Quick Sensor Tester

QST-5

User manual

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

Table of contents

1. Device parameters

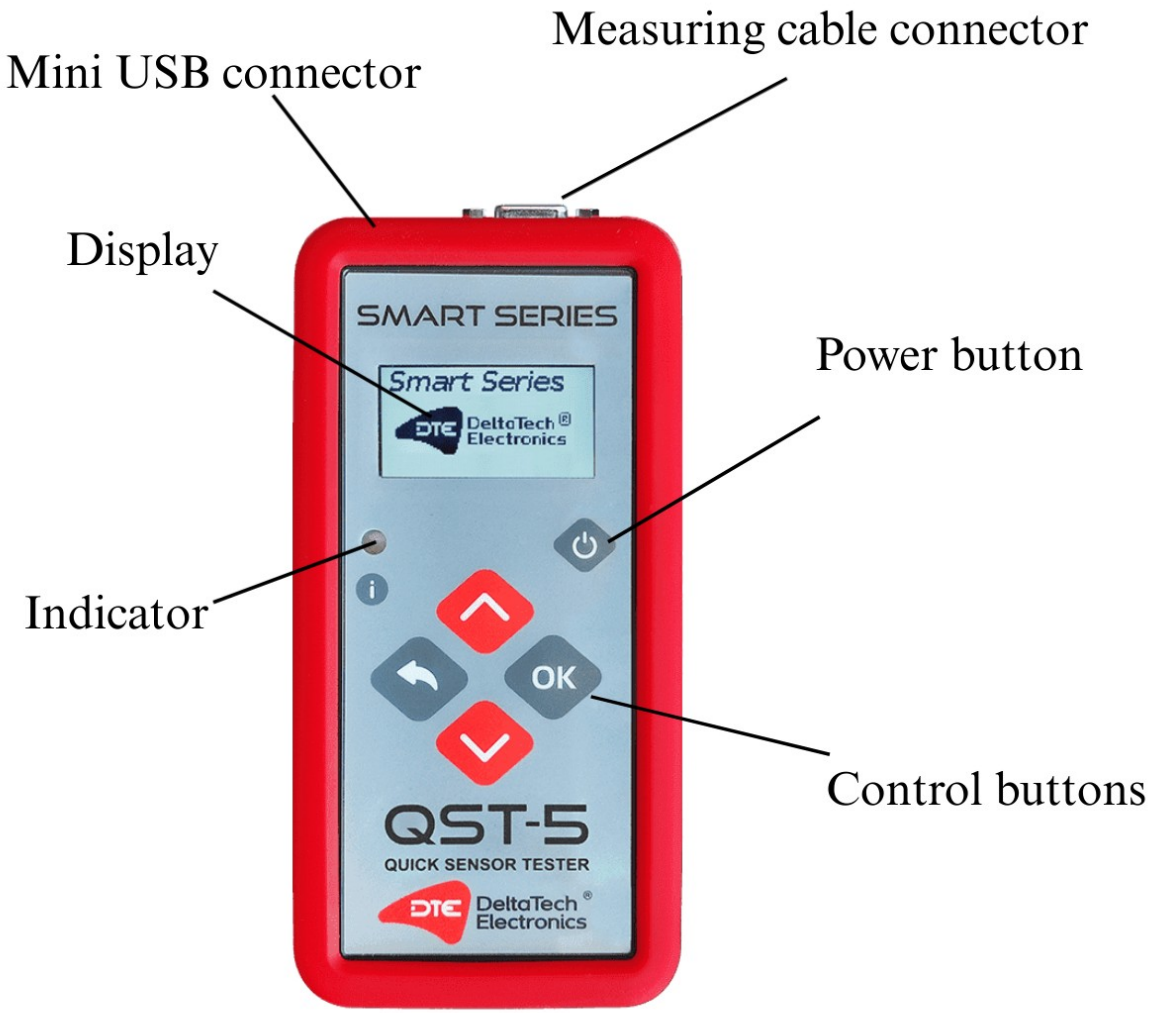
Power supply:	built-in Li-ion battery
Operating time:	approx. 8 hours when fully charged
Charging connector:	5V, 500mA
Operating conditions:	temp. 0 – 40°C
Test voltage:	5V
Resistance measurement:	0..5MΩ (2% accuracy + 2 digits)
Capacitance measurement:	100pF..5µF (5% accuracy + 2 digits)
Inductance measurement:	1mH..5H (10% accuracy + 2 digits)
Diode test:	100mV..3V (2% accuracy + 2 digits)
Frequency:	1Hz – 5kHz (1% accuracy + 2 digits)

