Seminar for Smoke Meter , Gas Analyzer and RPM tester

Model : Brain Bee OPA 300 , MGT 300 EVO & AGS 690

Present By : David Lim Siow Wei

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Cautions and Warnings

RISK OF SMASHING

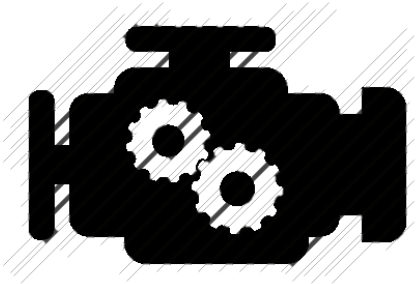
If the vehicles are not correctly secured by means of mechanic devices, the operator might get smashed against a working bench or against a wall. Even the equipment placed on unstable supports might fall and squash the operator's limbs.

SAFETY MEASURES:

- Make sure the vehicle has been secured by pulling the hand brake and locking the wheels.
- Make sure the equipment has been positioned on a stable support and, in case of trolley, that its wheels have been locked before use.

Cautions and Warnings

RISK OF INJURY



Engines, both working and in standstill, include moving parts (belts or other parts) which might injure hands and arms. In the vehicles, the cooling fan starts automatically by means of a temperature sensor even when the engine is off; always pay attention when operating close to it and disconnect it if needed.

SAFETY MEASURES:

- When the engine is turned on, do not put hands into the moving parts area.
- When operating close to electrically started fans, let the engine cool down beforehand and then remove the fan plug from the engine.
- Keep the testing tools connection cables far from the engine moving parts.

Cautions and Warnings

RISK OF FIRE OR EXPLOSION

When carrying out operations on the fuel system (injectors, fuel and gasoline pump, etc.) there is risk of fire or explosion due to the fuels employed and/or vapours formed by them.

SAFETY MEASURES:

- Disable start.
- Let the engine cool down.
- Do not use free flames or sparks sources.
- Do not smoke.
- Collect the outflowing fuel.
- Start the aspiration units in closed premises.

Cautions and Warnings

RISK RELATING TO NOISE LEVEL

During measurements on the vehicle, noise levels can exceed 90dB. Such noise levels can be reached with ultrasonic cleaning or with the vehicle's engine high rpm.
If a person is exposed to such noise sources for a long period of time, this can cause irreversible hearing damage.

SAFETY MEASURES:

- The operator shall adopt personal protective equipment (safety ear muffs).
- The operator shall also protect from noise the working stations close to the areas where test on the vehicle.

Cautions and Warnings

RISK RELATING TO DANGEROUS VOLTAGE

Civil or industrial electric power distributions, as well as vehicles electric systems, do imply dangerous voltages. When an operator is in contact with testing tools or live parts of the engine, risk of electrocution exists. For instance, this might be caused by cables with damaged insulation (ex. Bites of animals on power cords).
This is especially true of the vehicle starting system and testing tools connections.

SAFETY MEASURES:

- Connect the testing tools to an electric socket safety relay and correctly grounded.
- For the testing tool connection, use exclusively the cables provided with the tool itself, making sure insulation is not damaged.
- Make sure the testing tool is grounded before turning it on.
- When carrying out interventions on the electrical system of a vehicle (connection of testing tool, replacement of starting system parts), supply voltage shall be unplugged (ex. battery).
- During checks and setting operations with the engine turned on, attention shall be paid to avoid touching those vehicle live components (for instance the starting system) without the suitable precautions (for instance insulating gloves).

Cautions and Warnings

RISK OF INTOXICATION

The pipes that are used for exhaust gases sampling if subject to high temperatures (exceeding 250 °C or due to fires) release a highly toxic gas which, in case of inhalation, can be harmful for health.

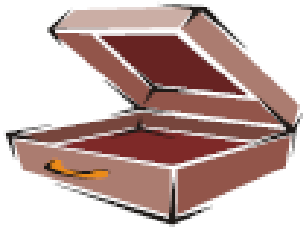
SAFETY MEASURES:

- In case of inhalation, immediately contact a doctor.
- To remove combustion residues wear neoprene or PVC gloves.
- Fire residues can be neutralized with a calcium hydroxide solution. This leads to the formation of calcium fluoride that can be removed with water.

Cautions and Warnings - Equipment

3.3.4 WHEN THE INSTRUMENT IS NOT USED

- Turn off all the power switches or unplug the power cable when the instrument is not to be used for a long period of time..



- It is advisable to store the instrument in its case if it is not going to be used for a long period of time.

3.3.5 CLEANING

- When necessary, clean the outer surfaces with neutral detergents and a soft, slightly damp cloth. Do not use detergents containing spirits, ammonia or petrol.

Cautions and Warnings - Equipment

When using the tool, the following operations are not allowed as they might cause, under certain circumstances, danger for persons and cause permanent damage to the tool itself.

- Do not remove or make unreadable labels, signs and/or dangers signs placed on the tool and in the area nearby.

- Do not disable the machine safety devices

- Use exclusively original fuses with the required ampere capacity! In case of electric supply anomalies, the machine shall be powered off immediately. Defective fuses shall not be repaired or excluded but replaced with fuses of the same type.

- The machine electrical connections shall be inspected at regular intervals. Defects, such as slackened connections or burnt cables or cables with damaged insulation, shall be immediately removed and replaced.

- Non authorized personnel must not open the equipment. Within the tool there are parts that, if touched, can cause electrocution: power off before opening the tool to carry out repair operations.

Emission from ??

THE CONDITIONS FOR COMBUSTION

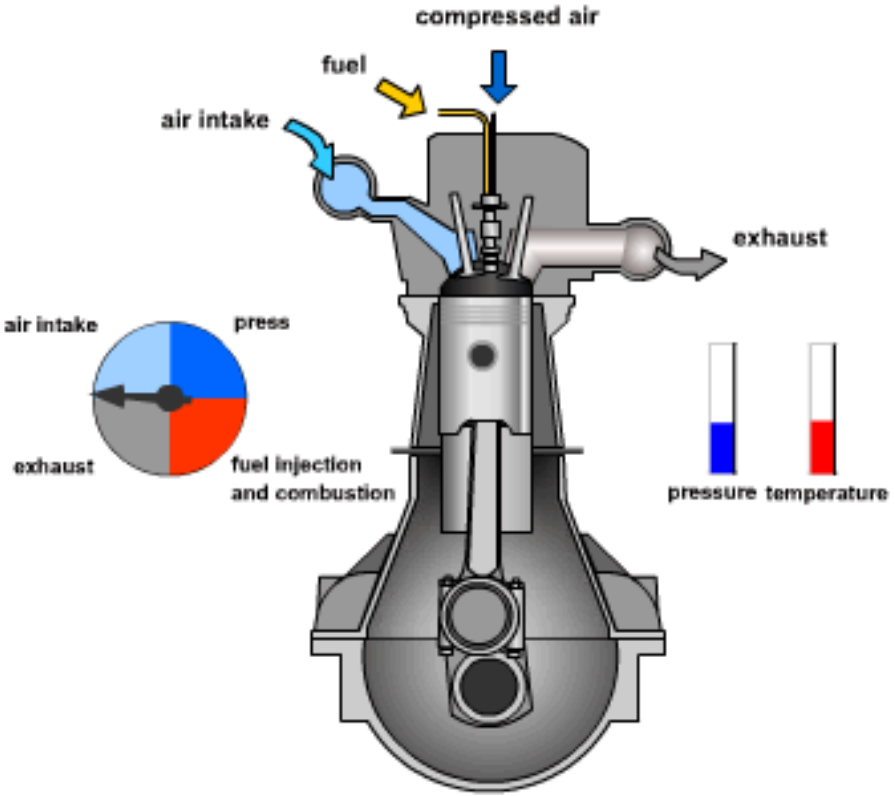
Fuel

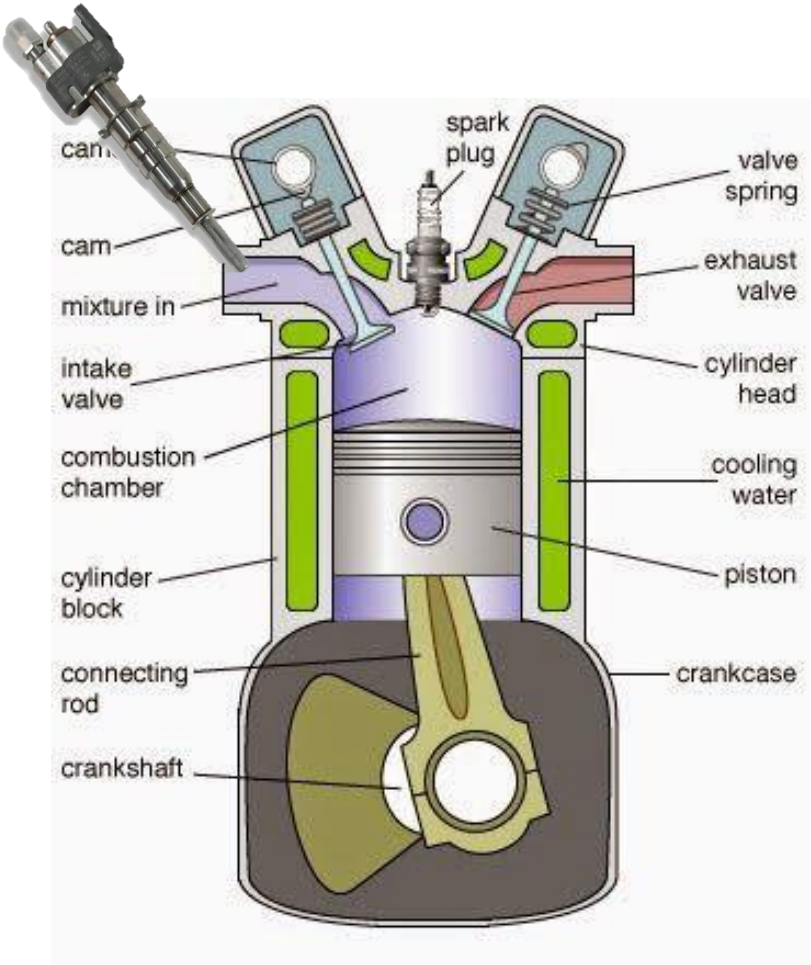
Oxygen

Ignition

The 3 elements for a successful combustion

Basic knowledge of engine

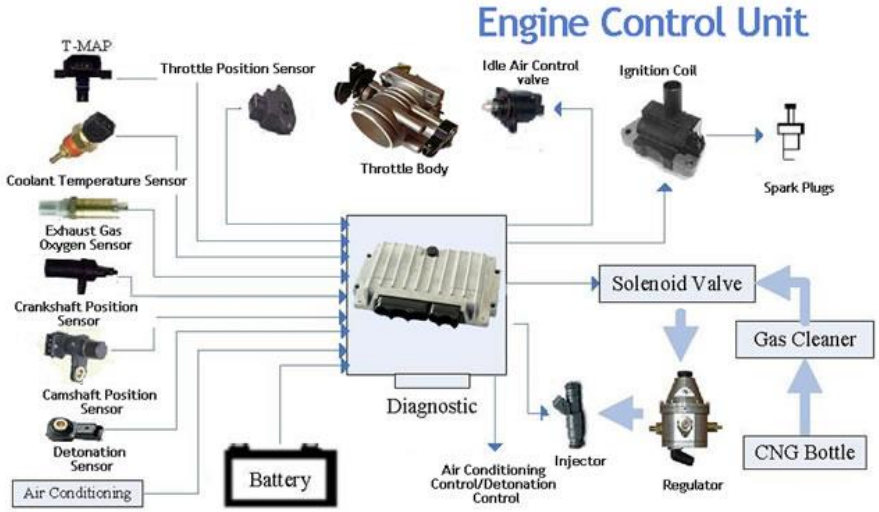




Why emission increase??

