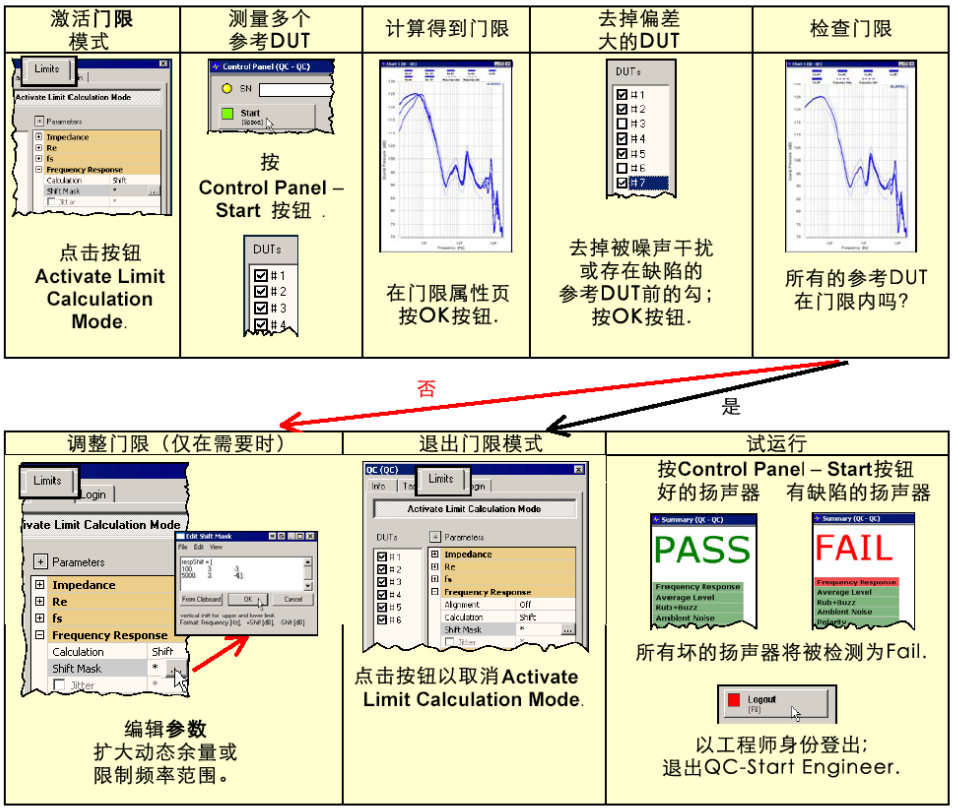
现在，测量设置已完成。

[1] 如果Re在此范围之外，请按照Re值达到额定的中值调整测试电压（Re越高，测试电压越高）。参见手册优化性能一章。

[2] 当Re>30Ω，需要使用特殊的硬件版本。

工程师

4 设置门限



现在，所有设置完成，可以投入生产线运行。

操作员

5 生产线运行

KLIPPEL
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详情请对应手册中各章节：

本指南提到的描述	手册中的章节
选择模板	测试配置 / 测试模板
配置测试	测试配置
调整测试电压	优化性能
调整门限	测试配置 / 门限计算
生产线运行	用户模式 / 操作员

Measurement Technique (Theory)
测量技术（原理）

For a general view on the measurement technique, the following paper is suggested for reading:

Loudspeaker Testing at the Production Line

W. Klippel, S. Irrgang, U. Seidel

KLIPPEL GmbH, Dresden, Germany

presented on the 120th AES Convention in Paris 2006.