Never connect the tester parallel with a sensor in a car if it has not been disconnected from the car's system. The tested element can be connected only to the tester.

You must not connect the tester outputs to any sources of voltage because it will damage it.

Although the device is meant for testing sensors powered by 5V voltage, it can be successfully used for checking many sensors powered by higher one (e.g. popular ABS sensors) because the electronic system of such sensors can work properly within a wide range of voltages.

2. Appearance and connection



Measuring cable connector – for connecting the cable ended with three numbered endings

Mini USB connector – for charging the device's battery and connecting it to a computer in order to update the software.

[⏻] – turns the device off and on.

[OK] Confirm the choice of menu or function, move to another stage of the test.

[⮌] Return from the chosen function to menu, return from a sub menu to the main menu, cancel a choice.

[▲] – chooses the previous option from the list, increases the modified value, switches additional options during the measurement.

[▼] – chooses the next item from the list, decreases the modified value, switches additional options during the measurement.

Indicator – with different colors it signals the operation of the device or, when the charger or computer is connected, it shows the battery charge status (red - "charging", green - "charged").

2.1 Charging the device.

The device is powered by a built-in battery. It is charged by connecting an external 5V charger (min. 500mA) connected to the mini USB connector or during a connection with a computer. Charging of the built-in battery takes, depending on the level of discharge, up to approx. 3 hours. During charging the device's indicator is lit in red, and after it finishes it changes the color to green.

You should not allow the battery to be discharged for a long period of time, as it may lead to its damage. Charge the battery beforehand if you plan on leaving the device unused for longer.

3. Using the device

The device can be used both for testing a sensor that is taken out of a vehicle or mounted in it. If the sensor is tested in a vehicle, **before connecting a sensor to the tester** disconnect it from the car's system!

The charge level of an internal battery is displayed in the upper right corner of the screen as a battery symbol (). If next to it the symbol is visible, it means that the Bluetooth module is active and it is possible to establish a connection with a compatible mobile device.

After starting, the device goes on to display the main menu. Use the [▲] and [▼] buttons to choose the desired function and [OK] to confirm it.

The list of available menu items is described in the next points.

3.1 *Sensor test*

After choosing the test, a list of sensors will appear, including typical sensors present in vehicles. You should choose the option from the list that best suits the tested element. The list has also a few more general items:

- *Voltage* – means any sensor with a voltage output;
- *Frequency* – means any sensor with a frequency output;

- *Switch* - means any sensor whose operation results in a contact closure, e.g. brake/clutch position sensor, reverse gear sensor, many sensors of air conditioning pressure, sensor of closed and open doors/roof/lid, oil pressure sensor, sensor of oil/windshield washer fluid level, etc.
- *Unknown* – means an unknown type of sensor. After choosing this option and performing a measurement, the device suggests a **list** of possible sensors, displaying it to the user.

The device cannot guarantee detecting a sensor which is not operational or which requires for its operation voltage higher than 5V (please remember that most of the sensors powered by higher voltage will be working normally with the tester). In case of problems with detection, use a manual mode, and then specify the sensor's terminals.

After choosing the sensor type and confirming with the [OK] button, the device will display two options:

- *Automatically* – allows to automatically detect the sensor type (e.g. inductive/Hall) and establish the terminals. After finishing the operation, a screen will be displayed with sensor's data.
- *Manual mode* – allows to manually specify the sensor type (if applicable) and to provide terminals, defining which of the numbered endings correspond to which signal. After choosing this option, a screen will be displayed with sensor's data and possibility of its edition. Use the [▲] and [▼] buttons to change the selected parameter and press [OK] to go to another item.