Why emission increase??

- ***Engine design***
- ***Fuel quality***
- ***Component faulty***
- ***Maintenance***

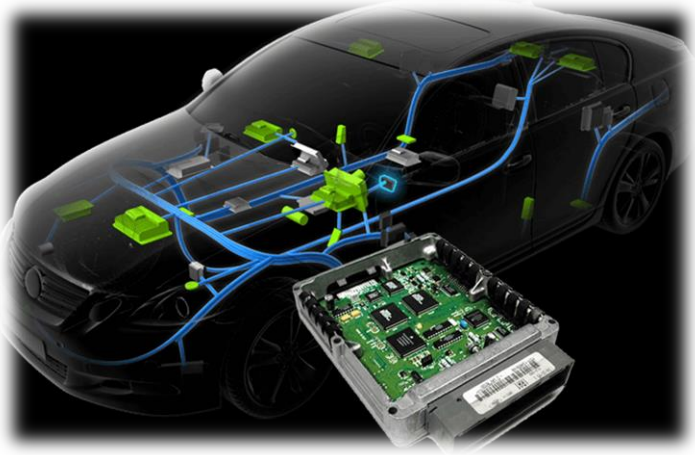


Perfect combustion = Less emission

Basic knowledge of engine

•air-fuel ratio

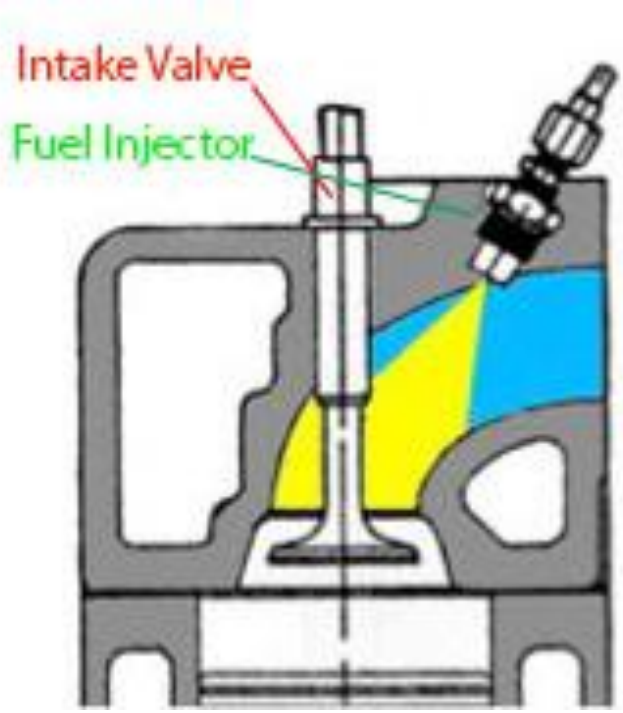
Mechanical type Injector



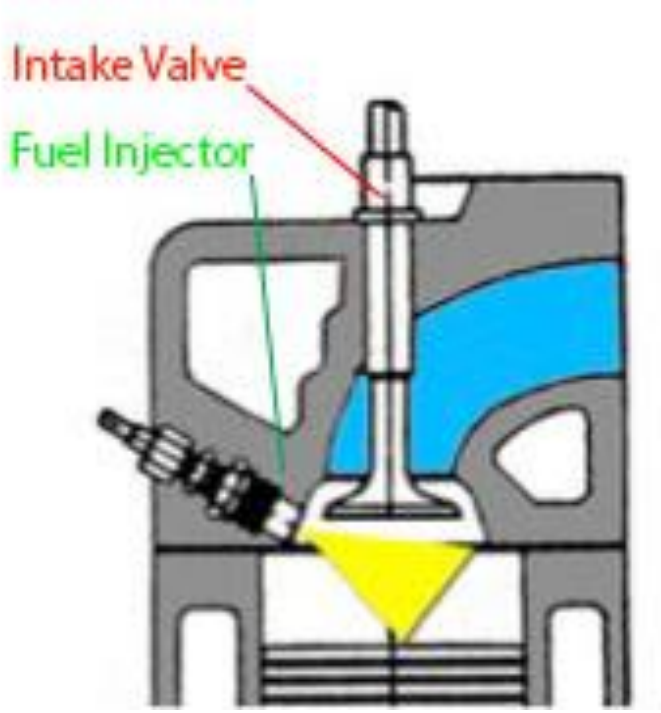
Electrical type Injector

Injection type

Port (old) Fuel Injection



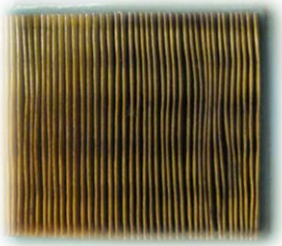
Direct (New) Fuel injection



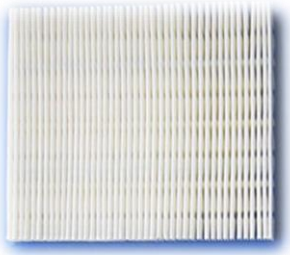
Component issue

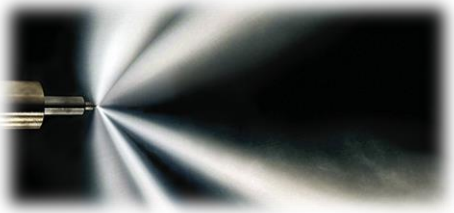
Maintenance issue

Without Maintenance

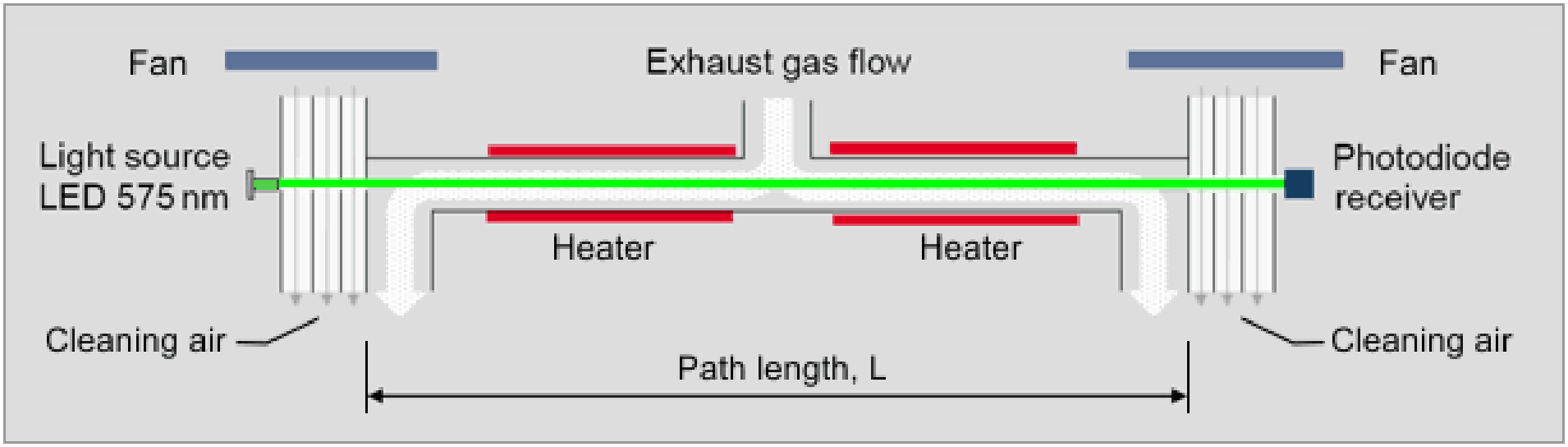


With well Maintenance





Function description



40% opacity

55% opacity

Function description

CHAP. 6 - TECHNICAL FEATURES

Smoke meter type (partial flow; total flow etc.): **Partial flow**
Model name: **OPA-300**
Display and user interface: **PC** or **AGS-688**

Measuring ranges:

Opacity	from 0 to 99.9 %
Resolution 0,1 %	
Coefficient k	from 0 to 9,99 m^{-1}
Resolution 0,01 m^{-1}	
Accuracy	+/-0,05 m^{-1}
Linearity:	+/-0.1 m^{-1}
Repeatability:	+/- 0.1 m^{-1}
Revolution counter	from 300 to 9990 1/min.
Resolution 10 1/min	
Engine oil temperature	from 20 to 150 °C
Resolution 1 °C	
Exhaust smoke temperature	from 20 to 400 °C
Resolution 1 °C	
Actual length of measuring chamber	200 mm
Chamber actual length tolerance	+/-0,5 mm
Response time filter	1000 ms

Conditions of use:

Ambient temperature	from 0 to 40° C
Pressure	from 85 to 102,5 kPa
Maximum humidity of ambient air	90 %
Maximum temperature of exhaust gas	400° C
Supply voltage	11-15 Volts DC
Absorbed current	1A DC, 5A DC with heaters on
Dimensions (width-height-depth)	360x281x288 mm
Weight	5 Kg.

