Noise Patrol

Exhaust Noise Control of Motor Vehicles

PRODUCT DATA

Road traffic is the most widespread source of noise in all countries and the most prevalent cause of annoyance and interference — all traffic noise reduction measures have the highest priority. The stationary noise is a footprint of any car, truck or motorcycle and it's noise limits are set by the EU Directive and/or national legislation.

The noise emission may change during the life time of the vehicle or due to unauthorized change of the exhaust system. Regular checks of noise emission is a logical consequence.

Noise Patrol provides ali-in-one and easy-to-use system designed for automatic measurement of exterior exhaust noise from road vehicles under stationary conditions, with simultaneous fully integrated RPM detection. The system documents results and enables printout of reports on the spot.

USES AND FEATURES

Uses
Measurement of exterior exhaust noise levels from motorbikes, cars, trucks and mopeds under stationary conditions (engine sweep test) with integrated RPM measurement control.

Features

- IEC and ANSI Type 1 Sound Level Meter Brüel & Kjær Type 2250-L
- Non-contact measurements of engine RPM by computing the engine speed from the acoustic signal of the exhaust noise
- Automatic procedure according to 70/157/EEC and ISO 5130
- Full Standard compatibility
- Complete measurement and result traceability with print-out and stored data
- Acoustic detection of engine RPM for 2- and 4-stroke engines, gasoline and diesel, from 1 to 24 cylinders
- OBD 2 interface, external Tacho interface (AVL) and inductive clamp interface
- Suitable for use by a single operator
- Battery operated
- Intuitive setup and measurement flow through iPod smart device with touch display
- Remote control of the SLM for calibration and measurements
- Simultaneous measurement and display of noise level and engine RPM
- Integrated printer for printout of results for instantaneous reporting
- Guided measurement with integrated requirements to help use the system according to the legislation

IMS MEASUREMENT SYSTEMS

INTRODUCTION

The Directive on Motor Vehicles 70/157/EEC: "Permissible Sound level and the exhaust system of motor vehicles" and its amendments describe a measurement procedure to facilitate subsequent checks on vehicles in use.

In addition, ISO 5130 specifies a test procedure, environment and instrumentation for measuring the exterior exhaust sound levels from road vehicles under stationary conditions, providing a continuous measurement of exhaust system sound level over a range of engine speeds (engine sweep test).

Noise Patrol is based on a Sound Level Meter (SLM) and is especially designed to automate measurement workflow as much as possible.

Noise Patrol is the efficient tool for vehicle noise checks. The kit is based on Brüel & Kjær Type 2250 Sound Level Meter connected to a smart device through wireless technology.

WHAT'S SO SPECIAL?

User friendly solution
By design, the system ensures correct and repeatable measurements using visual guidance and complete instructions during measurements without the need for in-depth knowledge of ISO 5130.

Convenience of on-the-spot printout
Measurement and printout for the customer are all produced and completed on the spot. Printout can be customized in terms of design and content.

Standard compliance
All the procedures are made to comply with standards allowing the operator to actually focus on performing measurements.

Type approved by PTB for EN 61672 Class 1
Using Brüel & Kjær type 2250 best in class instrument in terms of performance, accuracy and reliability, customer and operator can be confident that the system delivers the most accurate results in just the fraction of time.

Database
Measurement data and Meta-data are automatically stored within the system database (including vehicle information, operator information and settings used) with Passed/failed verdict.

Database connectivity
Upon request the system can be connected and integrated into other database systems easily with complete control over what data and in which form is transferred between databases.

System intelligence
ISO 5130 testing procedure is rather complex to execute with complete compliance. So the system is aware of the difficulty of choosing the right RPM detection method, so an intelligent measurement flow has been added via »Guided measurement«.

Integrated system update feature
The system has wide and extensive development roadmap set in place. And every system can easily take advantage of that through automated update feature with no need for hardware change.

Market and legislation adaptability
Various markets require different Sound levels and tests that can be easily implemented in the Noise Patrol and fully customized.