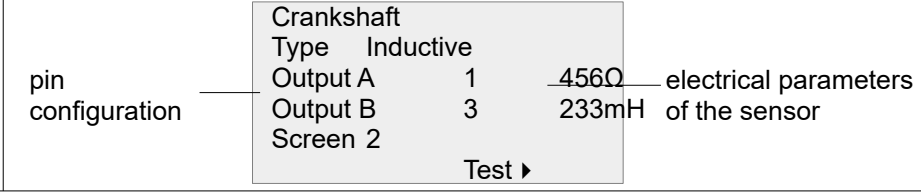
If after detecting the sensor or entering its data there is a possibility to go to the test, appropriate information will be displayed on the screen. To go to a test of a functional sensor, press [OK].

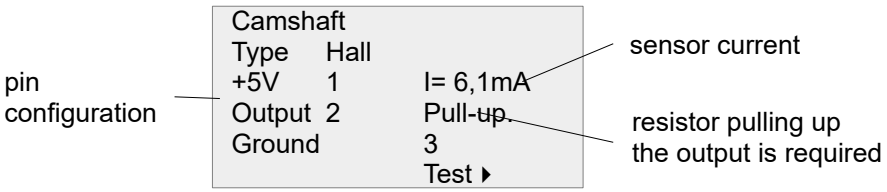
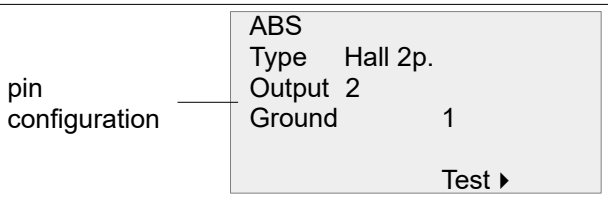
Below is a detailed description of the content of a sensor's data screens and test screens, depending on the chosen/detected types of sensors.

I Sensors of crankshaft and camshaft position, ABS sensors, vehicle speed sensor, etc.

While detecting Hall type sensors, "Generate a signal" message may appear. In this case, simulate the sensor's operation. Outside of the vehicle you may achieve an appropriate effect by moving a steel or magnetized element in front of the sensor.

Parameters screen:

Type	*Screen contents*
Inductive (passive)	

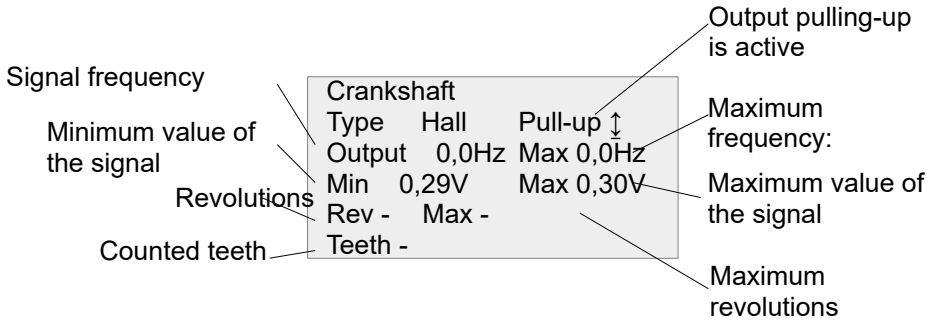
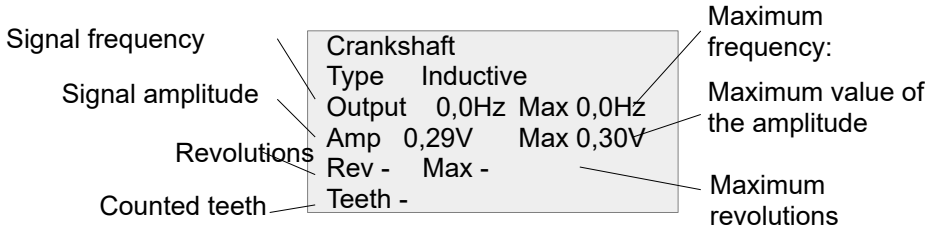
Hall 2p	
Hall 3p	