为了对测量技术有一个全局的了解，建议您阅读以下论文：

产线上的扬声器测试

W. Klippel, S. Irrgang, U. Seidel

KLIPPEL GmbH, Dresden，德国

发表在第 120 届 AES 大会，巴黎 2006。

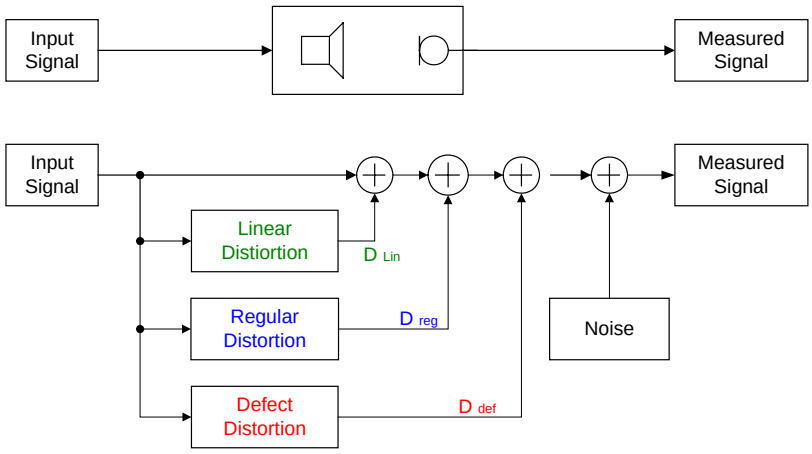
Rub & Buzz
异音

Defects that are usually designated as Rub&Buzz are typically small in amplitude and time relative to the fundamental of a test signal and are therefore difficult to detect. In this section the approach to reliably detect these defects with superior sensitivity and reliability is discussed.

通常被称为异音的缺陷相对于测试信号的基波而言，一般幅度小，时间短，因此难以检测。在本节将讨论超灵敏和高可靠性地检测这种缺陷的方法。

Background
背景

The response of a DUT (Device under Test) to an input signal can be modeled by the superposition of several distortion components:



Linear distortion describes the deviation from unity response, which is the linear, wanted behavior of a loudspeaker (frequency response).

Regular distortion describes the response of determined-by-design nonlinear behavior (e.g. 2nd, 3rd order harmonics due to motor or compliance nonlinearity).

Defect distortions are all unwanted signal components due to production failures, material problems or even design errors (wires hitting the cone). Usually these defects are short-term phenomenon such as clicks, rubbing at a certain excursion or loose particles.

Ambient Noise is also an unwanted signal but not related to the driver. The influence of the noise from the ambience should be reliably separated from the distortion components (see Production Noise immunity below).

DUT（被测件）对输入信号的响应可以用几个失真部分的叠加来建立模型：

（图略）

线性失真描述了来自单一响应的偏离，它是扬声器的线性的和所期望的特性（频率响应）。

常规失真描述了因设计所决定的非线性作用所产生的响应（例如由动力或顺性非线性所引起的 2 阶和 3 阶谐波）。

缺陷失真是由产品缺陷、材料问题、甚至设计误差（线碰到音圈）导致的所有不希望的信号成分。通常这些缺陷都是短时现象，比如咔哒声、碰到某些脱出部件或者松散杂质所产生的摩擦声等。

环境噪声也是一种不希望的信号但与发声器无关。 来自周边的噪声影响应应该确实地与失真成分分离（参见下文 *产线噪声免除*）。

Defect Characteristics

缺陷特性

Defects have in most cases very low energy and are usually concentrated at one time instant. They can be detected in time domain analysis best, since frequency domain (neglecting phase information) smears these effects over the whole measurement interval. Using time domain analysis, even shortest defects can be detected.
The Defect Distortion is separated from regular distortion and the fundamental using a tracking highpass filter with variable cut-off frequency.

This is an effective measure to detect Rub&Buzz defects. However, these measures do not only reveal the defect but are still contaminated with higher-order regular distortion (which are also found on good units) and noise. Testing even smaller defects that are masked by regular distortion the Meta-Hearing Technique shall be applied (see below).

在大多数情况下，缺陷的能量非常小，且通常集中在一瞬间。用时域分析的方法可以最好地检测出这些瑕疵，因为频域处理（忽略相位信息）模糊了这些瑕疵在整个测量范围内的影响。使用时域分析，即使最短的缺陷也能被检测出来。

使用变截止频率的跟踪高通滤波器可将缺陷失真从常规失真和基波中分离出来。

这是一种检测异音缺陷的有效测量。然而，这些测量虽然可以暴露缺陷，但仍然受高阶常规失真（这在好的单元中也存在）和噪声的影响。若要测试被常规失真掩盖的更小的缺陷，需要采用超听力技术（见下文）。

Meta Hearing Technology

超听力技术

The new **Meta Hearing technology** (patented in DE 102 14 407, CN 1449136, US) is used to suppress the regular distortion (from motor, or suspension) inherent in the Defect Distortion and to isolate the distortion (IDD) caused by the loudspeaker defect. The peak value of IDD may be preferred for ultra short-term or singular disturbances such as loose particles. The rms value with a short time constant is preferable for oscillating defects such as rubbing of the coil.