WHO SHOULD USE NOISE PATROL

- **Vehicle noise inspectors, police officers, race track noise inspectors**

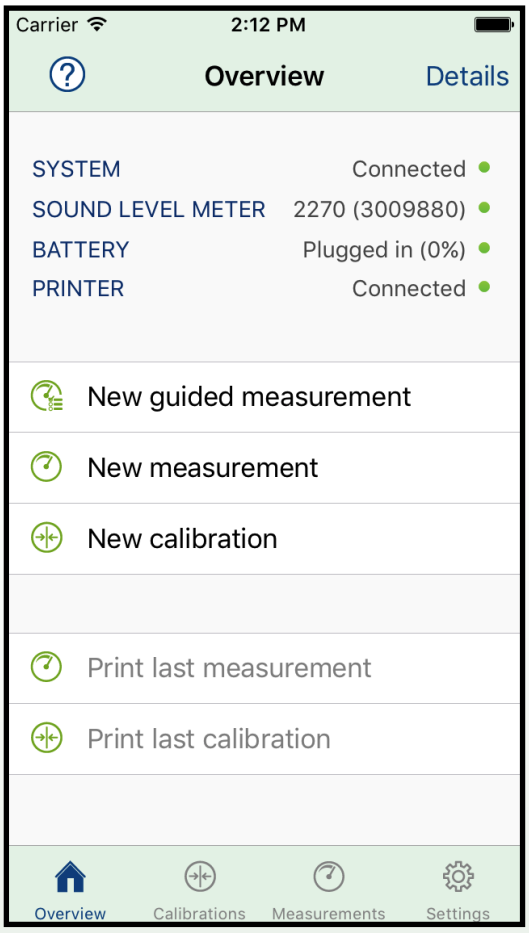
  The system is designed for vehicle noise inspectors, police officers or race track noise inspectors performing noise checks quickly and accurately on trucks, cars and motorcycles - and documenting the results.

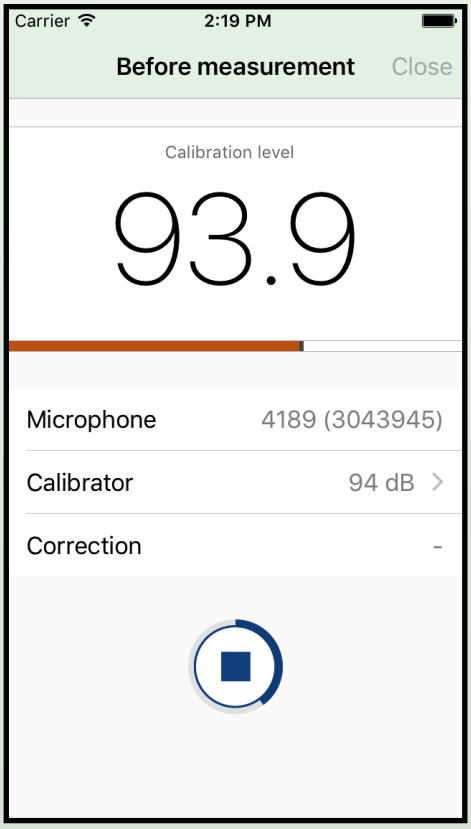
- **Exhaust R&D and production testing**

  The Noise Patrol system can also be used in the development or production testing steps for motor vehicle exhaust systems.

- **Car/motorcycle/truck production line testing**

  Noise Patrol can assist vehicle manufacturers performing final checks prior to customer delivery.





CALIBRATION

The system assists the operator in calibrating the Sound Level Meter. Once the calibration menu has been selected, you only have to insert the microphone into Type 4231 Sound Level Calibrator and activate calibration. The results can be printed for official reports.
Calibration procedure is also a part of each measurement—before a measurement can be started and after each measurement to ensure traceability and accurate results.

MEASUREMENT PROCEDURE

Settings
Before starting a measurement these different parameters have to be entered through the Settings menu:

- Vehicle category
- License plate/VIN
- Engine Type
- Number of strokes (2 or 4 stroke)
- Number of cylinders
- Number of exhausts
- Noise Limit
- Target RPM: set at three-quarters or half of the engine's rated maximum net power, as stated by the manufacturer.
- RPM detection method
- Vehicle Info
- Operator

Noise Patrol is an evolution of the popular and reliable exhaust noise measurement system, Exhaust Noise Inspector Type 3638. One of the most appraised features of the Noise Inspector was the ability to measure noise and monitor vibration through exhaust sound analysis. Noise Patrol is based on the technology of acoustic detection, which was the distinguishing trait of the Noise Inspector.
Noise Patrol covers all the vehicle exhaust noise measurement requirements by the legislation and individual demands of various markets or local legislations. The RPM can be obtained in four ways: 1) Acoustical detection, 2) OBD II 3) External tachometer (e.g. AVL), 4) Spark clamp.
These four options enable the system to work with both newer and older car models. Most importantly all options are simple to set-up and easy to use in full compliance with the ISO 5130 standard.

