

全新一代
更舒适 更快速 更精确

The new generation
More comfortable – even faster – more precise



**SmartBalancer2 – Perfect
field balancing made easy**

更容易的完美现场平衡

SMARTBALANCER
2



A new dimension in comfort, speed and precision

舒适、快速和精确的全新定义

The reliability of your machines and equipment is a basic prerequisite for remaining competitive. Errors, or even breakdowns, endanger your operational processes. Among the different types of "malfunctions" more than 50% can be directly or indirectly traced back to rotor unbalance. However, through the use of precise metrology, problems can be identified quickly and damage avoided. In 1925 the first ever operational, transportable vibration measuring device was developed at Schenck - the originator of all field balancing equipment. Nowadays we are reaching new dimensions with the SmartBalancer2 in comfort, speed and precision.

您的机器和设备的可靠性是保持竞争力的一个基本的先决条件。差错甚至是故障危及着您的操作流程。超过50%的各种故障能被直接或间接的追溯为转子不平衡。然而，通过使用精确的测量方式，能够快速的问题发现和避免损失。1925年，第一台可持续运行的移动式的振动测量设备在申克诞生——所有现场平衡设备的鼻祖。现在，我们有了一个全新的舒适、快速和精确的产品SmartBalancer2。

Avoid unbalance in your operations

Although rotors are exactly balanced when new, wear and tear or operational interference leads to new unbalances occurring. The consequences are centrifugal forces and mechanical vibrations in operation which lead to premature wear and tear of the bearings, fatigue fractures and impact fractures or shaft deformation. With the SmartBalancer2, rotors, of almost any size and weight – can be quickly, inexpensively and precisely balanced while installed and without the need to dismantle your machines. Thanks to the comprehensive diagnostic possibilities, the SmartBalancer2 always keeps you up to date about the unbalance status of your machine – and keeps your processes running.

在运行中避免不平衡

尽管新转子是精确平衡好的，但磨损或运行中的干涉会导致新的不平衡的产生。其结果便是运行中的离心力和机械振动将导致轴承磨损、疲劳断裂、冲击破坏或轴变形的过早产生。使用SmartBalancer2，几乎所有尺寸和重量的转子都能在不拆卸的情况下被快速的、低花费的和精确的平衡。由于具备全面的诊断功能，Smartbalancer2能始终使您了解机器的不平衡状况和保持您的生产过程正常运行。



Operator friendly!

One handed operation with the joystick and operational keys;
Simple user interface; large, high contrast display.



感受高级的操作友好度

使用SmartBalancer2，您总会把所有事情置于完美的控制中，一切尽在掌握。通过指点杆和一些操作控制按键，一个新手都能轻易的完成所有的设备功能。开机后，您将感受到直观的操作，就像一部手机或者导航仪。易于理解的示意图形、图标和简单的文件结构遵循着广泛使用的Windows风格。高对比度的带有4色LED灯的大液晶显示屏能清晰显示您的机器的当前运行状况。

Experience advanced operator friendliness

With SmartBalancer2 you always have things under perfect control, and best of all, always at hand. All of the equipment's functions can be easily operated by 'inexperienced' personnel with the joystick and a few operational control keys. You will experience intuitive user control upon start up – just like a mobile phone or a navigation system. Comprehensible pictograms and icons and simple file structure follows the widely used Windows presentation. A large high contrast display with 4 coloured LED lamps always provide a clear indication about the current operational status of your machines.

Benefit from the complete field balancing package

Everything you need for feild balancing is included in the basic equipment : from the acceleration sensor, laser reference sensor with magnet stand through to all connection cables, power suppliers and chargers as well as USB connection cables. Further functions are available as an option, for example, a software module which analyses the roller bearing condition and reliably identifies the start of raceway damage. All of this and more makes SmartBalancer2 an indispensable low cost and high performance tool for your operation.