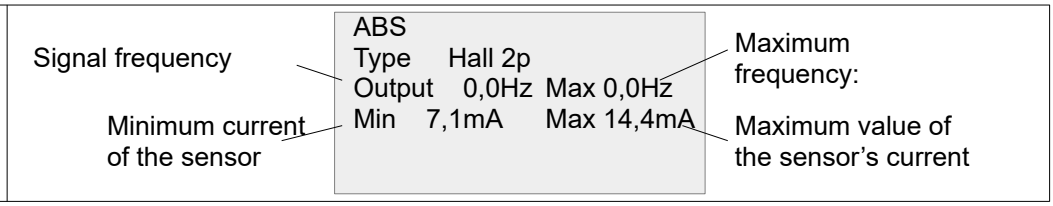
Test screen:

All the minimum and maximum values concern the time since starting the test. To zero them, start the test again, pressing [⮌] and then [OK].

During the test the indicator blinks in green, in accordance with the detected input signal.

During functional tests of inductive sensors you should limit yourself to tests during the start-up try, and in case of ABS or speed sensors - to tests at low speed, e.g. when manually spinning the wheel.

Type	*Screen contents*
Inductive (passive)	
Hall 2p	

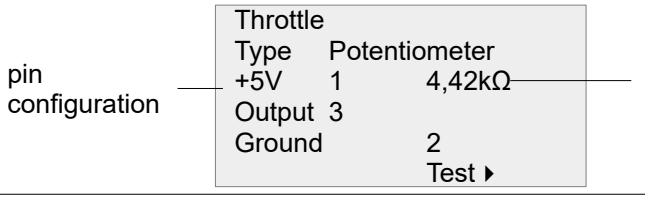
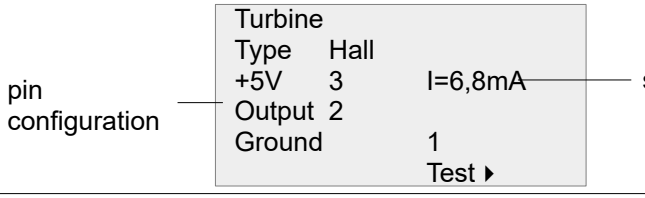
Hall 3p	

While testing a Hall type sensor (3p) it is possible to turn on or off the pulling up of the output with a resistor to the supply voltage using the [▲] and [▼] buttons. There is such a requirement in case of sensors with the "open collector" type of output. If the device does not detect the signal from the sensor during the test, retry the test with active pulling-up.

II Sensors of the position of throttle, gas pedal, turbine, EGR valve, etc.

In case of testing potentiometric sensors, there is no possibility to unambiguously determine the +5V/Ground terminals. The device will automatically choose the variant which corresponds to the lower output voltage in resting mode. If there is a need, the supply polarity can be reversed during the test with the [▲] and [▼] buttons.

Parameters screen:

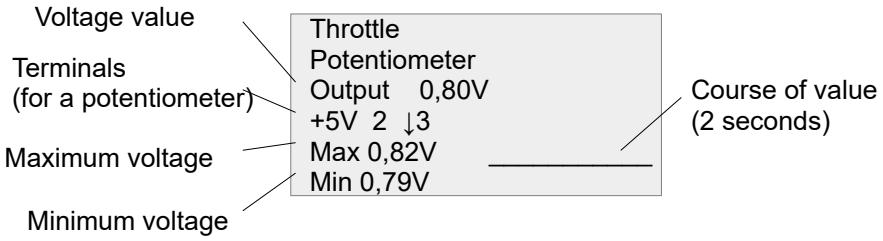
Type	*Screen contents*
Potentiometer	
Hall (linear)	

Test screen:

All the minimum and maximum values concern the time since starting the test. To zero them, start the test again, pressing [⮌] and then [OK].

