Smart Electric Tester

User manual

SIT-12

Please read carefully before using the device. Ignorance of this manual may result in damage to the device or components operated by it.

DeltaTech Electronics ®

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Introduction

The SIT-12 Tester is a device introduced as part of the “SMART” devices series. This device combines several measuring instruments used for electrical measurements of injectors. Integrating several testers into one, handy tool allows for using SIT-12 in everyday diagnostics connected with common rail injectors. This tester includes the following measurement capabilities:

- low resistance measurement – range up to 5Ω – with high resolution typical for miliohmmeters,
- resistance measurement up to 1MΩ,
- capacitance measurement in the range of up to 50μF,
- inductance measurement with automatic change of ranges up to 800μH,
- function of high voltage insulation test - the so called megohmmeter mode,

Measurement ranges of each function have been chosen in such a way so as to measure parameters of injectors that are most common. Combination of a very broad range of measurements, such as low resistance measurement of injector coils and - on the other side - measurement of very high resistances reaching gigaohm values means that SIT-12 is indispensable in quick workshop diagnostics. Combining into one tool other instruments that are on the market as separate meters, such as inductance meter, capacitance meter or megohmmeter allowed us to create a small and universal SIT-12 tester. A built-in battery and charging via mini USB port allows for a few hours’ use. Should there be a need, the tester can be quickly charged and used for essential measurements. The user can define the time after which SIT-12 will turn itself off. Additionally, the tester has a built-in internal temperature measurement of the device.

Safety instructions

This chapter contains important safety instructions that must be followed when handling and storing the SIT-12. Please read the following information before any operation to ensure your safety and keep your SIT-12 in the best possible condition.

General guidelines.

- Do not place heavy objects on the device.
- Avoid impacts or rough handling, which may damage the tester.
- Do not discharge static electricity and connected components through the device.
- Use only compatible connectors and probes, not bare wires.

Cleaning the device.

- Turn off the device, disconnect the cables and plugs (measuring, control and computer communication).
- Use a soft cloth moistened with a mild solution of detergent and water. Do not spray SIT-12 with liquid.
- Do not use chemicals or cleaning products containing aggressive agents such as benzene, toluene, xylene and acetone. In case of severe dirt, you can use isopropyl alcohol ("IPA").

Operating environment.

- Operating temperature 5 do 40°C
- Relative humidity during operation:
  1. for temperature <30°C: <80%RH (non-condensing)
  2. for temperatures in the range of 30 - 40°C: <70%RH (non-condensing)
- Storage temperature -20 to 60°C, humidity <90%RH (non-condensing)

SIT-12 Specifications

Smart Injector Tester SIT-12 enables the following measurements and tests (the data pertain to ambient temperature in the range of 15-25°C):

1. ***Resistance measurement***

Range	Resolution	Accuracy
up to 5Ω	0,001Ω (1mΩ)	1,5% + 3c
from 8kΩ up to 1050kΩ	0,1kΩ	2% + 5c

2. ***Capacitance measurement***

Range [µF]	Resolution	Accuracy
up to 5	0,001µF (1nF)	2,5% + 3c
from 5 up to 50	0,1µF (100nF)	3% + 5c

3. ***Leakage current measurement - megohmmeter mode***

Test voltage [V]	Range [MΩ]	Accuracy
100	7-125	4% + 3c
250	18-300	4% + 3c
500	35-1400	5% + 3c

4. ***Inductance measurement***

Range [µH]	Test frequency	Resolution	Accuracy
0-60	100 kHz	0,1 µH	3% + 5c
60-800	50 kHz	1 µH	3% + 5c