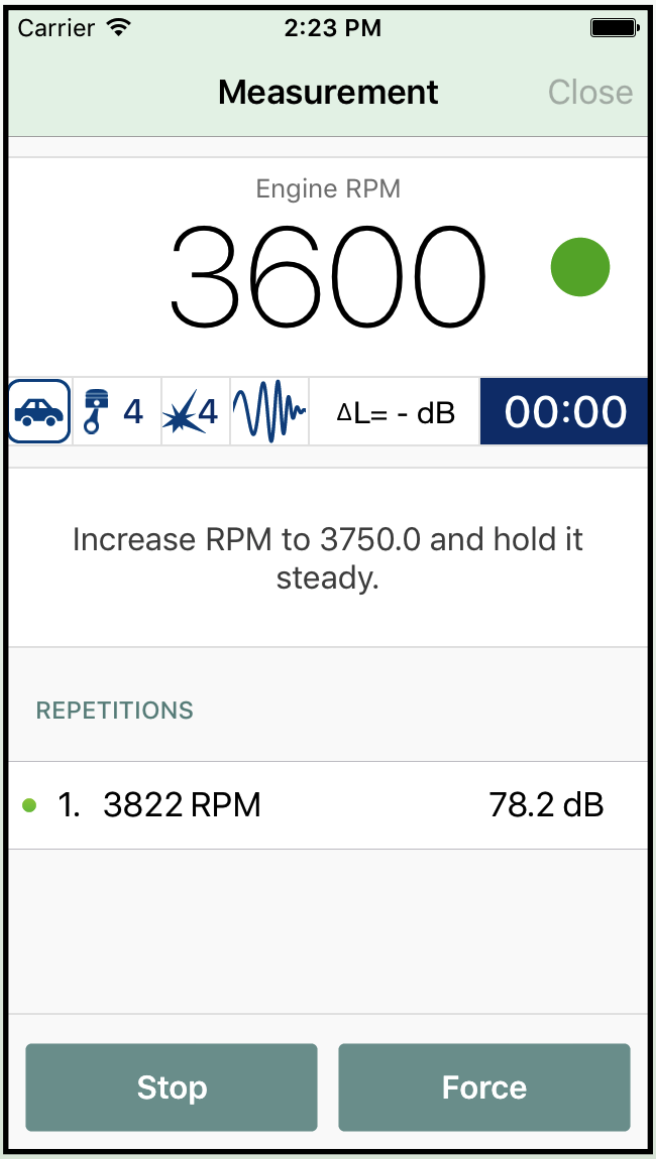
Acoustical Detection
IntelliRev
Noise Patrol is based on the experience with acoustical detection enabling the development of a new special algorithm, *IntelliRev*. The cars have changed and *IntelliRev* is the answer. It improves performance, provides faster detection and better overview to perform the measurement task faster, more effectively and with better indication.

OBD II
Modern cars are changing material technologies in engines, changing the exhaust to produce different noise making the RPM measurements more difficult. All those cars however have one thing in common. They all have an interface for diagnostics that provides the RPM parameters. Since the protocol is standardised, all modern cars can be measured this way.

External Tachometer
When acoustic detection is not possible, the tachometer AVL DiTest Speed 2000 is recommended. The AVL DiTest Speed 2000 offers the most universal RPM analysis device spanning everything from motorcycles and cars to trucks.

Spark clamp
It is used on 1- and 2-cylinder motorbikes, by clamping it around the ignition coil cable or the current cable of electronic distributor, detecting the spark signal of ignition systems.

Automatic calibration and background measurement is followed by a set of steps guiding user through the measurement process seamlessly and effortlessly with all the instruction on the screen with complete control over measurement process.



Making a measurement according to ISO 5130

STEP 1
Unlock iPod by pressing home button twice. Launch Noise Patrol app by tapping its icon.

Tap **New guided measurement**. The app will guide you through the measurement process.

Once you get comfortable using the system and the app, you can also choose **New measurement** – this option enables experienced users faster measurement execution, but leaves more room for human error.

STEP 2
Before a measurement sequence can begin, specific measurement parameters must be defined, which determine the type of vehicle to be tested, target RPM and the maximum sound level to which the exhaust system must comply.