This technology is based on a loudspeaker model, which has to be identified by a learning procedure applied to a good unit (e.g. golden unit). The continuous learning procedure provides also a compensation for parameter shifts during production. Thus loudspeakers with minor defects (stray units) are detected reliably.

These defects may be masked by regular distortion and inaudible for a human tester (Meta-Hearing technology). However, inaudible effects may provide valuable indications for loose particle detection or other defects, which become worse in the final application. The active compensation of the regular distortion provides additional headroom between a good and a defect unit. Limits are easier to define.

新**超听力技术**（专利号 DE 102 14 407, CN 1449136, US）用于抑制在缺陷失真中固有的常规失真（由动力或悬挂产生），且能够隔离由扬声器缺陷导致的失真（IDD）。IDD 的峰值可能在如松散杂质产生的超短或单一的扰动中出现。具有短时间常数的均方根值更适合如线圈摩擦产生的振动缺陷。

此技术是基于一个扬声器模型，必须对一个好的单元（例如黄金单元）进行学习并辨识得到该模型。连续的学习过程也提供了对于生产过程中参数漂移的补偿。因此可以可靠地检测出有小缺陷的扬声器（如性能偏移的单元）。

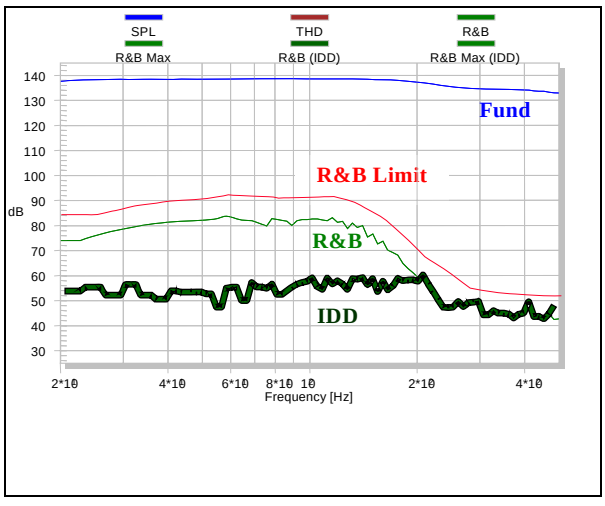
这些缺陷可能被常规失真所掩盖，且听音员（超听力技术）无法听见。然而，听不见的现象可能对于在最终应用中会恶化的松散杂质或其他缺陷给出有价值的征兆。 通过主动补偿常规失真，在好器件与有缺陷器件之间提供了一个额外的动态余量，使得门限更易设定。

Isolated Defect Distortion (IDD)