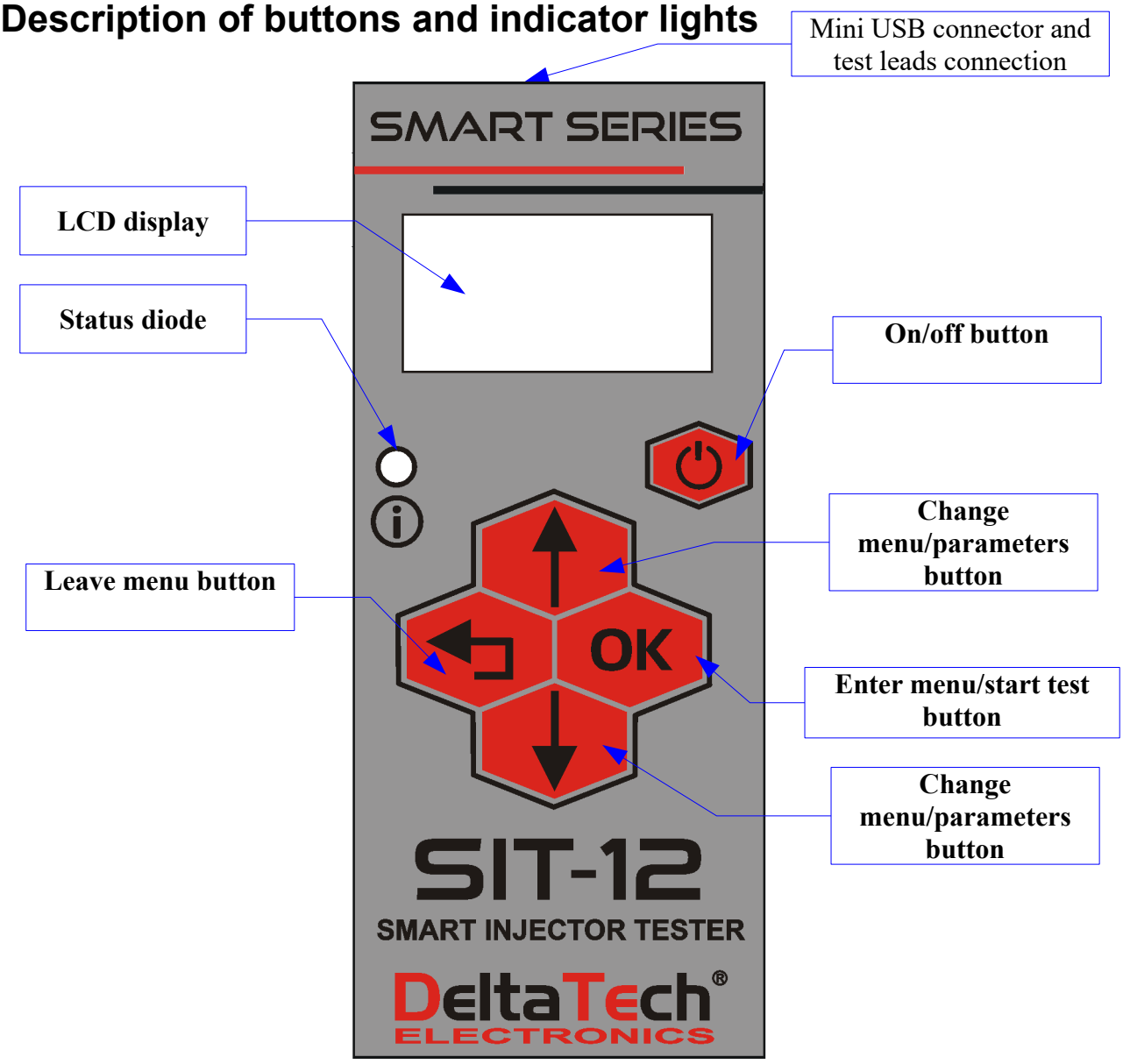
Content of the Kit

SIT-12 consists of the following elements:

1) SIT-12 Tester,
2) Cable for insulation measurement - with red band,
3) Cable for the measurement of other parameters - with black band,
4) Charger with a mini USB cable,

5) User manual.

Description of buttons and indicator lights



Power supply

WARNING: Do not perform measurements while the tester is charging.

SIT-12 is powered by a built-in Li-ion battery. Maximum operating time is 7 hours and depends on the measurements performed and their frequency. It is possible to charge the tester up at any moment. You can charge the device via a mini USB connector above the display, next to the 9-pin connector. The charger should have a voltage of 5V and at least 0,5A current efficiency.

The battery charge status is in the upper right corner of the display. It is a battery symbol whose bar corresponds to the charge level. Every time the device is turned on, initially a 3-line symbol is displayed instead of the bar. It indicates that the tester is calculating the charge level and after a few seconds it displays the current charge level. In case of excessive discharge, the device will automatically turn off, displaying appropriate message. The status diode is red while charging. When fully charged, it turns green.

Menu structure / selecting functions

Navigate through the menu of test functions by pressing [▲] and [▼] buttons. Select a function or enter a submenu by pressing the [**OK**] button. Go back by pressing the [◄] button.

Below is the list of available measurement functions in the SIT-12 tester:

- **Menu**
  1. **Insulation measurement**
  2. **Capacitance measurement**
  3. **Resistance measurement**
  4. **Inductance measurement**
  5. **Settings**
     - *5.1.* **Language**
     - *5.2.* **Auto power-off**
     - *5.3.* **Info**
     - *5.4.* **Service**
  6. **Calibration**

Measurements - operating the tester

The SIT-12 Tester uses two different cables depending on the type of measurement. Insulation measurements (megohmmeter) require using the cable with the red band by the plug. Other measurements are performed by using the cable with the black band. All the measurements have similar layout for displaying data and choosing functions. During measurements, the results is always displayed in the upper left corner. The next line contains information about the range or

other parameters characteristic of a given measurement, while on the right side is the current temperature inside the tester. The bottom part of the display is for messages and additional information.