Light source details

Green LED diode	
Peak wavelength spectrum	565 nm +/-30nm
Automatic adjustment of drive current	

Photoreceiver details:

Measuring range	420nm - 675
Signal maximum wavelength	565 nm

Electric response time	1 s
Physical response time with 10mm probe	0,14 s
Physical response time with 27mm probe	0,08 s

Other features
Measuring and automatic monitoring of chamber pressure
Automatic monitoring of chamber temperatures @ 90° C

3.3 TECHNICAL FEATURES

Measurement field:

Opacity	between 0 and 99.9 %	Res. 0.1
Opacity	between 0 and 9.99 m-1	Res. 0.01
Rpm counter	between 300 and 9990 rpm	Res. 10
Oil Temp.	between 20 and 150 °C	Res. 1
Smoke Temp.	between 20 and 400 °C	Res. 1

- Green LED diode light source
- Photodiode light receiver
- Measurement chamber pressure automatic check
- Measurement chamber temperature automatic check
- Slides cleaning system automatic check
- Ambient temperature automatic check
- Calibration of opacity channel with reference optical filter
- Automatic Autozero
- Heating time at 20 °C - 5 minutes.
- Dirty slides automatic check
- Rpm counter pulses reception, by wire or radio - wireless
- Oil temperature input for PT100, or by radio - wireless
- Serial connection RS 232
- Network serial connection 485
- Power supply 12 Volt DC
- Consumption 1A DC, 5A DC with heating on
- Working temperature ranging between 5 and 40 °C
- Size 200 x140 x 430 mm
- Weight 5 Kg

Standard

Organisme désigné par
le Ministère chargé de l'industrie

LABORATOIRE NATIONAL DE MÉTROLOGIE ET D'ESSAIS

CERTIFICAT D'EXAMEN DE TYPE

N° LNE-34741 rév. 0 du 19 novembre 2018

Délivré par : Laboratoire national de métrologie et d'essais

En application : Décret n° 2001-387 du 3 mai 2001 modifié, arrêté du 31 décembre 2001 et arrêté du 22 novembre 1998 relatif à la construction, au contrôle et à l'utilisation des opacimètres et la décision n°17.00.852.001.1 du 4 janvier 2017 autorisant la délivrance de certificats d'examen de type d'opacimètres conformes à la norme NF R 10-025 : 2016

Délivré à : MECALAN - Actiparc des 3 Routes Rue Jean Monnet
FRANCE - 49120 - CHEMILLE EN ANJOU

Fabricant : MECALAN - Actiparc des 3 Routes- Rue Jean Monnet - FRA - 49120 - CHEMILLE EN ANJOU

Concernant : les opacimètres type OPA-300

Caractéristiques : les caractéristiques de l'instrument sont définies en annexe au présent certificat.

Valable jusqu'au : 18 novembre 2028

Les principales caractéristiques et conditions d'approbation figurent dans l'annexe ci-jointe qui fait partie intégrante du certificat d'approbation et comprend 21 page(s). Tous les plans, schémas et notices sont déposés au Laboratoire national de métrologie et d'essais sous la référence de dossier DCF22/P181790-1

cofrac
CERTIFICATION DE PRODUITS ET SERVICES
Accréditation n°5-0012
Liste des sites accrédités et portée disponibles sur www.cofrac.fr

Etabli le 20 novembre 2018
Pour le Directeur Général
Thomas LEMMATZSCH
Responsable du Pôle Certification Instrumentation et Technologies de l'Information

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Siège social : 1, rue Gaston Boissier - 75724 Paris Cedex 15 • Tél. : 01 40 43 37 00 - Fax : 01 40 43 37 37
info@lne.fr • lne.fr • RCS Paris 313 320 244 - NAF : 7120B - TVA : FR 92 313 320 244

Ministero delle Infrastrutture e dei Traspor
DIPARTIMENTO PER I TRASPORTI, LA NAVIGAZIONE,
GLI AFFARI GENERALI ED IL PERSONALE
DIREZIONE GENERALE TERRITORIALE DEL CENTRO
Centro Superiore Ricerche e Prove Autoveicoli e Dispositivi
Via di Settebagni, 333 - 00139 ROMA - Tel. 06872881

Roma, li 18 FEB

CERTIFICATO di OMOLOGAZIONE

- Visto l'articolo 80 del decreto legislativo del 30 Aprile 1992, n. 285 *(Nuovo codice della strada NC*
- Visto l'articolo 241 del regolamento di esecuzione e attuazione del NCdS;
- Visto il DM 23 ottobre 1996, n. 628 pubbl. sulla G.U. n. 293 del 14/12/96;
- Vista la Circolare 6 Settembre 1999 n. 88/95 e successive modifiche ed integrazioni;
- Vista la Circolare prot. RU n° 79298 del 11 agosto 2009, (protocollo di comunicazione MCTCNET2) e successive modifiche ed integrazioni;
- Vista la domanda pervenuta in data 06.08.2013 della società **Brain Bee S.p.A.** con Parma, intesa ad ottenere l'aggiornamento dell'omologazione dell'attrezzatura tipo:

OPA-300
opacimetro per autoveicoli e motoveicoli

- Visto il verbale n°457/AT/b/NET2/16/RM del 15 dicembre 2016;

SI DICHIARA AGGIORNATA L'OMOLOGAZIONE

del tipo di attrezzatura sopra specificata, le cui caratteristiche sono state accertate confo documentazione tecnica allegata alla domanda ed alle prescrizioni di legge con la ste verbale citato.
Gli esemplari prodotti dovranno essere conformi al tipo omologato e portare su targhetta la c

OM00293EST003b/NET2

Per l'attrezzatura di cui sopra è autorizzato il rilascio della dichiarazione di cor congiuntamente al libretto metrologico.
Per ogni esemplare di tale attrezzatura si dovrà annotare, su apposito registro con num progressiva e relativa data, le dichiarazioni di conformità rilasciate.
La presente omologazione ha validità temporale illimitata fatta salva l'entrata in vigore d non congruenti con quelle sopraindicate.

IL DIRETTORE
Dott. Ing. Graziano TABELLI

Prüfstelle für Abgasmessgeräte

DEKRA

Gutachten über die Anwendbarkeit eines Drehzahlerfassungssystems

im Rahmen der Abgasuntersuchung nach § 29 StVZO

Antragsteller:
Brain Bee S.p.A.
Via Quasimodo 4/a
I – 43126 Parma (Italy)

Gerätehersteller:
Brain Bee S.p.A.
Via Quasimodo 4/a
I – 43126 Parma (Italy)

Gerätetyp: MGT-300 EVO

Gegenstand der Prüfung:

Das in der Anlage beschriebene Gerät ermöglicht die Drehzahlmessung an Fahrzeugen mit Otto- und Dieselmotor.
Untersucht wurde die Einsatzmöglichkeit des BrainBee MGT-300 EVO zur Drehzahlmessung im Rahmen der Abgasuntersuchung nach Anlage VIIIa - Nr. 6.8.2.1, StVZO (§ 29 StVZO)

Ergebnis der Prüfung:

Das Messgerät BrainBee MGT-300 EVO ist zur Drehzahlerfassung an Fahrzeugen mit Otto- bzw. Dieselmotor im Rahmen der Abgasuntersuchung (Untersuchungspunkt Motormanagement/Abgasreinigungsysteme) nach Anlage VIIIa - Nr. 6.8.2.1, StVZO (§ 29 StVZO) geeignet. Der Anschluss an ein zur AU zugelassenes Messgerät ist prinzipiell möglich.

Anlage: Gerätebeschreibung BrainBee MGT-300 EVO

Das Gutachten besteht aus 3 Seiten

DEKRA Automobil GmbH
Prüfstelle für Abgasmessgeräte

Stuttgart, den 02 Juli 2014

Dipl.Ing.(FH) Th. Ost

Stempel

Gutachten ohne Unterschrift und Stempel haben keine Gültigkeit. Die Gutachten dürfen nur unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung durch DEKRA Automobil GmbH, Prüfstelle für Abgasmessgeräte.

BRAIN BEE

On 26 April 2001, from the merger of two companies in the automotive sector

BRAIN BEE


AGS-688
OPA-300
BrainBee
AUTOMOTIVE


AGS-690
OPA-300
BrainBee
AUTOMOTIVE


BrainBee
AUTOMOTIVE
CO
CO2
HC
O2
λ/NOx
RPM
AGS-688
AGS-688
BrainBee
AUTOMOTIVE


TRO-220
BrainBee
AUTOMOTIVE


800
80
MGT-300 EVO
BrainBee
AUTOMOTIVE

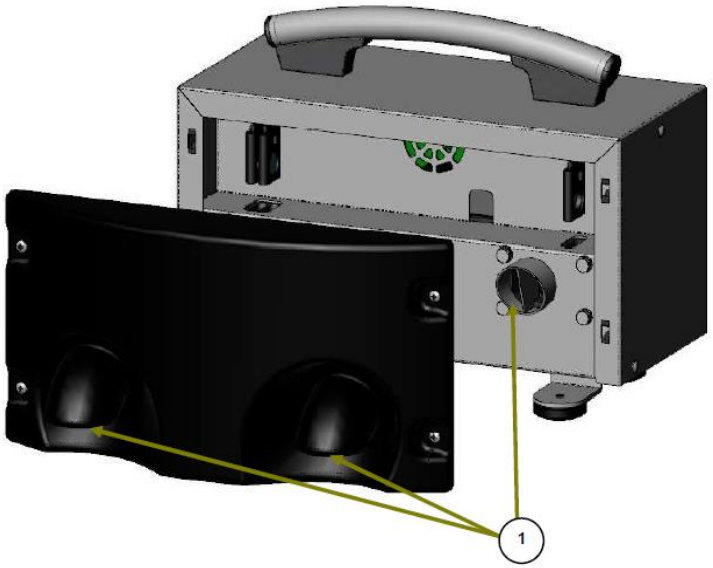
BRAIN BEE - MAHLE

MAHLE is a leading international development partner and supplier to the automotive industry as well as a pioneer and technology driver for the mobility of the future.

