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 all-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 print-out of reports on the spot.

**PRODUCT DATA**

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**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 Type 2250L
- 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 12 cylinders
- OBD 2 interface and external Tacho interface
- Suitable for use by single operator
- All in one suitcase
- Battery operated
- Intuitive setup and measurement flow through Ipod smart device with touch display
- Remote control of the SLM, for setup, and measurements
- Simultaneous measurement and display of noise level and engine RPM
- Integrated printer for print out of results for instantaneous report
- Integrated camera for documentation
- GPS for geo-tacking
- Local database and upload to central database
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 measure of exhaust system sound level over a range of engine speeds (engine sweep test).

Noise Patrol is based on a Sound Level Meter (SLM) especially designed to automatically perform the complete measurement procedure.

**WHAT’S SO SPECIAL?**

**Wholesome and complete solution**
By design, the system ensures correct and repeatable measurement using visual guidance and complete instruction during measurement with no other knowledge required.

**Convenience of on-the-spot printout**
Measurement and printout for the customer are all produced and completed on the spot. Printout can be customised 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.

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

**Database connectivity**
System can be connected and integrated into other database system easily with complete control over what data and in which form they are stored.

**Geo-tagging**
Information on the location of performed measurement is stored together with measurement. This allows for a smart measurement identification and query with viewing on map capability.

**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 customised.
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 has to be entered through the Settings menu:

- Vehicle type
- License plate
- Engine Type
- Number of strokes (2 or 4 stroke)
- Number of cylinders
- Noise Limit
- RPM detection: set at three-quarters or half of the engine's rated maximum net power, as stated by the manufacturer.
- Operator
- RPM Tolerance [%]

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 is 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 three ways: 1) Acoustic detection, 2) External tachometer or 3) OBD RPM interface. These three options enables 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 both noise and RPM in the ISO 5130 standard.

**Acoustic Detection**

*IntelliRev*

Noise Patrol is based on the experience with acoustic 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.

**External Tacho**

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

**OBD RPM interface**

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

The procedure first measures the background noise. The sequence is started by operating the throttle so that the engine speed gradually increases from idle to the engine speed corresponding to the trigger RPM value, with help from the RPM Indicator. Then the speed should be held constant for 1 to 2 s. Finally, the throttle should be released rapidly and the engine speed allowed to return to idle. The SLM will measure from the time the RPM trigger occurs, until the engine has returned to idling position. This sequence is generally repeated 3 times, but can be modified, if required.
SPECIFICATIONS

These specifications apply to the Noise Patrol solution used with a Type 2250L 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
- SAEJ1297: 1998-07, Measurement of Exhaust Sound Levels of Stationary Motorcycles

NATIONAL LEGISLATION:
- Germany: DIN ISO 5130 Methode für die Messung des Standgeräusches von Strassenfahrzeugen; 70/157EWG, 2/97/EWG, 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
m 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
- 200< RPM measurement capabilities< 13000 for 1, 2, 3, 4 cylinders
- 200< RPM measurement capabilities< 7000 for 5, 6, 8, 10, 12 cylinders
- Accuracy: better than 2 %

OPTIONAL RPM SOLUTIONS
Integrated tachometer AVL DISPEED 492
- 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
  2-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. 5+) 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:
- Engine RPM trigger
- Number of cylinders
- Type of engine
- Date/time
- Measurement values
- Criteria level
- Lmax or Laverage
- Pass/Fail criteria
- SLM serial number

TACHOMETER INTERFACE AND CABLING
Tachometer cable (length 4 m) connected to the system on the front plate

OBID II Interface (optional)
The NP-0327 is design to act as a bridge between On Board Diagnostic ports and PC. For the purpose of Exhaust Noise measurement full range RPMs are extracted directly from the car on board computer. The interface is connected via USB socket installed on the side connection panel.

SETTLING TIME
From power-on: <60s

BATTERY
LiFePo battery 12V/10Ah. Lifetime (at room temperature): typically >12h Power supply for SLM and external tachometer

LANGUAGE
Each instrument is loaded with English, German, French, Italian and Spanish text.

EXTERNAL DC BATTERY CHARGER
Voltage: Regulated 12 to 14,6V
Power: Approximately 5A at 14,6V, 3 pin LEMO plug FGG 1B.

PHYSICAL CHARACTERISTICS
Size (L×W×H): 474 x 415 x 214mm (18.6 x 16.3 x 8.4“)
Weight: Type i305, 8 kg (13 lb 2 oz.) (excluding SLM, calibrator, and tachometer).
C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand

<table>
<thead>
<tr>
<th>Safety</th>
<th>EMC Emission</th>
<th>EMC Immunity</th>
<th>Temperature</th>
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<tbody>
<tr>
<td>EN61010-1 and IEC61010-1: Safety requirements for electrical equipment for measurement, control and laboratory use.</td>
<td>EN/IEC61000-6-3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC61000-6-4: Generic emission standard for industrial environments.</td>
<td>EN/IEC 61000-6-1: Generic standards – Immunity for residential, commercial and light industrial environments</td>
<td>IEC 60068-2 – 2 – 1 &amp; 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: &lt;0.5 dB (–10 to +50°C)</td>
<td>IEC 60068 – 2 – 78: Damp Heat: &lt;0.5 dB for 30% &lt;RH &lt;90% (non-condensing at 40°C, 1 kHz)</td>
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<tr>
<td>Noise Patrol - Vehicle Exhaust Noise</td>
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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-2085 Tripod for Exhaust measurement
- NP-0588 UA-0588 Brüel & Kjær ½” Microphone holder
- NP-1236 UA-1236 Brüel & Kjær Microphone protection
- NP-0200 Measuring tape
- NP-1101-A Suitcase with Accessories

#### Components ordered separately
- 2250-L-100 Sound Level Meter 2250 L
- 4231 Acoustic Sound Calibrator
- NP-0697-D050 Microphone Extension cable 5m
- NP-0697-D100 Microphone Extension cable 10m
- NP-0492 AVL Dispeed 492 RPM unit
- 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
- 2250-L-CAL 2250-L Accredited calibration
- 4231-CAL 4231 Accredited calibration
- NP-0492-CAL AVL DiSpeed RPM meter accredited calibration
- NP-2000-CAL AVL DiTest Speed 2000 Traceable calibration
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Sound and Vibration Solutions - in cooperation with Brüel & Kjær

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

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