Insulation measurement (megohmmeter mode)

WARNING: Voltages that may be dangerous to humans are present in this mode. Use caution and check whether the circuit or element you are testing will not be damaged by applying the chosen test voltage. Connect the red alligator clip to the part that has larger surface, e.g. injector housing etc.

Measurement in the megohmmeter mode is possible in three different ranges resulting from the chosen voltage, i.e. 100, 250 or 500V and it has been described in the specifications. Voltage can be changed by using [▲] and [▼] buttons. The tester will perform measurement after confirmation with the [**OK**] button. During the test, the status diode will blink in green once or twice. At the same time, there will be chosen voltage for less than a second on the alligator clips connected to the circuit being tested. In case of exceeding the range characteristic of a given voltage, there will be information on the display stating that the measured resistance is higher or lower than the chosen measurement range. Additionally, at the bottom of the display there is information about the current voltage during the measurement.

Capacitance measurement

WARNING: Discharge the capacitor you are testing before connecting the tester. Do not connect to a live circuit!

Capacitance measurement has two ranges with automatic change. Measurements in this mode are performed continuously until leaving to the main menu. Depending on the range – up to 5µF or up to 50µF – the result is given with the resolution 0,001µF or 0,1µF, respectively.

Resistance measurement

WARNING: Do not connect to a live circuit! In case of testing the capacitive elements, e.g. piezo stack, capacitor etc. they must be discharged before being connected to the tester.

Resistance measurement has two ranges which can be changed by pressing the [▲] and [▼] buttons. The range of up to 5Ω is chosen as default when entering this measurement. In this range the resolution is 1 miliohm and is for checking the resistance of injector coils. The other range covers from 8 to 1050kΩ with 0,1kΩ resolution. This range is helpful when checking piezo stacks in injectors. Measurements in both ranges are performed continuously until leaving to the main menu. Measurement outside of the range is signaled with the „**-OL-**” message.

Inductance measurement

WARNING: Do not connect to a live circuit!

This measurement is for specifying inductance of an injector coil. In this mode there is

automatic change of ranges with simultaneous change of resolution and frequency at which it is measured: up to 60µH the test frequency is 100kHz and the resolution is 0,1µH, while in the range of 60 – 800µH the frequency is reduced to 50kHz and the resolution is 1µH. Measurement outside of the range is signaled with the „**-OL-**” message.

Settings

There are three options available in this menu for setting the language, checking information concerning software version and entering the service mode.

Language

Language can be changed to Polish or English by pressing [▲] and [▼] buttons. When leaving the menu, the status diode will blink in green, informing about saving the chosen language.

Auto power off

In this menu item you can set the time after which the device will turn itself off after counting the time since the last press of any button. This is the so-called APO (Auto Power Off) function. The following options can be selected using the [▲] and [▼] buttons:

- 10 minutes
- 30 minutes
- 2 hours
- disabled (the device will remain on all the time until the battery runs out)

When exiting the menu, the status LED will flash green to indicate that the selected turn off time has been saved.

Info

The menu contains information about software of the SIT-12 tester and an identifier of a given tester.

Service

Menu for service activities carried out by the producer (password protected).

Calibration

Menu available for the producer for calibrating the instrument.

Warning !!!

This device is covered by a 24-month warranty, excluding damage caused by improper use.

Delta Tech Electronics company shall be liable up to the amount of the sum paid for the device and shall not be liable for possible damage and effects of its improper use.

DeltaTech Electronics company has made great effort to write this manual to the best of its ability, but it cannot guarantee that it does not contain any mistakes. While conducting any workshop activities always conform to vehicle service manuals, applicable laws, regulations, provisions, as well as industrial safety and fire protection rules.

Troubleshooting.

Symptom/cause	Solution/suggestion
Different results of leakage current measurement for the same element.	The level of inference from the network is too high. Test leakage/insulation of the elements removed from a car and placed on a non-conductive surface.
No charging (the red status diode is not on).	The battery is almost completely discharged. Leave the plugged charger for a dozen or so minutes.
“Error CAL” message in the voltage measurement menu.	This error may occur right after turning the tester on and may result from the change of temperature. Enter and exit the voltage measurement menu (several times, if there is a need).
Unstable resistance readings (range of up to 5Ω).	Check the contact and connection of alligator clips. Due to the way low resistances are measured, do not repair the cable that serves this purpose. Each use of an extension cord will result in wrong readings in the range of up to 5Ω (both the resistance of tested element and of the extension cord will be measured).
“Error CRC E2PROM” Message	This message may appear when turning the device on. It is an internal error that cannot be repaired by the user. Return the tester for repair.
No reaction to pressing the keys / inability to turn off the tester.	Possible freeze of the device. This is an unusual symptom that may be caused by using the device in conditions of water vapor condensation. You must wait until the built-in battery is discharged (this is the only reset option). After recharging, check the correct operation of the device.