Founded: December 1, 1920, Stuttgart, Germany
Revenue: 12.58 billion EUR (2018)
CEO: Jörg Stratmann (Feb 1, 2018–)
employees: 77,015

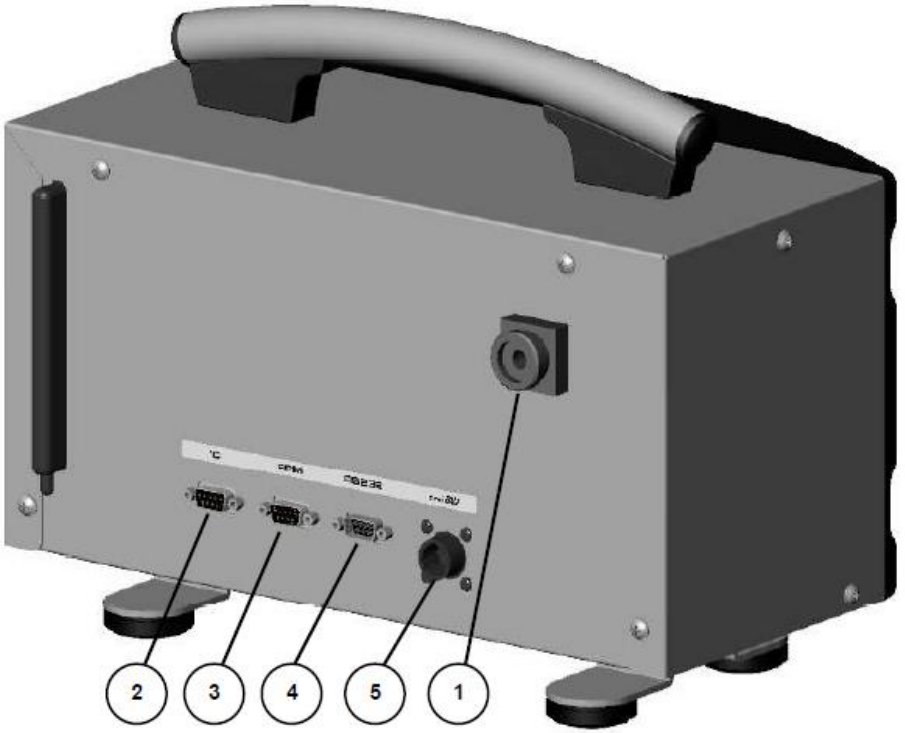
Hardware Description

5.2 Front view



1) SMOKE OUTLET

5.3 Rear view and supplied accessories



1) SMOKE INLET
2) ENGINE TEMPERATURE SENSOR INPUT
3) ENGINE RPM SENSOR INPUT
4) SOCKET FOR RS-232 SERIAL LINK
5) 12 Vdc POWER SUPPLY AND RS485 COMMUNICATION WITH omniBUS INSTRUMENTS

Hardware Description

5.3.1 ACCESSORIES PROVIDED WITH THE TOOL

The OPA-300 is equipped with the following accessories:

FUMES SAMPLING PROBE WITH HOSE

PROBE TERMINAL TYPE 1

PROBE TERMINAL TYPE 2

SAMPLE OPTICAL FILTER

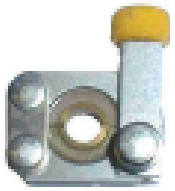
Hardware Description

Characteristics and advantages of the extensible probe PF-035

- ✓ Designed for use on heavy-duty and industrial vehicles with vertical exhaust system.
- ✓ Extensible rod – from 1.2m to 3m
- ✓ Adjustable swivel probe tip that can be easily and quickly adapted to all types of exhaust systems
- ✓ Probe tip clamp can be opened for easier positioning
- ✓ It can be used on all Brain Bee smoke meters

Length of probe hose: 3.5 m
Tip diameter: 27 mm

Hardware Description

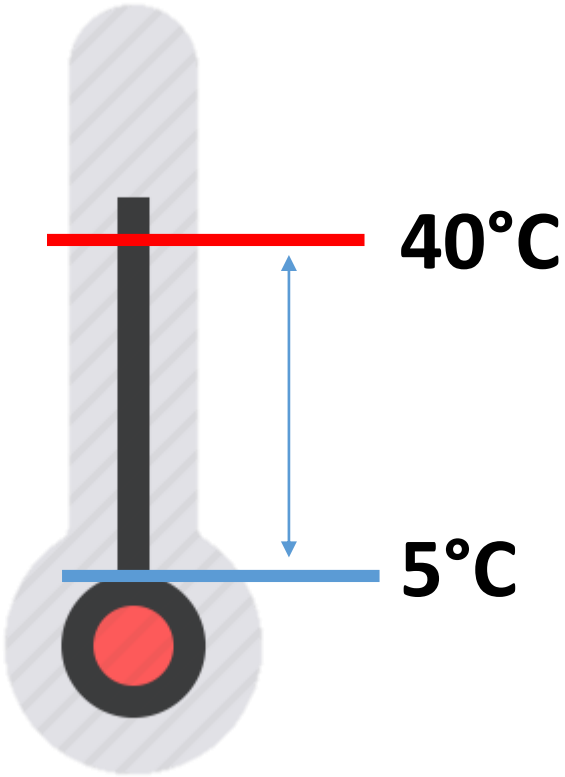
	**RPM-030:** Rpm measuring cable for piezo sensor for OPA-300 Length 6 m.
	Piezo sensor to measure diesel engine rpm. **TSD-010** (Ø 6 mm.) **TSD-020** (Ø 6,5 mm.) **TSD-030** (Ø 7 mm.)
	**ST-050:** Temperature probe.

Standard Operation Procedure
Pre-Operational Procedure

Before beginning the test

Check that:

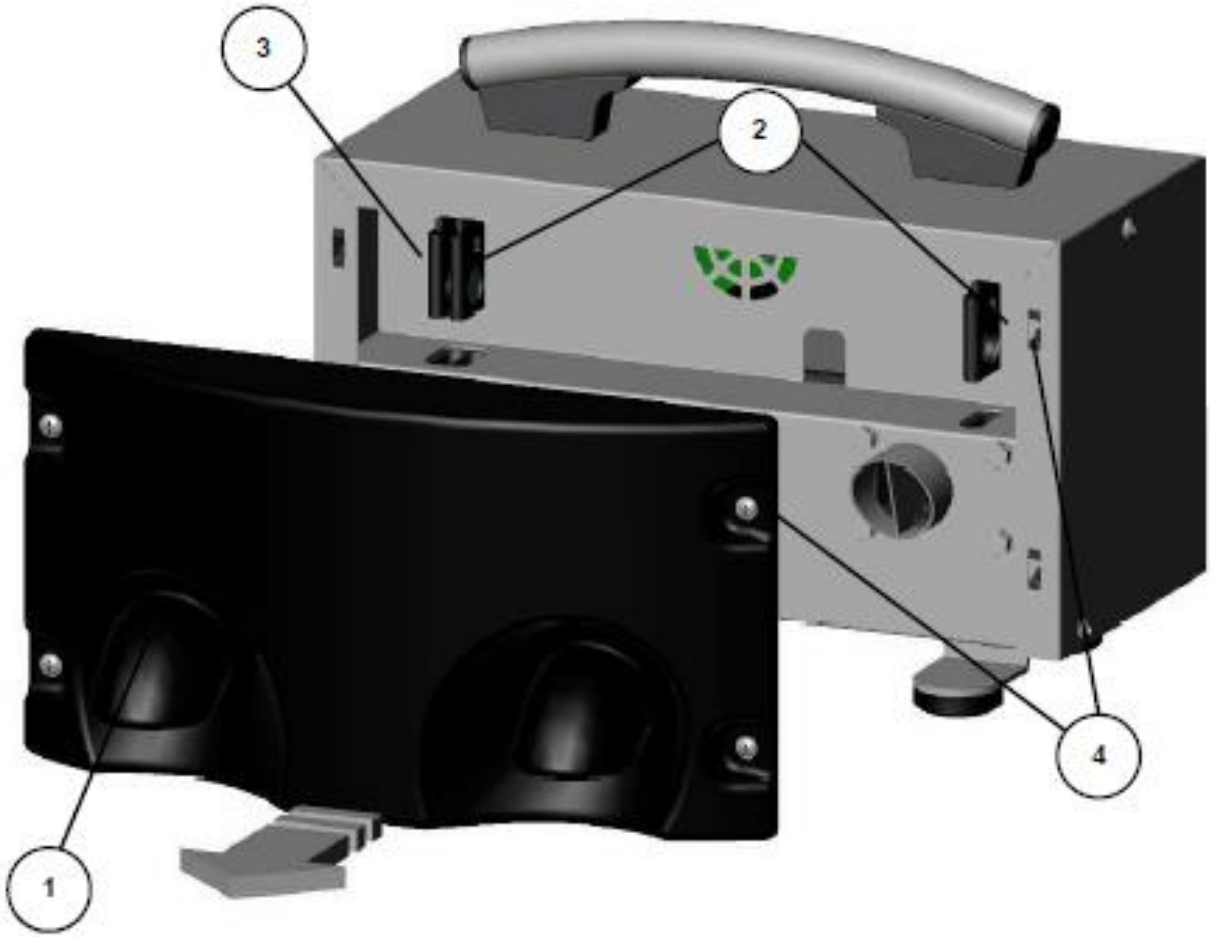
- **The ambient temperature is between 5 and 40° Centigrade.**



Standard Operation Procedure
Pre-Operational Procedure

8.1 Filtering system cleaning

The protection glasses are extremely important as they protect the receiver and projector lenses from dirt; for this reason, they must always be thoroughly cleaned as required by the tool.