从完整的现场平衡功能中获益

您需要的关于现场平衡的一切都包括在基本配置中：从带有磁座的加速度传感器，激光相位传感器到所有的连接线缆，电源和充电器还有USB连接线等。高级功能作为选项出现，如滚动轴承状况的分析和轴承滚道损伤出现的可靠性鉴定。以上的所有以及更多使SmartBalancer2成为必不可少的高性价比的平衡工具。



Advantages at a glance

- A complete package at a favourable price/performance ratio
- 2 simultaneous measuring channels for efficient field balancing
- One handed operation with the joystick and operational keys; large illuminated display
- Graphic presentation of unbalance and an indicator for all measuring points
- Assessment setup according to DIN ISO 10816-3 and DIN ISO 1940
- Integrated machine diagnostic with FFT analysis
- Standardised overall vibration measurement
- Direct log sheet on a suitable printer
- Optical laser reference pickup with up to 0.5 m measuring distance
- Lithium-ion battery for a minimum of 8 hours operation time - no replacement batteries are required
- 1 GB data storage with Compact Flash
- Roller bearing diagnostic

优点一览

- 高性价比的完整整合包
- 2个用于高效现场平衡的同时测量通道
- 可单手操作的指点杆和按键，高亮的大显示屏
- 不平衡的图形显示和所有测点的指示
- 设置评定参照DIN ISO 10816-3 和 DIN ISO 1940
- 带有FFT分析的完整机器诊断功能
- 标准化的整体振动测量
- 可在匹配打印机上直接打印
- 激光相位传感器，最远测量距离0.5m
- 锂离子电池，至少8小时运行时间，无需另配电池
- 1GB CF存储卡
- 滚动轴承诊断



A tool with many talents
一个拥有许多独特功能的工具

The SmartBalancer2 contains extensive measuring and analysis functions which provide you with a valuable service during field balancing but also proves itself in the start up, servicing and maintenance of machines and equipment. From the measurement, assessment and diagnosis of the machine's status, the rollers bearing evaluation and impact test through to the filing and documentation of all results : the SmartBalancer2 has many talents above and beyond field balancing.

SmartBalancer2带有许多测量和分析功能，不仅能在现场平衡中为您提供有价值的帮助，而且能在机器设备的安装、服务和维护中证明它的价值。从测量、评估诊断机器的状况、滚动轴承诊断、撞击试验到测量结果的整理归档，SmartBalancer2拥有许多独特功能，不仅仅局限于现场平衡。

Measurement and assessment: identifying problems before they occur

Unbalance, misalignment and impending damage are exhibited as mechanical vibrations in machines. In order to quickly and accurately assess the vibration level, the limit values of the DIN ISO 10816-3 are recorded in the SmartBalancer2. You simply select the type of machine and you have the correct assessment setup at hand! The SmartBalancer2 indicates whether the machine can continue to be operated or, for example, whether the rotors must be balanced while installed.

Diagnosis of the machine's status: tracking down the cause

In order to establish the causes of vibration, the SmartBalancer2 offers a high performance dual channel FFT frequency analysis. Complex vibration occurring in the machine can be segregated into harmonised parts and be displayed with frequency and amplitude spectral lines. The causes of the vibrations can be detected using the frequencies and unbalanced rotors can be identified.

Assessment of roller bearings: for even more applications

The additional module 'bearing diagnostic' expands the possible application fields of the SmartBalancer2 further. The system, which works according to the envelope analysis, ascertains the highest signal level in the unwinding sound of a bearing – an increase suggests the start of damage to the bearing. This allows you to take appropriate measures in good time, well planned and at reasonable cost.

测量和评估：防患于未然

机器的不平衡、未对准和即将出现的损坏都表现为机械振动。为了快速而准确的评估振动的等级，SmartBalancer2中存储着DIN ISO 10816-3的限制值。您只需要简单的选取机器的类型，就能实现正确的振动评估。SmartBalancer2能指示出机器能否正常运行或者是否需要在安装的时候进行转子平衡。

机器诊断状况：追溯原因

为了确定振动的原因，SmartBalancer2提供了高性能的双通道FFT频率分析功能。机器出现的复杂振动能被分离成谐振波和显示成频率幅值谱线图。通过频率可以发现振动原因和不平衡的转子。

滚动轴承诊断：更广泛的应用

额外的“轴承诊断”模块进一步的扩展了SmartBalancer2的可应用领域。这个模块根据包络分析来工作，在轴承声音的释放中探知最高的信号等级——信号增强意味着轴承损坏的开始。这将使您及时的、按计划的、合理的采取适当的测量措施。



Professional balancing and measurement reports.