Swipe up to reach all the settings.

To set a setting tap the corresponding row.

Tap **Next** when done.

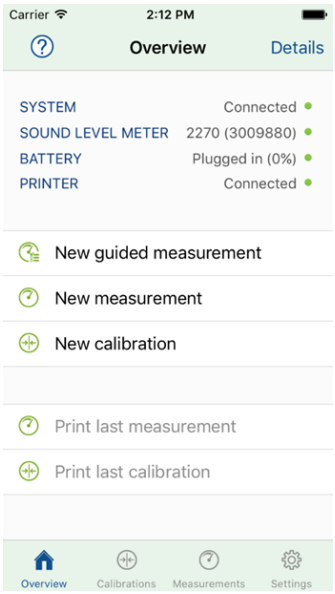
STEP 3
A checklist appears. Follow each instruction individually. After you are done, tap the instruction to check it off. To get additional instructions tap **HOW?**

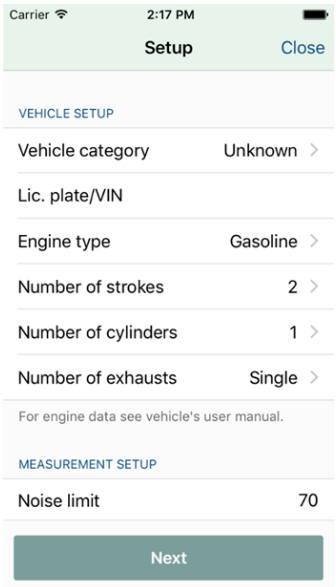
After you checked off all the instructions, tap **Continue**.

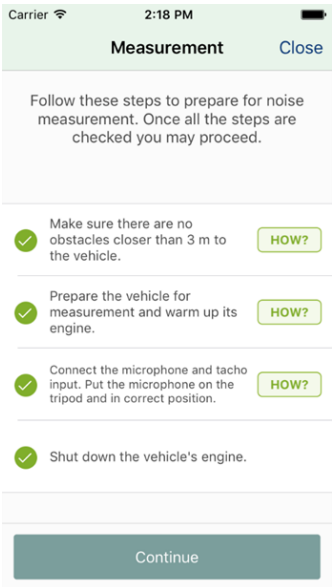
STEP 4
Once you reach this screen you only need to rev the engine and release the throttle in accordance with instructions on the screen. This will result in one repetition being completed.

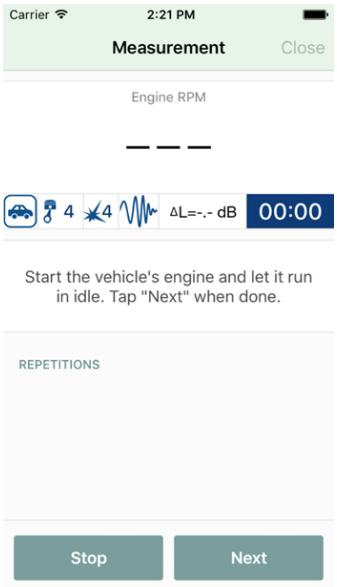
By default, you need to complete three consecutive repetitions with sound levels that are within 2 dB.

After the measurement is completed, **Measurement report** is shown.









SPECIFICATIONS

These specifications apply to the Noise Patrol solution used with a Type 2250-L Sound Level Meter, fitted with the supplied microphone, preamplifier and extension cable.
Note: Specifications that apply only to the SLM are shown in italics in the following specification.

STANDARDS:
Noise Patrol conforms with the following:

- *IEC/EN 61672 - 1:2002 Class 1*
- *IEC 60651 Type 1, 1979 & Amendment 1 1993 & Amendment 2 2000*
- *EN 60651 Type 1*
- *EN60804 Type 1*
- *ANSI S1.4 - 1983 Type S1*
- *ANSI S1.43 - 1997 Type 1*

Measurements of exhaust sound levels emitted by stationary road vehicles according to ISO 5130 and 70/157/EEC:
Standards:

- ISO - 5130:2007
- SAE J1492: 2008–10, Measurement of Light Vehicle Stationary Exhaust System Sound Level Engine Speed Sweep Method
- SAE J2825: 2012–11, Measurement of Exhaust Sound Pressure Levels of Stationary On-Highway Motorcycles
- SAE J1287: 2008–05, Measurement of Exhaust Sound Pressure Levels of Stationary Motorcycles
- Directives and Regulations: 70/157/EEC, Reg. 41 (Australia), ADR 83/00 (Australia), Canadian Reg., Swiss Reg., Reg. 168/2013 (EU)
- USA: J2567 – Snow mobile