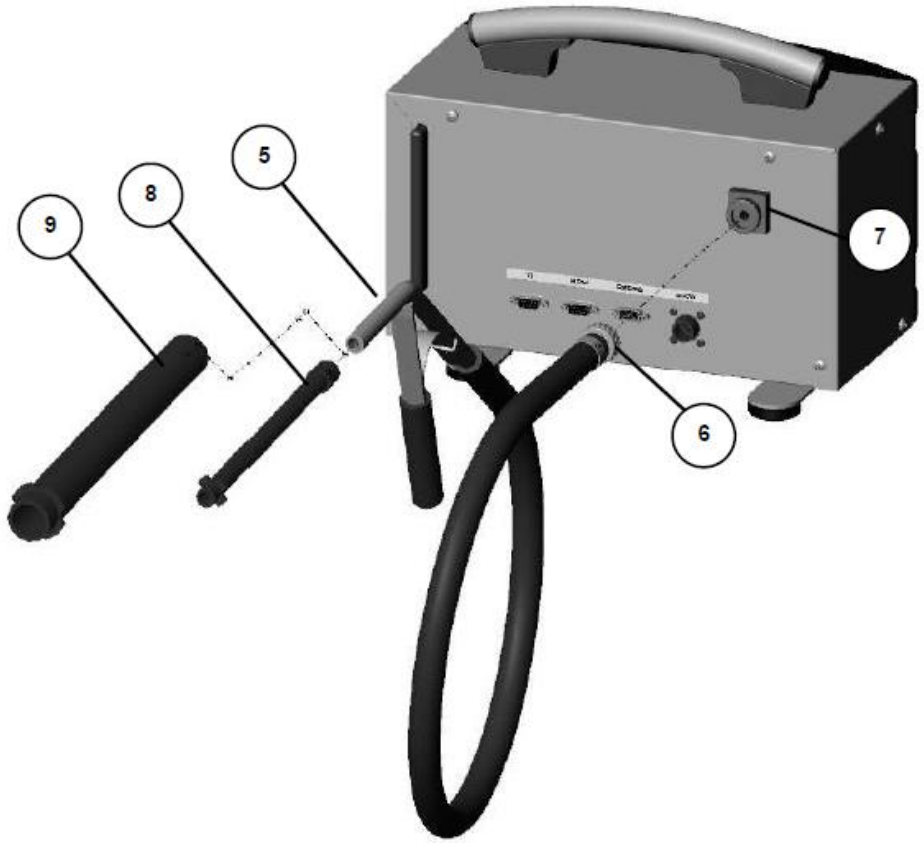
Standard Operation Procedure
Pre-Operational Procedure

IMPORTANT INFORMATION ABOUT OPERATING SAFETY

Standard Operation Procedure

Step 1

Connect the suitable Probe to smoke Meter.



Take the fumes sampling probe (5) and fit in the union (6), then screw it (6) to the fumes inlet connection (7), inserting the gasket as well. According to the specific requirements, use the 10 mm (8) or the 27 mm (9) sampling terminal. To use the 27 mm probe, you need to first disassemble the 10 mm probe.

Standard Operation Procedure

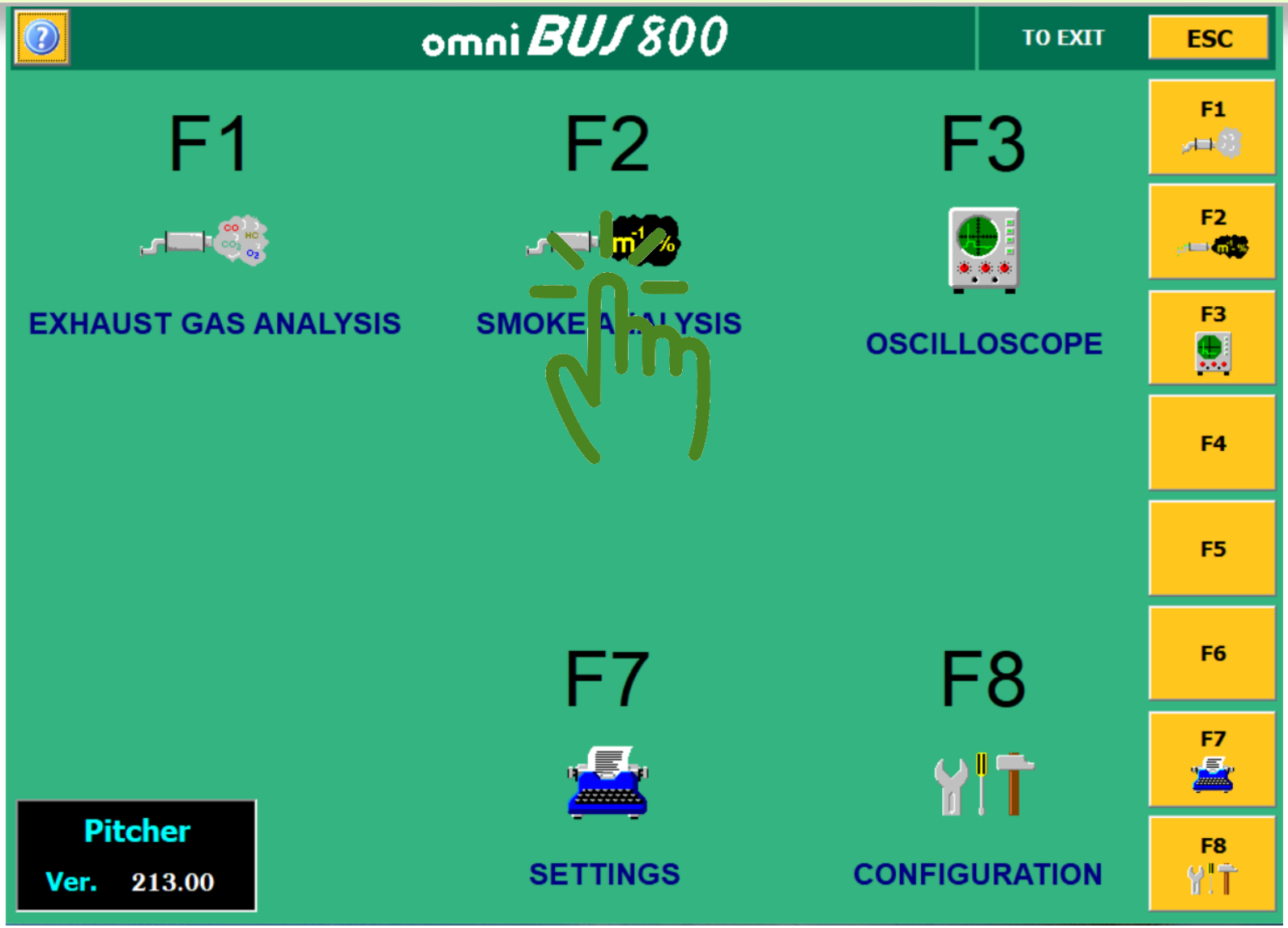
Step 2

Connect the power source- 12VDC and all devise communication.

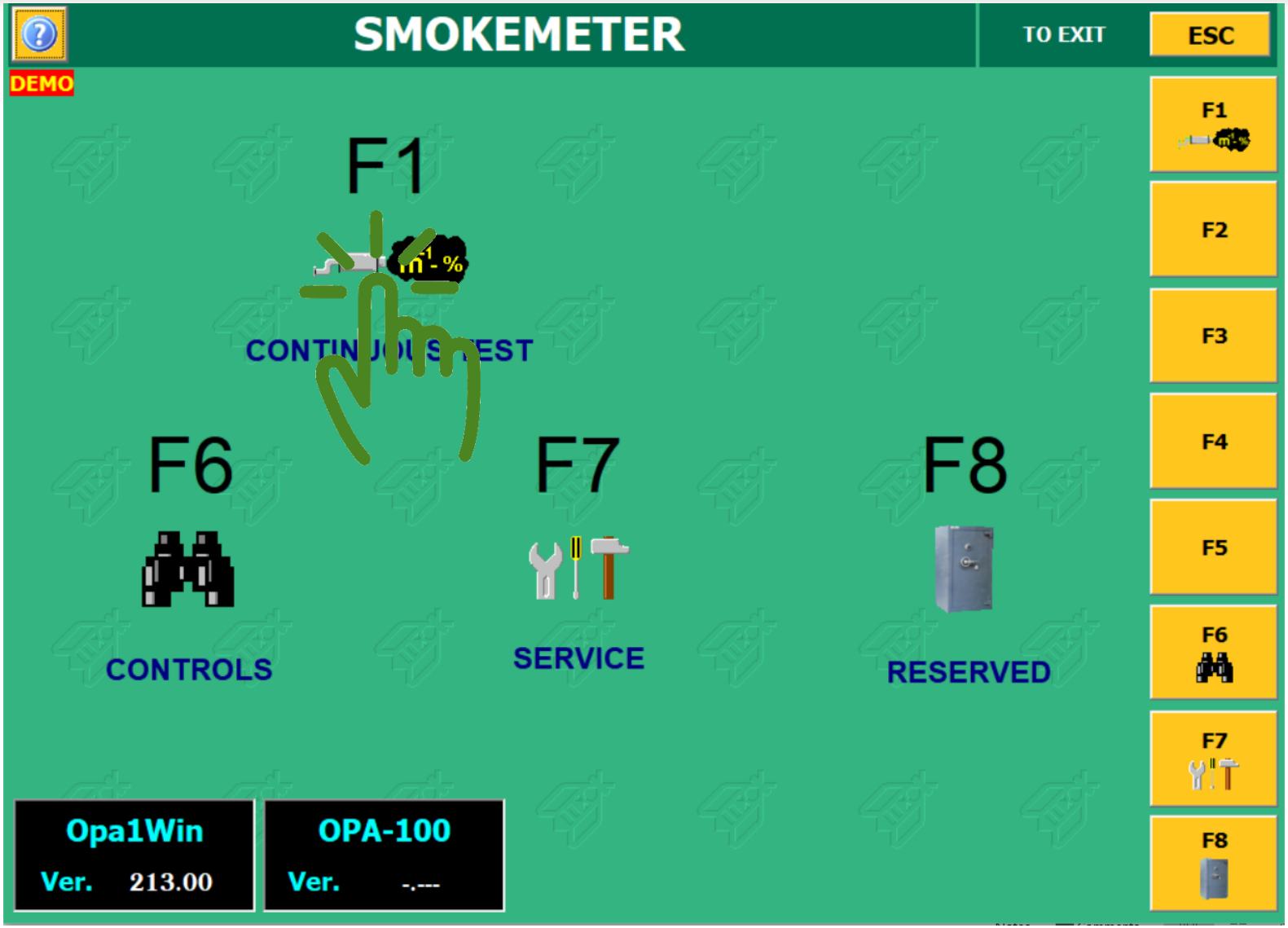
RPM & Temperature

- **Why RPM measurement is very important?**
- **Why need to measure the engine temperature?**