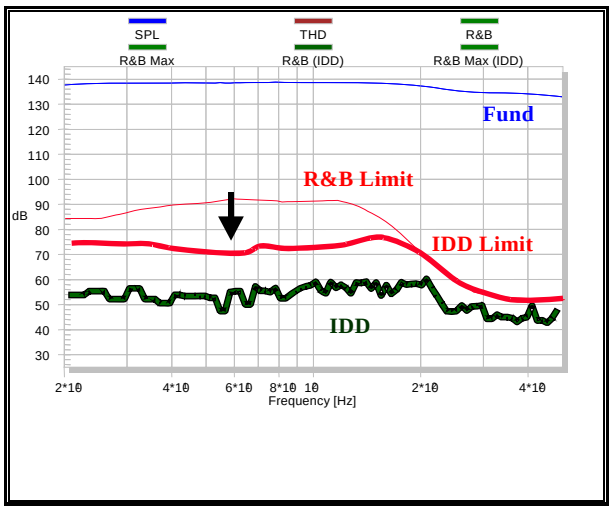
分离缺陷失真（IDD）

If *Meta Hearing* is activated an additional measure is calculated. It is called IDD (Isolated Defect Distortion) and is obtained by suppressing the regular distortion, which mask potential defects, and provides therefore a higher rate of defect detection as well as higher headroom for limit setting. To ensure high sensitivity the IDD limit is adjusted automatically. It is identical to the rub & buzz limit for all frequencies where no suppression of the regular distortion can be achieved. For all other frequecies it will be lowered according to the grade of suppression.

In the graph below the thin green line is the normal Rub&Buzz curve *R&B* with its limit *R&B Limit.* The thick green curve IDD is at lower frequencies up to 20 dB below the normal Rub&Buzz curve. This is the compensation achieved by Meta Hearing Technology. Thus the test is 20 dB more sensitive to potential defects.



The next graph shows the derived limit for the IDD measure *IDD Limit*. At frequencies were compensation was achieved, the limit is attenuated. Note that at high frequencies the Rub&Buzz curve and the IDD curve are identical, no compensation was achieved and therefore the IDD limit was not attenuated. Basically it is possible that the IDD limit is below the measured Rub&Buzz, detecting defects that are masked by the normal Rub&Buzz and therefore inaudible for the human ear.



如果激活*超听力*，则要计算一个额外的测量。它被称为 IDD（分离缺陷失真），它是通过抑制常规失真得到的。常规失真掩盖了潜在的缺陷。IDD 提供了更高的缺陷检测率，对门限设定的动态余量也更大。为了保证高灵敏度，IDD 门限是自动调节的。对于能够得到的常规失真不被抑制的所有频率，它等价于异音门限。对于所有其他频率，它将根据抑制的级别略低于异音门限。

在下图中，绿细线是常规的异音曲线（*R&B*）（带有其门限 *R&B Limit*）。粗绿线 IDD 在较低频率范围比正常异音曲线低 20dB。这是由超听力技术得到的补偿。因此测试对潜在缺陷要灵敏 20dB。

（图略）

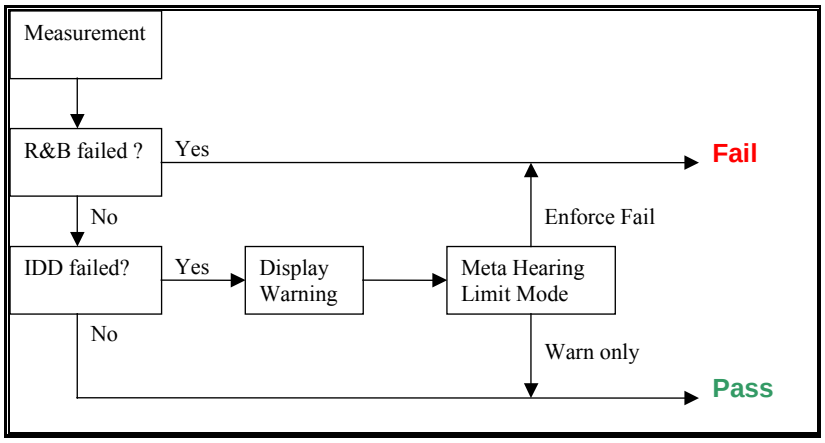
下一幅图显示的是为 IDD 测量所推算出来的门限（*IDD Limit*）。在一些频率上实现了补偿，则门限就降低了。注意，在高频处，异音曲线与 IDD 曲线基本相等，没有取得补偿，因此 IDD 门限就没有降低。总之，IDD 门限要低于测量到的异音门限，因此可以检测被常规异音掩盖的缺陷，而这些缺陷人耳是无法听见的。

（图略）

Handling of IDD result

处理 IDD 结果

The results of rub & buzz and IDD are combined into one test verdict. If the basic rub & buzz exceeds the limit the verdict is always Fail. For the more sensitive IDD measure the user can decide wheter a limit violation leads to Warning or Fail. In case of Warning the overall result will be Pass if no other measure failed.