With SmartBalancer2 you can create reports and incorporate the measurement results into your office applications.

专业的平衡和测量报告

通过SmartBalancer2，您可以制作报告以及把测量结果整合到您的办公软件中



Recognising machine and installation resonance: better safe than sorry

With the measurement and graphic display of the amplitude and the phase angle of the rotational frequency vibrations as a function of the speed, the resonances of the machine and its foundation can be determined. This ensures that field balancing is undertaken at a resonance free rotational speed.

The impact test: identify danger and eliminate it

With the impact test you can determine the separate resonance frequencies of a structure. When the machine is rotating you can determine the rotational speed range at which vibrations are over-proportionally increased due to resonance and at which the machine may be subject to damage.

Filing and documenting: so simple

All of the results can be saved, together with a description of the machine, measurement points and indications of date and time, directly in the SmartBalancer2. They can then be downloaded onto a PC/laptop and incorporated in your office applications. This allows you to immediately create and print out professional balancing and measurement reports on site.

识别机器和安装中的共振：安全胜于道歉

一个测量速度的功能，通过测量和图形显示旋转频率振动的幅值和相位角度，能够判断机器和地基的共振。这将确保现场平衡在一个非共振的旋转速度下进行。

撞击试验：识别并排除危险

通过撞击试验，您能确定结构的固有共振频率。当机器在旋转，您能判断出某个旋转速度范围下超比例增加的振动是因为共振，以及多大的振动可能损坏机器。

文件整理归档：易如反掌

所有的测量结果都能连同机器描述、测点和日期时间一起保存在SmartBalancer2中。测量结果可以下载到PC或笔记本中，也可以整合到您的OFFICE软件中。这让您可以在现场直接制作和打印出专业的平衡和测量报告。

				Vibration velocity (r.m.s.) (10-1000 H z n > 600 min ⁻¹) 振动速度 (2-1000 H z n > 120 min ⁻¹)				
				D	11,00 0,43			
					7,10 0,28			
					4,50 0,18			
				C	3,50 0,14			
					2,80 0,11			
				B	2,30 0,09			
					1,40 0,06			
				A	0,71 0,03			
					mm/s inch/s			
rigid 刚性的	Flexible 挠性的	rigid 刚性的	Flexible 挠性的	rigid 刚性的	Flexible 挠性的	rigid 刚性的	Flexible 挠性的	Foundation 地基
Pumps radial,axial,mixed flow 离心泵、轴流泵、混流泵 P > 15 kW		med. sized mach. 中型机器 15 kW < P		large machines 大型机器 300 kW < P < 50 MW				
Integrated Driver 集成驱动		External Driver 外部驱动		Motors 电动机 160		Motors 电动机 315 mm		Machine type 机器类型
Group 4		Group 3		Group 2		Group 1		Group 组

DIN ISO 10816: Mechanical vibrations – assessment of the vibrations of machine through measurements on no rotating parts

DIN ISO 10816: 机械振动——通过测量非旋转部分评估机器的振动



Technical data 技术参数

Field balancing

- With prompted operator guide, integrated evaluation computer, vector indication of the unbalance and interference indicator as well as the direct printing of balancing reports and storage in the PC.
- Balancing speed: 120 to 60,000 rpm
- Number of correction planes: 1 or 2
With storage of the influence coefficient for balancing in case of repetition
- Features:
 - Summary of correction weights
 - Balancing correction at fixed locations
 - Calculation of the angular position for 2 fixed weights
 - Tape measure (exact determination of the position using a tape measure)
 - Balancing quality according to DIN ISO 1940
 - Vibration assessment according to DIN ISO 10816-3

Measuring channels

- 2 analogue channels (A & B); adjustable
 - Voltage (AC/DC, ± 30 V max.)
 - Current (AC/DC, ± 30 mA max.)
 - ICP®-Signal (2 mA, 24 V max.)
 - LineDrive accelerator sensor (10 V, 10 mA max.)
- 1 digital channel: 1+1 Pulse/speedometer (speed, trigger, key phaser)
 - Pulses & AC signals (+26 V)
- Optical laser reference sensor