Analysis selection

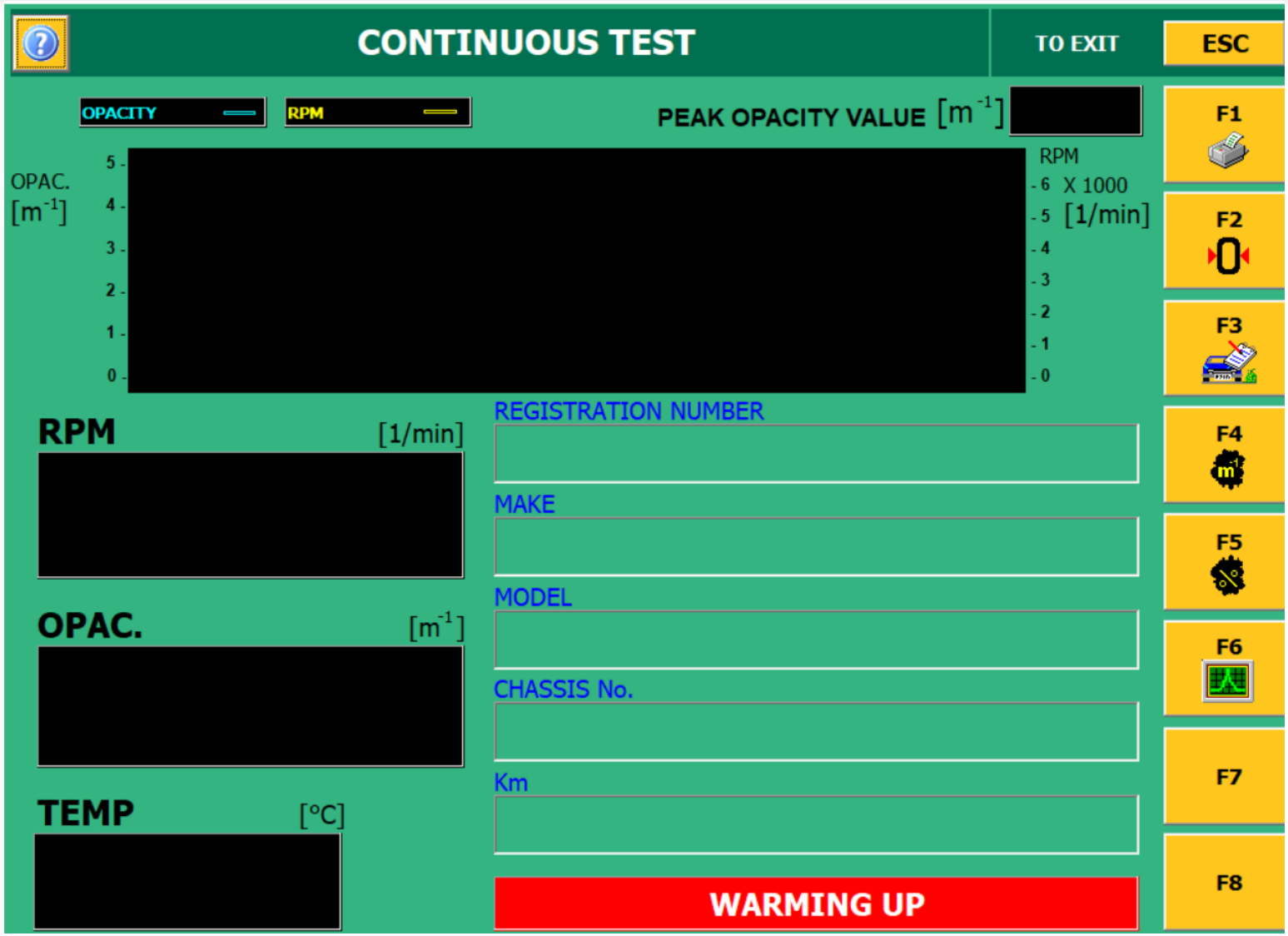


Test mode selection

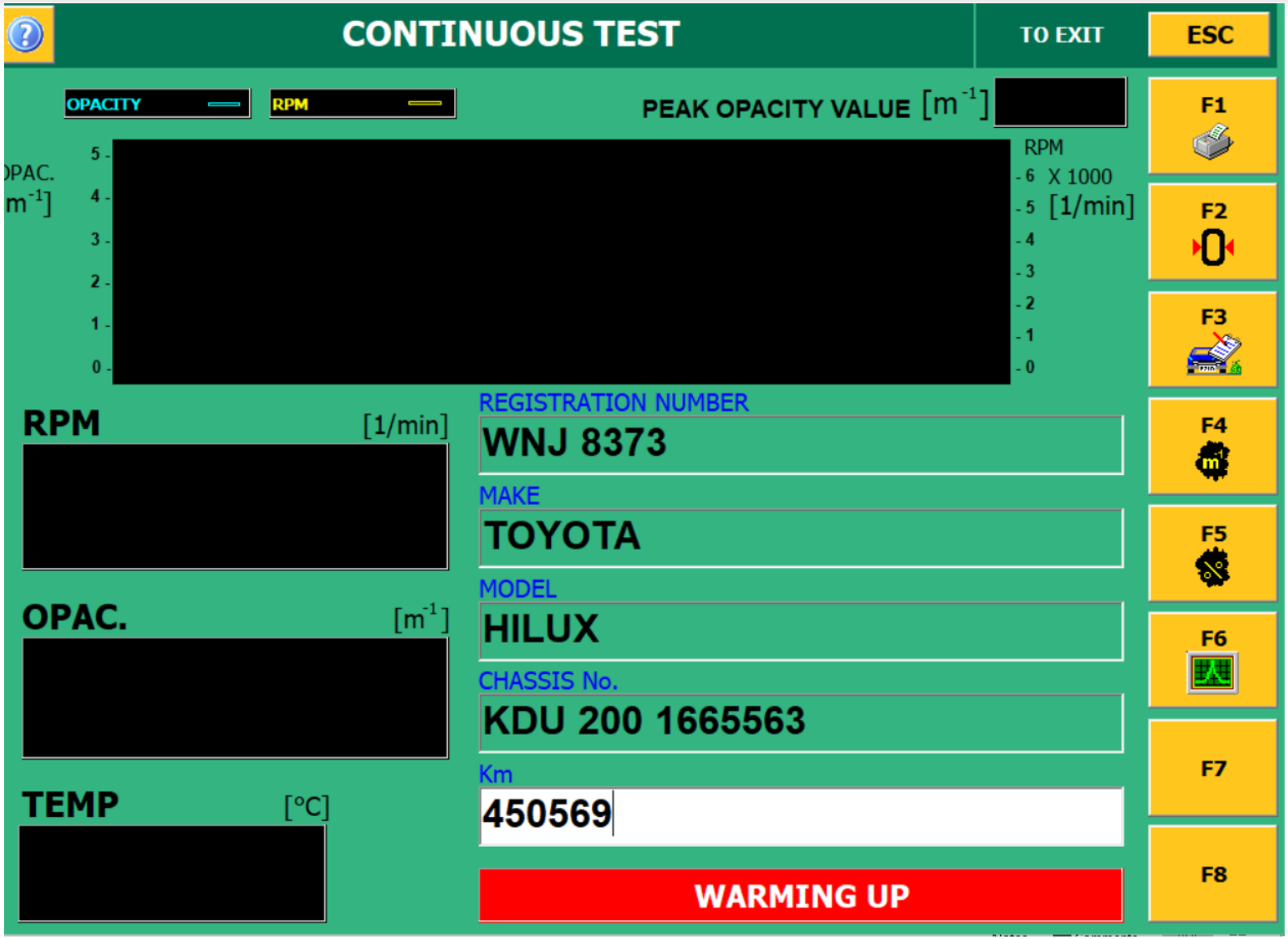


Warming up

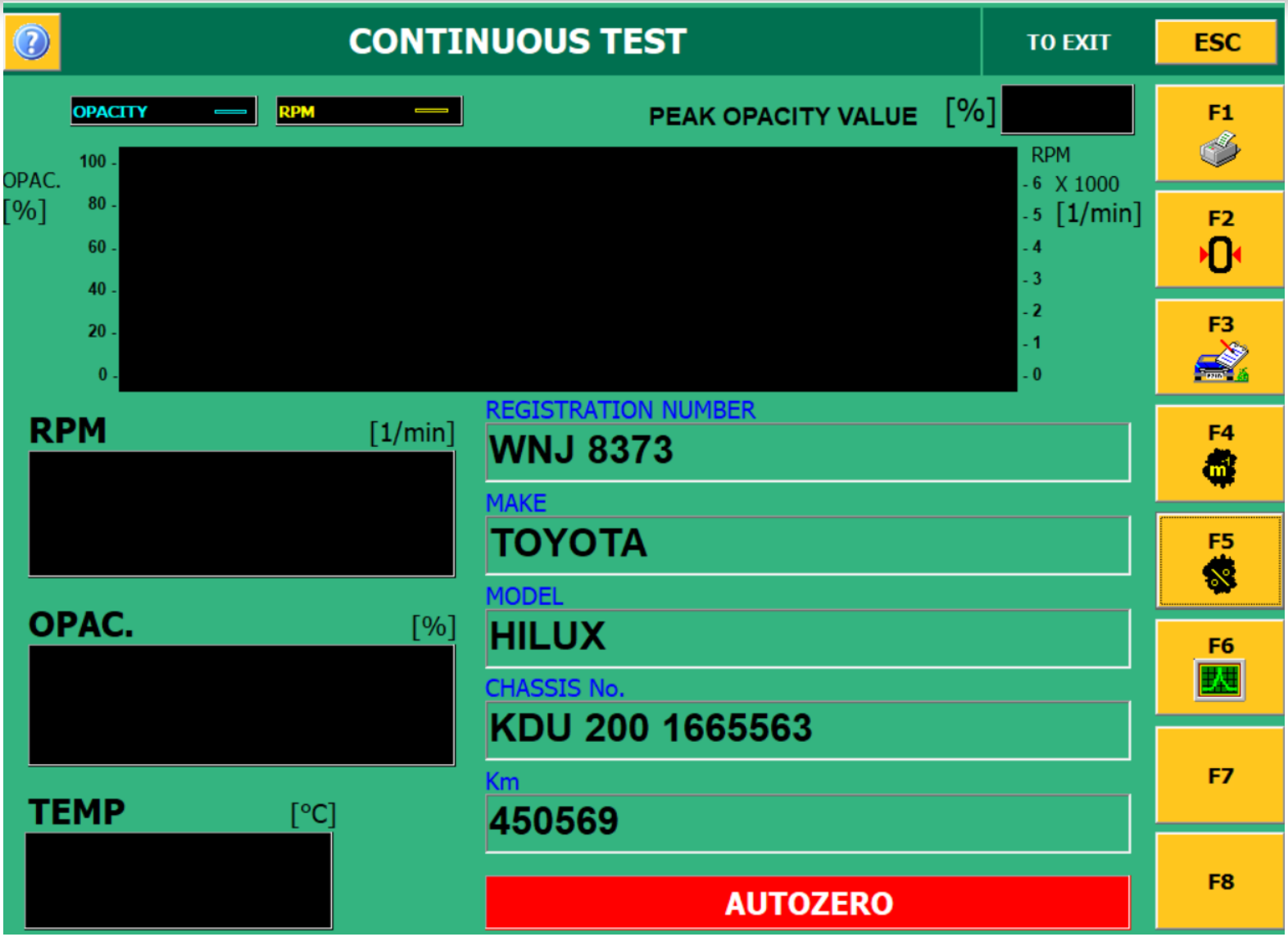
How many Celsius ?