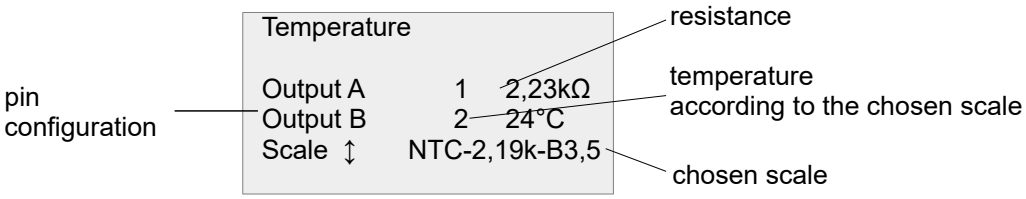
The chart with the course of sensor's value, visible on the right, is displayed so as to present

even very short distortions of signal.



III Temperature sensors (thermistors or Pt100/200 sensors)

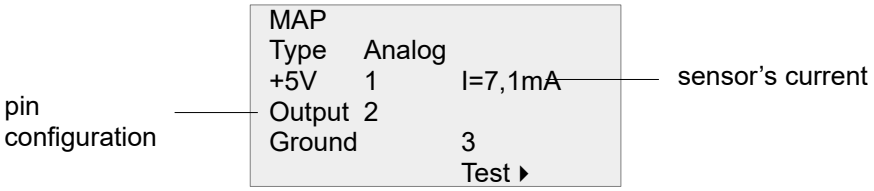
Parameters screen:



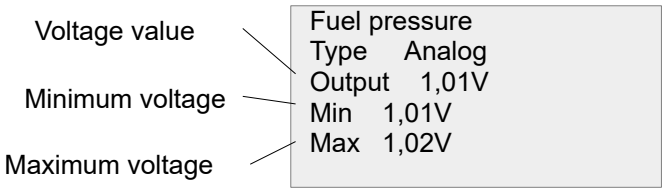
In case of temperature sensors there is no separate measurement screen – the parameters screen plays this role by performing a constant measurement of resistance and converting to temperature according to the chosen scale. There are several scales available for NTC type thermistors and thermo resistant Pt100 and Pt200 sensors. In case of NTC thermistors, the names of the scales include the sensor's parameters, e.g. „*NTC-2,19k-B3,5*" indicates a sensor with resistance in 25°C temperature which is 2,19kΩ and with β coefficient that equals 3500. The first two items (NTC-2,19k-B3,5 and NTC-2,8k-B4,0) correspond to scales which are most common in temperature sensors of (engine) cooling liquid or air.

IV Sensors with analog output (pressure)

Parameters screen:



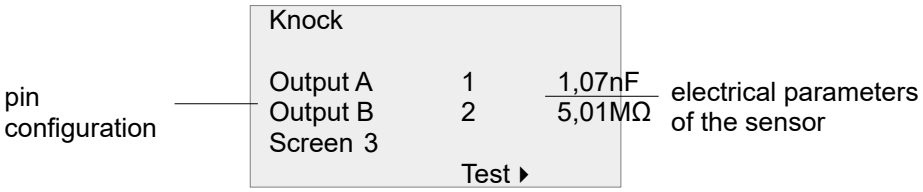
Test screen:



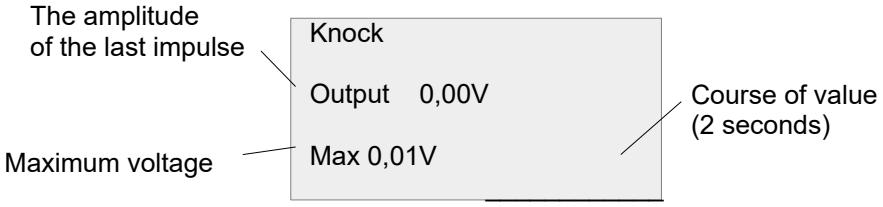
All the minimum and maximum values concern the time since starting the test. To zero them, start the test again, pressing [⮌] and then [OK].