Parameter measuring channels

- Frequency range: 0,5 Hz...40 kHz
- Dynamics: (measurement / total) 96 dB / 136 dB
- Sampling rate: up to 131 kHz per channel

Measurement range / accuracy

- Rotational speed: 10 ... 200,000 rpm / $\pm 0,1\%$ resp. ± 1 rpm
- Vibration displacement *: 6000 μ m (p-p) / $\pm 5\%$
- Vibration speed *: 6000 mm/s (p-p) $\pm 1\%$

- Vibration acceleration * 6000 m/s (p-p) / $\pm 1\%$
* valid for the LineDrive sensor (1μ A/ms²) and sensors providing voltage (100mV/g);
Reference point: 159.15 Hz

FFT

- 2 Hz ... 12,8 kHz
- Lines: 6400
- Windows: Hanning

Operating modes

- Dynamic balancing at 1 or 2 levels
- Parameters: vibration acceleration, speed and displacement, current, voltage (AC), bearing diagnostic, temperature, rotational speed
- Signals: spectrum (amplitude, envelope), time signal, coast down curve, impact test

Computer

- Processor: Intel Strong ARM 206 MHz

Display

- LCD, 16 greyscales, 480x320 pixel (1/2 VGA),
- Pixel range 115x78 mm; illuminated

Operator elements

- 1 joystick & 6 keys
(Zoom, Escape, Function, Help, Menu, On/Off)

Memory

- Internal RAM: 64 MB
- CompactFlash: 1 GB

USB interface

- USB host for printing
- USB slave for PC / laptop

Printing

- Direct print out of measurement reports using the USB interface
- Compatible printers: HP, Epson and other printers with USB connection

Supply

- Battery: Lithium-ion battery (7,2 V / 4,8 Ah);
Minimum 8 hours of operating time, charged in the unit

Charge power supply

- Input: 110-240 V / 50-60 Hz.
- Charging time < 5 hours, intelligent charge cycle
- Charge temperature: 0° C to 50° C

Dimensions

- 180 x 160 x 50 mm (LxWxH)

Weight

- 1,2 kg

Environment

- Protection class: IP65, dust proof and splash proof
- Temperature range: -10° C to +60° C

SMARTBALANCER²

Technical data 技术参数

现场平衡

带有提示的操作指导，整合的评估计算器，不平衡量的矢量显示和干扰指示器以及平衡报告的直接打印和PC存储

平衡转速：120至60,000 rpm

校正平面数量：1或2个，带有可储存的影响系数，用于重复平衡

特点：

- 校正重量概要
- 可在固定位置校正平衡
- 对于2个固定试重可计算其角度位置
- 可使用工业胶带测量（使用工业胶带测量可精确确定相位）
- 平衡精度参照DIN ISO 1940
- 振动评估参照DIN ISO 10816-3

测量通道

2个模拟通道（A&B）：可调

- 电压（AC/DC，±30 V最大）
- Storm（AC/DC，±30 mA最大）
- ICP®信号（2 mA，24 V最大）
- LineDrive加速度传感器（10 V，10 mA最大）