NATIONAL LEGISLATION:

- Germany: DIN ISO 5130 Methode für die Messung des Standgeräusches von Strassenfahrzeugen; 70/157EWG, 2/97/EWG, 96/20/EG, ECE-R 63, 78/1015/EWG, 97/24/EG, 1999/101/EC
- France: Arrêté du 18 juillet 1985 relatif au contrôle au point fixe du niveau sonore des véhicules; 70/157/EEC□

SUPPLIED MICROPHONE
Type 4950 Prepolarized Free-field 1/2'' Condenser Microphone Nominal Sensitivity: -26dB re 1V/Pa or 50mV/Pa
Frequency Range: 6.3Hz to 20kHz ± 2dB
Capacitance: 12.5 pF (@250 Hz)

MICROPHONE PREAMPLIFIER
ZC 0032

EXTENSION CABLE
5m (10 m option) in length

MEASUREMENT RANGES
Dynamic Range: From typical noise floor to max. level for a 1 kHz pure tone signal, A-weighted: 16.4 to 140 dB

RPM ACOUSTIC (*IntelliRev*) MEASUREMENTS RANGE

- 2 or 4 stroke
- Number of cylinders: 1, 2, 3, 4, 5, 6, 8, 10, 12, 16, 24
- 400< RPM measurement capabilities< 13000 for 1, 2, 3, 4 cylinders
- 400< RPM measurement capabilities< 7000 for 5, 6, 8, 10, 12 cylinders
- Accuracy: better than 2 %

OPTIONAL RPM SOLUTIONS
Tachometer AVL DISPEED 2000

- Passenger vehicles or trucks:
  Petrol engine 400-8000 RPM, Resolution: 10 RPM
  Diesel engine 400-8000 RPM, Resolution: 10 RPM
- Motorbikes:
  2 -stroke engine 900-8000 RPM, Resolution: 10 RPM
  4 -stroke engine 600-8000 RPM, Resolution: 10 RPM

Any Tachometer with interface connects to the outside connector of the suitcase via adapter.

SLM REMOTE CONTROL
The smart device manages the Sound Level Meter Type 2250 setup, measurements and measured values according to the above standards, automatically, via the wireless interface

SMART DEVICE□
Apple iOS (ver. 10+) device running Noise Patrol app.

TACHOMETER CONNECTION
'Plug and play'

CALIBRATION
Automatic, using Sound Level Meter calibrator Type 4231, via the Noise Patrol app.

PRINTED DATA
Measurement data are automatically printed, or printing is manually selected via the main menu. The data consists of the following:

- Logo
- Type of printout
- License place/VIN
- Measurement date
- Equipment used for measurement:
- SLM type and serial number
- Microphone type and serial number
- Calibrator type and serial number
- Measurement data
- Background noise
- Target RPM
- Repetitions, each with measured noise level and RPM
- Result level
- Verdict: Passed/Failed

TACHOMETER INTERFACE AND CABLING
Tachometer cable (length 4 m) connected to the system on the side connection panel.

OBD II Interface (optional)
For the purpose of Exhaust Noise measurement full range RPMs are extracted directly from the car's on-board computer. The interface is connected via LEMO socket located on the side connection panel.

SETTLING TIME
From power-on: <60s

BATTERY
LiFePo4 battery 12V/12Ah. Lifetime (at room temperature): typically >12h of power supply for the system without external tachometer

LANGUAGE
Each instrument is loaded with English, Slovene, Dutch and Thai texts. New languages can be added – please contact IMS d.o.o.: info@ims.si.

EXTERNAL DC BATTERY CHARGER
Voltage: Regulated 12 to 14,6V
Power: Approximately 5A at 14,6V, 2 pin LEMO plug

PHYSICAL CHARACTERISTICS
Size (L×W×H): 474 x 415 x 149 mm (18.6 x 16.3 x 5.9")
Weight: Type i305, 9.1 kg (20 lb 1 oz.) (including SLM, calibrator, printer, tape measure, spark clamp).