In order to simplify the user interface the Rub&Buzz and IDD measure are not shown simultaneously in Result Window 1. Normally Rub&Buzz is shown. IDD is shown only, if it exceeds the limit. If both measures exceed the limit only Rub&Buzz is shown.

Applications:

Warn Only	- Well trained operator who can double check the DUT by e.g. manual sweep - Not recommended for automated test setup
Enforce Fail	- Absolute safe operation to prevent any unit from shipment that differs from the preceding units (stray unit). - May be used with offline check of failed units. - Recommended for automated test setup.

异音和 IDD 的结果被整合在一个测试判决中。如果基本的异音超过门限，判决结果总是失败。对于更加敏感的 IDD 测量来说，用户可以决定超过门限是给出警告，还是失败的结果。在警告情况下，如果没有其他测量项目失败，整体测试结果是通过的。
（图略）

为了简化用户界面，不会在结果窗口 1 中同时显示异音和 IDD 测量。通常显示的是异音。只有当 IDD 超过门限时，才会显示 IDD。如果两个测量均超过门限，也只显示异音。

应用：

只警告	- 训练有素的操作员可以再检查一次 DUT，例如用手动扫频信号 - 对于自动测试装置不推荐使用。
强制失败	- 绝对安全操作，防止任何与以前不一样的单元（意外单元）出货。 - 可以用于离线检查未通过单元。 - 对于自动测试装置推荐使用。

Limit Calculation of IDD

IDD 的门限计算

The IDD Limit is calculated as following:

$$Compensation = RBz - IDD$$

$$IDD_{Limit} = RBz_{Limit} - \min\left(Compensation / 2, 10dB\right)$$

Thus the attenuation of the IDD Limit is not more than 10dB below the Rub&Buzz limit to ensure robust operation.

IDD 门限用下列公式计算：

$$补偿 = RBz - IDD$$

$$IDD_{Limit} = RBz_{Limit} - \min(补偿 / 2, 10\ dB)$$

因此 IDD 门限低于异音门限不超过 10dB，以保证可靠操作。

Ambient Noise Immunity

环境噪声免除

Ambient noise from production may impair the detection of rub& buzz defects for a human or automated tester. Shielding of the test unit by a test box or measurement cabin may help. However, an additional microphone measuring the noise in the far field (1 m distance) is used to predict the **Ambient Noise** level in the near field and to separate the defects from ambient noise disturbances. In case of an external noise disturbance the measurement can be repeated automatically.

For details on the hardware setup and noise attenuation achieved by using test enclosures, see section *Test Configuration / Measures and Limits / 注意：为了获得更多关于超听力技术和独立缺陷失真（IDD）的细节和背景信息，请查阅章节 附录/词汇表 /* 测量技术（理论） /异音 / Meta Hearing Technology。

注意：为了调整和优化异音检测，请查阅章节优化性能/SPL *Tests.*。

Ambient Noise.

来自产线的**环境噪声**可能影响人或自动测试仪检测异音缺陷。使用一个测试盒或测量小屋可以屏蔽测试件。然而，还可以使用另一只传声器测量远场（1 米距离）噪声以预测近场**环境噪声**电平，并分离因环境噪声干扰产生的缺陷。如果发生外部噪声干扰，测量可自动重复。

更多关于如何设置硬件和使用消音箱衰减噪声的方法，请参阅章节*测试配置/测试和门限/ 注意：为了获得更多关于超听力技术和独立缺陷失真（IDD）的细节和背景信息，请查阅章节* 附录/词汇表 / 测量技术（理论） /异音 / Meta Hearing Technology。