V Knocking combustion sensors.

Parameters screen:



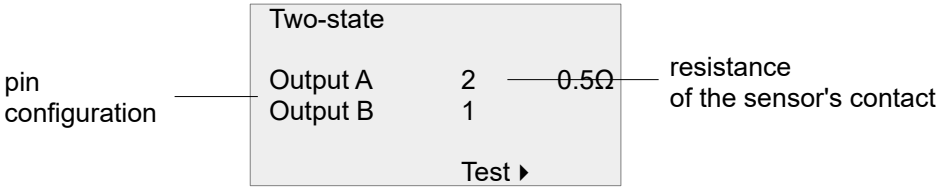
Test screen:



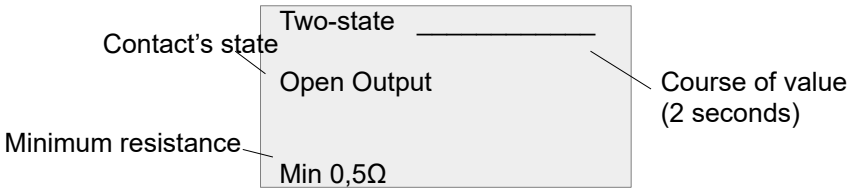
The maximum value concerns the time since starting the test. To zero it, start the test again, pressing [⮌] and then [OK].

VI Switch sensors (on/off)

Parameters screen:



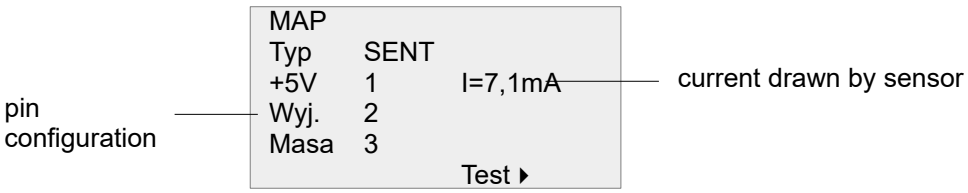
Test screen:



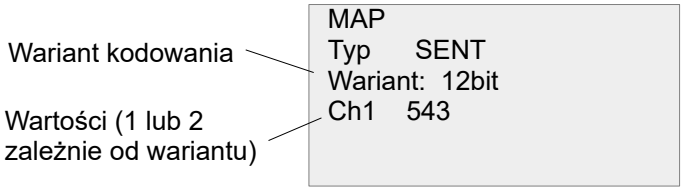
The minimum value concerns the time since starting the test. To zero it, start the test again, pressing [⮌] and then [OK].

VII SENT protocol sensors

Parameters screen:



Test screen:



3.2 Electrical measurements

This function allows to measure the following electrical parameters:

- Resistance (range 0Ω - 5MΩ)
- Capacitance (range 100p - 2uF)
- Inductance (range 1mH - 5H)
- Measurement of diode's forward voltage (range 0,1 - 3V)

After choosing the option with the [►] button you may test individual elements by connecting them to two of the three measuring endings. Potentiometers which can be connected using all three measuring endings are the exception.

The results of the measurements are shown on the screen as a graphic symbol together with measured values and numbers of measuring probes.

The results of electrical measurements will be reliable if the parameters are not subject to quick change (e.g. the potentiometer should be still). While connecting or disconnecting an element or uncertain contact, incorrect readings may appear.

Before connecting the capacitor, make sure that it is completely discharged by momentary short circuiting its endings. **Connecting a charged capacitor may result in damaging the device.**

3.3 *Settings* – settings menu.

Language

The menu allows to choose the device's interface language. Use the [▲] and [▼] buttons to change the value. The [►] button confirms the choice, [⮌] goes back to the previous setting.

Bluetooth

Use the [▲] and [▼] buttons to choose *Turn on* or *Turn off*. At the bottom part of the screen there is a PIN number for pairing with a device to use the included application. The [►] button confirms the choice, [⮌] goes back to the previous setting.