CE C-Tick	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand
Safety	EN61010-1 and IEC61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL3111-1: Standard for Safety - Electrical measuring and test equipment
EMC Emission	EN/IEC61000-6-3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC61000-6-4: Generic emission standard for industrial environments. CISPR22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device.
EMC Immunity	EN/IEC 61000–6–1: Generic standards – Immunity for residential, commercial and light industrial environments EN/IEC 61000–6–2: Generic standards – Immunity for industrial environments EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements
Temperature	IEC 60068 – 2 – 1 & IEC 60068 – 2 – 2: Environmental Testing. Cold and Dry Heat. Operating Temperature: –10 to +50°C (+14 to +122°F) Storage Temperature: –25 to +70°C (–13 to +158°F) Effect of Temperature: <0.5 dB (–10 to +50°C)
Humidity	IEC 60068 – 2 – 78: Damp Heat: <0.5 dB for 30% <RH <90% (non-condensing at 40°C, 1 kHz)

ORDERING INFORMATION

Type i305	Noise Patrol Unit with acoustical RPM detection Software

Included with the Type i305 Noise Patrol Unit

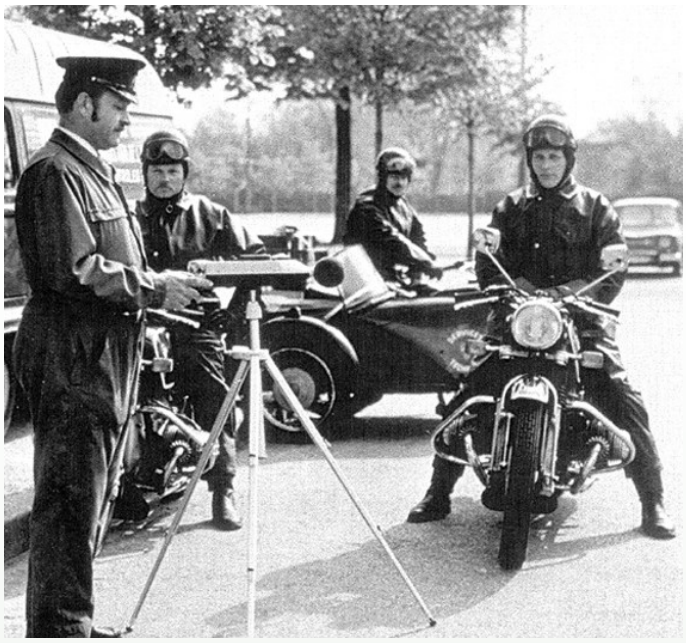
NP-i720-01	Noise Patrol Application Software
NP-0315	Smart Remote Control with pre-installed Noise Patrol Application
NP-0588	UA-0588 Bruel&Kjaer ½" Microphone holder
NP-1236	UA-1236 Bruel&Kjaer Microphone protection
NP-0697-D050	Microphone Extension cable 5m
NP-0200	Measuring tape
NP-0060	Graphic printer
NP-1101-A	Suitcase with Accessories

Components ordered separately

2250-L-100	Sound Level Meter 2250 L
4231	Acoustic Sound Calibrator
NP-0697-D100	Microphone Extension cable 10m
NP-2000	RPM analyzer, AVL DiTest Speed 2000
NP-0237	ELM-0327 - OBD II interface
NP-1678-05	Printer Paper, 58mm (5 extra rolls)

Services

2250-L-CAF	2250-L Accredited calibration
4231-CAF	4231 Accredited calibration
NP-0492-CAL	AVL DiSpeed RPM meter Traceable calibration
NP-2000-CAL	AVL DiTest 2000 Traceable calibration
I305–CAL	Noise Patrol System Calibration



NOISE PATROL

Vehicle noise inspectors, police officers or race track noise inspectors
The system is designed for vehicle noise inspectors, e.g. police officers or race track noise inspectors, performing noise checks quickly and accurately on trucks, cars and motorcycles—and documenting the results.

Exhaust R&D and production testing
The Noise Patrol system can also be used in the development or production testing steps for motor vehicle exhaust systems.

Car/motorcycle/truck production line testing
Noise Patrol can assist vehicle manufacturers performing final checks prior to customer delivery.

Noise Patrol fits the requirements for portable units:

- Autonomous operation
- Rugged design
- Quick setup
- Weather-proof
- Database storage
- Customised printout on the spot

Sound and Vibration Solutions - in cooperation with Brüel & Kjær

IMS is a company dedicated to solutions based on Brüel&Kjær measurement platforms.

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