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Ambient Noise。

Maximal SPL

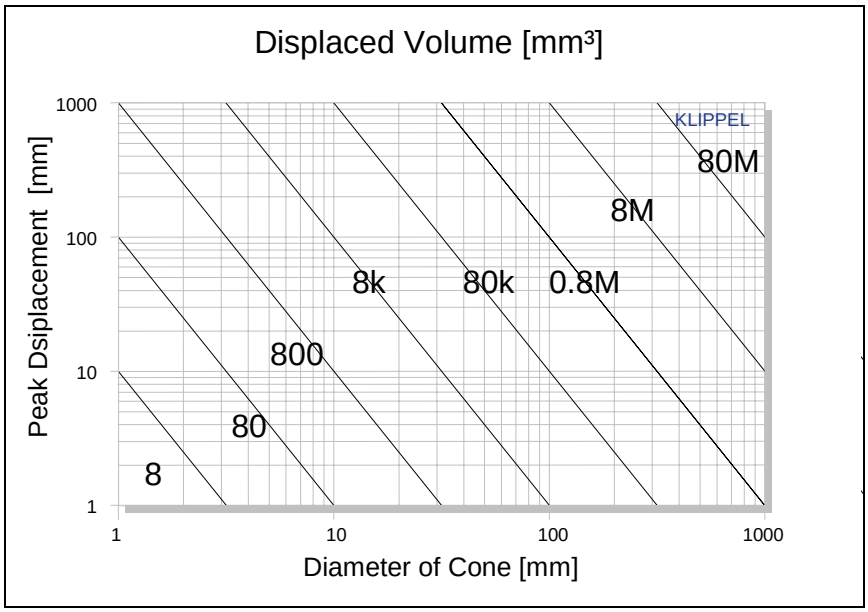
最大 SPL

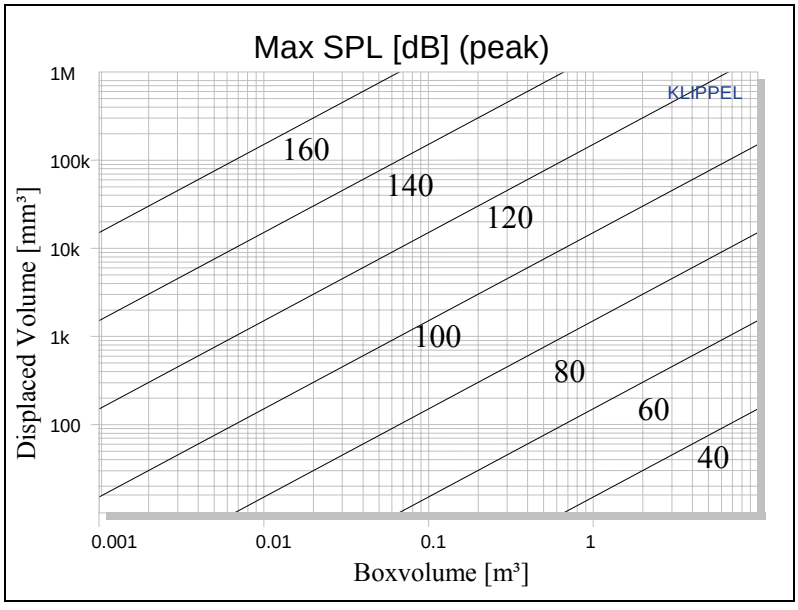
For measuring SPL in a closed test box it is essential to estimate the maximal SPL to prevent from microphone clipping and excessive distortion.

Follow the simple two-step procedure using the following 2 graphs to assess the maximal peak SPL for given peak displacement, diameter of the cone / vibrating area and testing box volume.

1. Read the displaced volume from the first graph.
2. Using the displaced volume and test enclosure volume, read the max SPL from the second graph.

Note: If the measured SPL exceeds the specified max. SPL of the microphone, a warning is generated in the *Summary* result window. See also section *Hardware / Calibration / Microphone Calibration.*





对于在消音箱中测量 SPL 来说，为防止传声器削波和过度失真，估计最大 SPL 尤为重要。

在给定峰值位移、纸盆直径或振动区域和测试箱体体积的情况下，利用下面两幅图，简单地按照下列两个步骤可估算出 SPL 的最大峰值。

1. 从第一幅图读取移位体积。
2. 利用移位体积和测试箱体体积，从第二幅图读取最大 SPL。

注：如果测量得到的 SPL 超过传声器的额定最大 SPL，则在*综述* 结果窗口中会产生一个警告。请参阅*硬件/校准/ Microphone* Calibration。

（图略）

（图略）