Turning Bluetooth off when it is not needed will make the device run longer on battery.

Auto-calibration

It allows to perform the device's self-diagnostics, and also set the compensation of measuring cables. The operation is best carried out in typical environment temperature in which the device is used. Auto-calibration has to be done each time after changing or modifying the measuring probes. It is worth using this option in every situation when there is a doubt about the accuracy of readings.

After choosing the option, follow the instructions on screen, confirming your action with the [►] button. At the first stage, the user will be asked to leave the measuring cable connected to the device, while the numbered endings remain unconnected. The next step is to short circuit all three endings (triple jumper included in the kit) and confirm with the button.

To cancel, press the [⮌] button.

LCD Contrast

Allows you to adjust the contrast of the display. Use the [▲] and [▼] keys to adjust the contrast to your preference. The [►] button saves the new setting, [⮌] returns to the previous setting.

Version

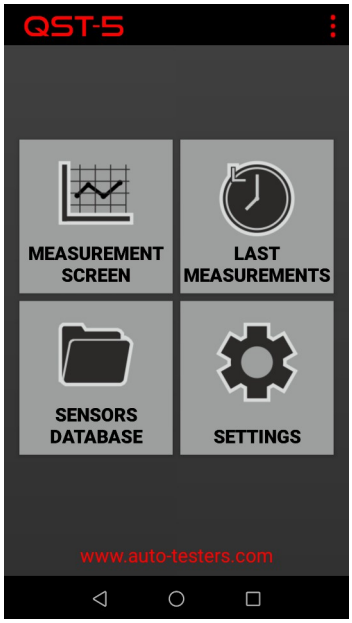
Displays the device's software version. To return to the previous menu, press [⮌].

4. Application for the Android system

There is a possibility of expanding the device's capabilities by working with a dedicated application. To download it, go to the link below:
http://dte.com.pl/download/qst/

You must enter the device's serial number to download the application. The serial number is under the silicon cover of the casing. The serial number can be also read using the updating program on a PC by choosing *Menu → Information.*

Program's window:



Measurement screen – allows to remotely read the measurement parameters. This function is available only when an appropriate screen of sensor's test is displayed on the tester.

Recent measurements – reads three most recent measurement results from the tester. By tapping *Add to the database* you can save the measurement results, complementing them with additional information and an optional photo.

Sensors' database – allows to browse and modify the sensors' base stored on the device.

Settings – allows to configure Bluetooth connection, change the program language and display information about the version.

To establish a connection with the application:

- Turn on Bluetooth on QST-5 and on the mobile device.
- Start the QST-5 application.

At the first connection:

- Choose a Bluetooth device by selecting *Settings* → *Bluetooth.*
- When pairing the devices, enter the PIN number 7785 (shown in the device's menu).

All the program data is saved in the main memory of the Android device in the *QST5_DATA* folder. To make a backup copy of the database, you should make a copy of that folder. To transfer data to other Android device, simply transfer the contents of the above-mentioned folder.

5. Updating the software

5.1 Installing the software

The software necessary for firmware updates can be downloaded online:

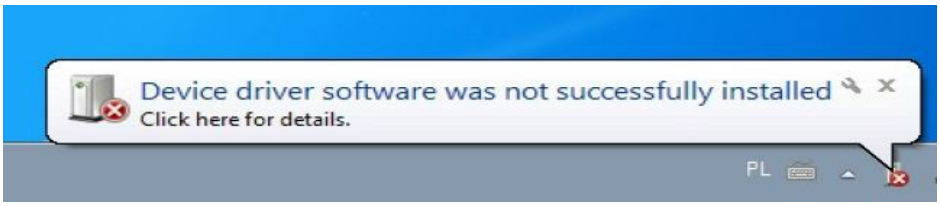
https://dte.com.pl/download/software/smart/

After unpacking the archive, run the *START.exe*, and then click the *Install* button. After starting the installer, please follow the instructions on the screen - accept the license agreement, indicate the destination folder and specify whether an icon should be created on the desktop. Confirm each step by clicking *Next*.