1个数字通道

- 1+1脉冲/速度计（速度、触发、主相位器）
- 脉冲和交流信号（±26 V）

激光相位传感器

参数

模拟通道

频率范围：0.5 Hz至40 kHz

动态：（测量/总共）96 dB/136 dB

采样频率：最大至131 kHz每通道

测量范围/精度

旋转速度：10 - 200,000 rpm / ± 0.1%

resp. ± 1rpm

振动位移*：6000 μm (p-p) / ± 5%

振动速度*：6000 mm/s (p-p) ± 1%

振动加速度*：6000 m/s²(p-p) / ± 1%

*仅对LineDrive传感器（1 μA/ms²）和传感器供电电压（100 mV/g）有效

参考点：159.15 Hz

FFT

2 Hz-12.8 kHz

6400线

窗口：汉宁窗

操作模式

单面或双面动平衡

参数：振动加速度、速度和位移，电流，电压（交流），轴承诊断，温度，旋转速度

信号：频谱（幅值、包络），时间信号，下降曲线，撞击试验

计算机

处理器：Intel Strong ARM 206 MHz

显示

LCD，16灰阶，480 x 320像素（1/2 VGA）

像素范围115 x 78 mm，带背光

操作元件

1个指点杆，6个按键

（放大、退出、功能、帮助、菜单、开/关）

存储

内部RAM：64 MB

CF卡：1 GB

USB接口

USB主接口用于打印

USB从接口用于PC / 笔记本电脑

打印

通过USB接口可直接打印测量报告

兼容打印机：HP、Epson及其他USB接口打印机

电源

电池：锂离子电池（7.2 V / 4.8 Ah）

待机时间8小时以上，直接充电

充电

输入：110-240 V / 50-60 Hz

充电时间：小于5小时，智能充电循环

充电温度：0°C 至 50°C

尺寸

180 x 160 x 50 mm（长 x 宽 x 高）

重量

1.2 kg

工作环境

防护等级：IP65，防尘，防泼溅

温度范围：-10°C 至 +60°C



Standard equipment 标准配置



Standard equipment

- 1 SmartBalancer2 measuring unit; with built in rechargeable battery and operator prompts in German, English, French, Spanish, Russian, Italian, Swedish, Czech, Dutch, Polish and Chinese
- 2 Acceleration sensors with:
 - 1 contact probe
 - 2 magnets for even surfaces and cylindrical surfaces
 - 2 connection cable; 5 m long
- 1 Optical laser reference sensor with
 - 1 magnetic stand, Reflective foil
 - 1 connection cable; 3 m long
- 1 CD-ROM with operator instructions, firmware equipment and utility software for the preparation of measurement results on the PC
- 1 USB connection cable for the PC; 1.5 m long
- 1 USB printer cable; 1.5 m long
- 1 mains plug and charger with UK and US adapter
- 1 hard shell case for the measuring equipment and accessories

- **Option 01**
 - 1 additional acceleration sensor with
 - 1 contact probe,
 - 1 magnet and
 - 1 connection cable approx. 5 m long
- **Option 02**
 - 1 extension cable for the acceleration sensor; 10 m long
- **Option 03**
 - 1 extension cable for the optical laser reference sensor; 5 m long
- **Option 04**
 - 2 TNC-BNC sensor adaptor
- **Option 05**
 - 1 printed and bound set of operating instructions
- **Option 06**
 - Calibration of the SmartBalancer2 at a frequency range of 5 Hz to 5 kHz with DKD calibration certificate
- **Option 07**
 - Calibration of the SmartBalancer2 with an amplified frequency range of 2 Hz to 5 kHz with DKD calibration certificate (only in combination with option 06)
- **Option 08**
 - 1 set of pocket scales; accuracy 0.1g
- **Option 09**
 - 1 kg balancing putty
- **Option 10**
 - 1 Software module for bearing diagnostic

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Standard equipment 标准配置

1个SmartBalancer2测量单元：内置充电电池和德文、英文、法文、西班牙文、俄文、意大利文、瑞士文、捷克文、荷兰文、波兰文和中文操作系统

2个加速度传感器，带有：
1个探针
2个磁座，可用于平面或曲面
2根连接电缆，5米长

1个激光相位传感器，带有：
1个磁座，一套反光标签
1根连接电缆，3米长

1张CD光盘带有操作说明，设备固件和用于将测量结果配置在PC上的实用软件

1根连接PC的USB线，1.5米长
1根USB打印线，1.5米长
1个带有适配器的充电器
1个硬质皮箱，用于携带仪器及配件

选项01

1个加速度传感器，带有一个探针、一个磁座和一根约5米长的连接电缆

选项02

1根加速度传感器延长线，10米长

选项03

1根激光相位传感器延长线，5米长

选项04

2个TNC-BNC传感器适配器

选项05

1本打印装订版操作说明书

选项06

SmartBalancer2标定，频率范围为5Hz至5kHz，带有DKD标定证书

选项07

SmartBalancer2标定，频率范围为2Hz至5kHz，带有DKD标定证书（须选配选项06）

选项08

1套口袋秤，精度0.1g

选项09

1 kg平衡胶泥

选项10

轴承诊断功能模块