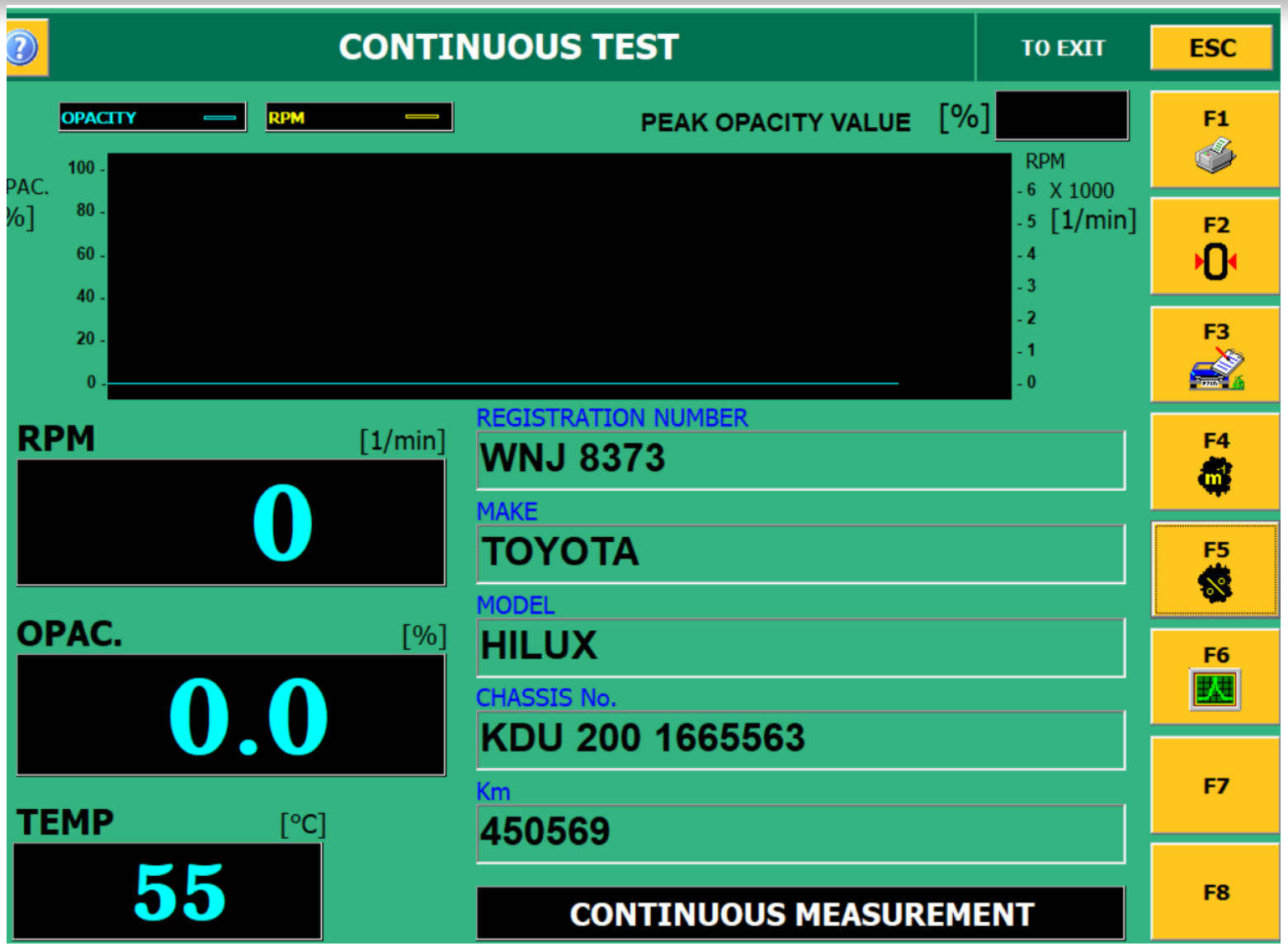
Key in vehicle data



Autozero


CONTINUOUS TEST
TO EXIT
ESC
OPACITY
RPM
PEAK OPACITY VALUE [%]
OPAC. [%]
100
80
60
40
20
0
RPM
6
5
4
3
2
1
0
X 1000 [1/min]
F1
F2
F3
F4
F5
F6
F7
F8
RPM [1/min]
OPAC. [%]
TEMP [°C]
REGISTRATION NUMBER
WNJ 8373
MAKE
TOYOTA
MODEL
HILUX
CHASSIS No.
KDU 200 1665563
Km
450569
AUTOZERO

Self setting completed



Plug in the probe

Start the engine – idling status

CONTINUOUS TEST

TO EXIT

ESC

OPACITY

RPM

PEAK OPACITY VALUE [%] 4.3

OPAC. [%]

100 80 60 40 20 0

RPM X 1000 [1/min]

6 5 4 3 2 1 0

F1

F2

F3

F4

F5

F6

F7

F8

RPM [1/min]

750

OPAC. [%]

0.0

TEMP [°C]

55

REGISTRATION NUMBER

WNJ 8373

MAKE

TOYOTA

MODEL

HILUX

CHASSIS No.