5.2 Installing the driver (Windows 7)

1. Connect the device to a USB port in the computer.
Information will appear at the bottom left corner of the screen:

After a while a warning should appear about failed driver installation:



2. Right click on the *Computer.* In the window that will appear, click *Device manager.* A list will be displayed and it should contain a new item (*Other devices: DeltaTech Electronics...)*

3. Right click on *DeltaTech Electronics...* and choose the *Update driver software* option. The *Update driver software wizard* window will appear.

4. Choose *Browse my computer for driver software*, and then select the path with the driver. Choose the *Driver* folder on the install drive and click *Next* (the drive letter may differ from the example).

5. The system will display a warning about an untrusted software publisher. Click *Install the driver software anyway.* After a while the driver installation should finish with an appropriate message.

5.3 Installing the driver (Windows 8, 8.1 systems)

To properly install the driver in Windows 8/8.1 64 bit versions it is necessary to start the computer in a special mode. Perform the following steps:

1. Open power options: Move cursor over the top or bottom right corner of the screen and the Charm Bar will appear. Click *Settings,* and then *Power.*
2. While holding down the *SHIFT* key, click the *Restart* button.
3. When the option screen appears, click *Troubleshoot*, then *Advanced options,* and then *Startup settings.*
4. The system will display a list of available options. Click *Restart.*
5. The system will start in settings mode. On the list displayed select number 7 (*Disable driver signature enforcement)* by pressing F7 key.

After performing all the above steps, run *Device manager.* The fastest way to do this is to press *WinKey + X* on the keyboard and select *Device manager.*

After opening *Device manager* proceed as if you were installing the driver on Windows 7 (see the previous point of the Manual).

5.4 Installing the driver (Windows 10)

When using Windows 10 it is not necessary to install additional drivers. It is enough to connect the device to a USB port and an appropriate driver will be installed automatically.

5.5 Updating the software

Before updating, make sure that the device's battery is fully charged.

To update the software, start the device in a special mode. To do so, hold the [▲] button when the device is turned off and while holding it, turn the device on with the power button. The update mode is signaled with the ↻ symbol displayed on the screen.

Start the Smart Updater program. When starting for the first time, it will ask you to choose a language.

The program window will be displayed:

After clicking the *Program* button, the information about the available and up-to-date software version will be displayed. If a new version is available, click *Yes* to update (the process will take less than a minute).

6. Troubleshooting

Problem	*Tips*
The device does not turn on. After connecting to the charger, none of the indicators are lit.	Check if the charger is operational. Make sure that the battery is charged by connecting to the charger for a longer period of time. If it does not help, the battery may be worn out or damaged.
The device runs for a very short period of time after charging and/or charging ends soon after connecting to the charger.	The battery is worn out and needs to be replaced. Contact the producer.

Cannot perform software update.	1. Make sure that the computer is connected to the Internet. 2. Properly install the device's driver (see points 5.2 – 5.6) 3. Check if the device is running in the update mode (see point 5.6 Updating the software).
The update was interrupted or the device works incorrectly after the update.	Run the update once again (see 5.6 Updating the software).
The device does not recognize a working sensor.	Perform the test in a manual mode by specifying the terminals. In special circumstances there is a possibility of wrong detection in the automatic mode. If despite that the sensor does not work, most likely the tester is not capable of providing appropriate supply current (for safety reasons the maximum sensor current is limited).
Auto-calibration try ends in "Error" message	Make sure that the successive steps were carried out properly (see point 3.3 of the Manual). If the situation repeats itself, the measuring cable or the device may need improving. Contact the producer, giving the number of the error displayed. Do not diagnose sensors until the fault has been removed.

If the list of suggested solutions has been exhausted or the problem is not included in the table, contact the device's producer.

Warning !!!

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.

The DeltaTech Electronics company shall not be liable for possible damage caused by improper use of the QST-5 tester.