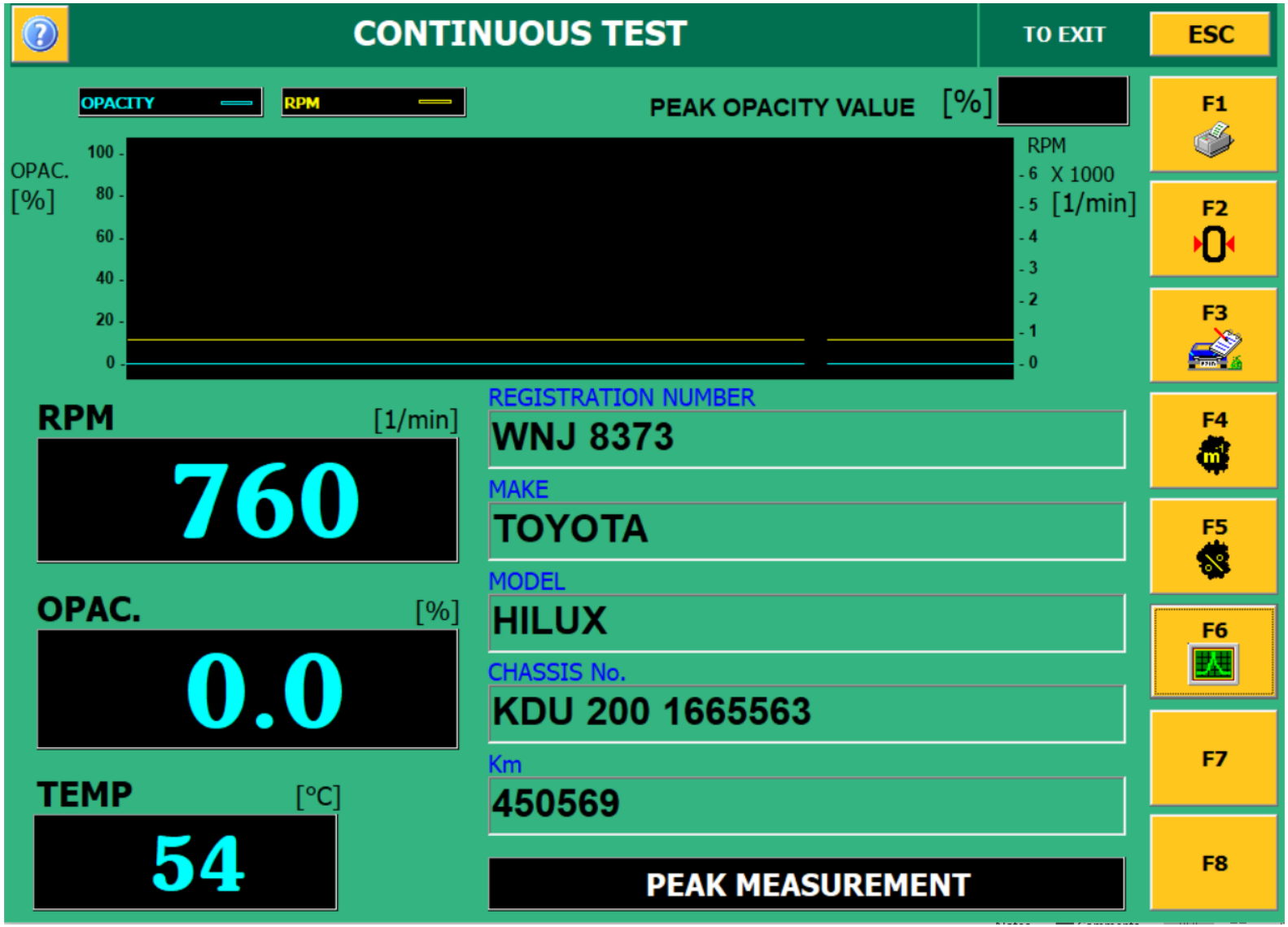
KDU 200 1665563

Km

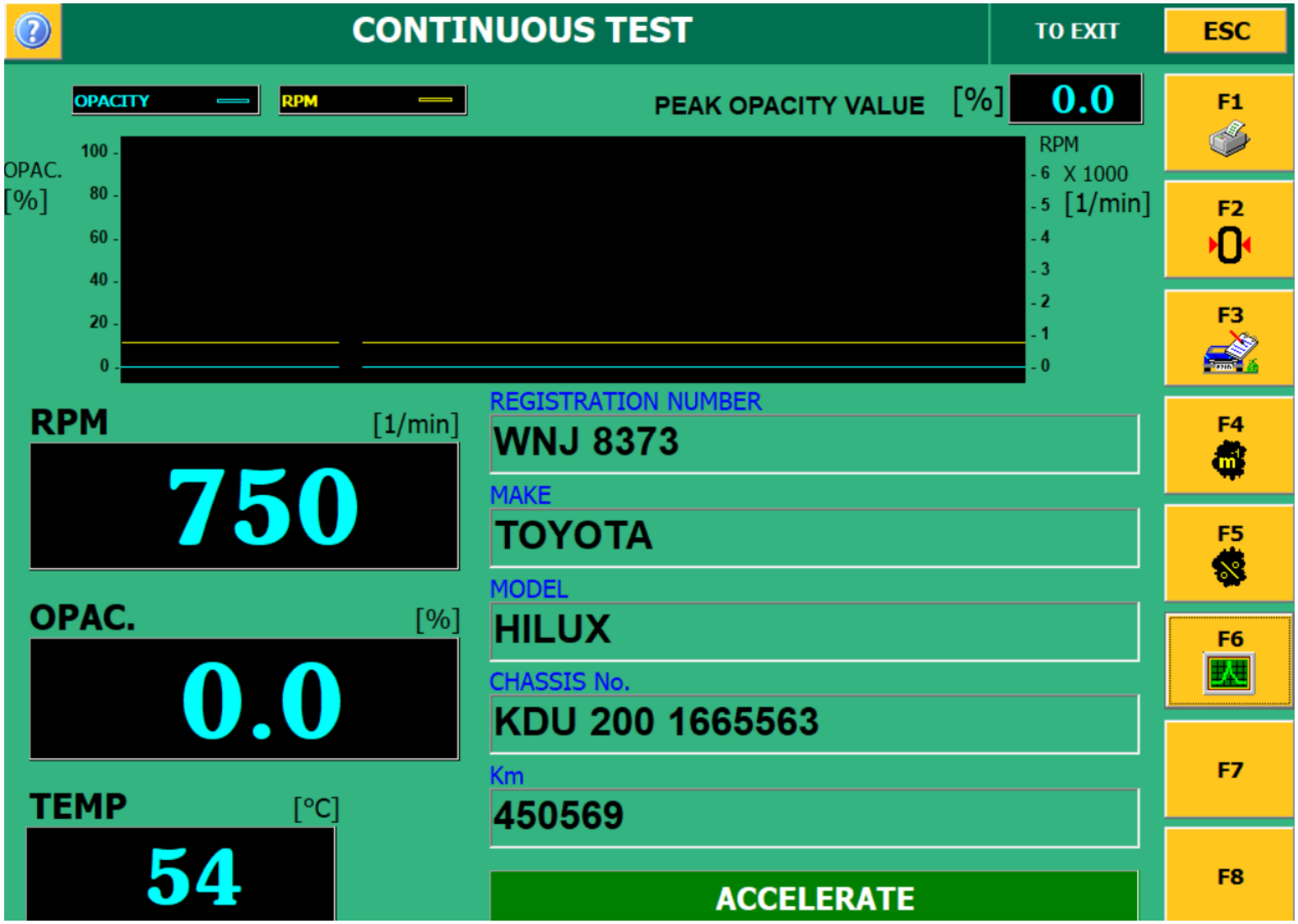
450569

CONTINUOUS MEASUREMENT

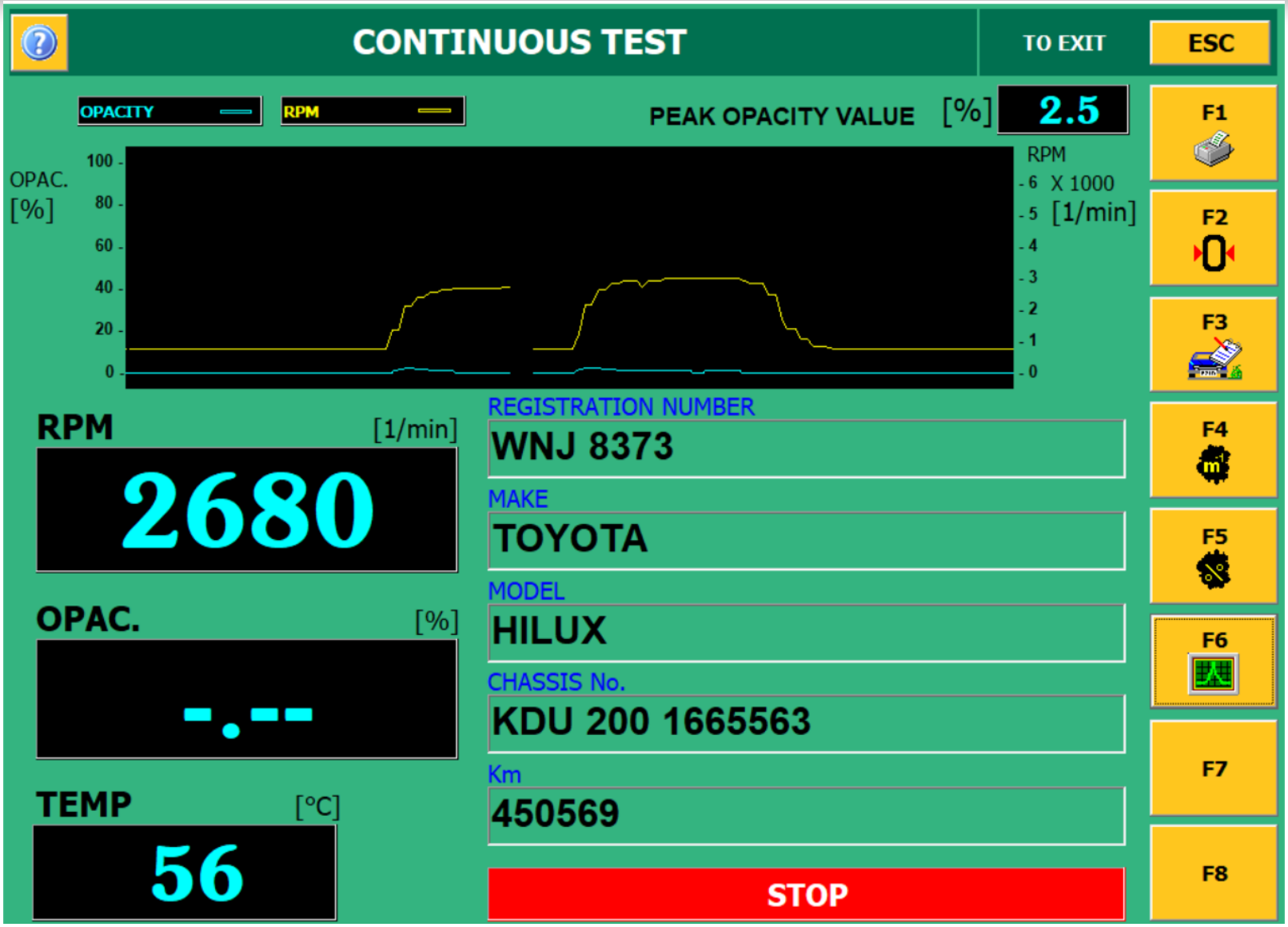
Peak measurement



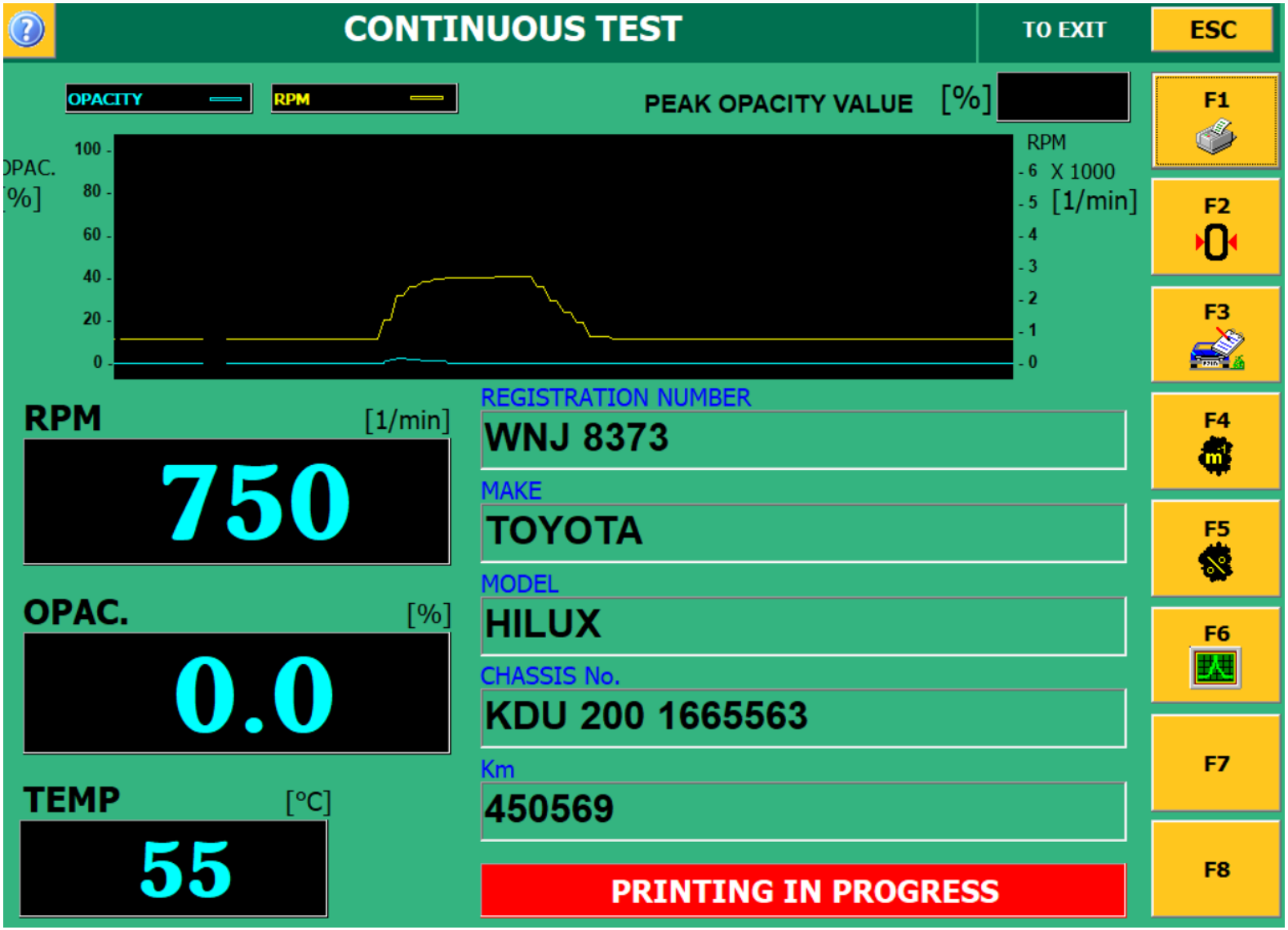
Accelerate to maximum



Stop accelerate



Print out the result



Q & A