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1. Operator instructions

1.1 Important notes

Important notes on the agreement pertaining to copyright, liability and warranty, about the user group and obligation on the part of the contractor, are available in the separate instructions entitled "Important notes and safety instructions" on Bosch test equipment. These are to be read thoroughly before using, connecting and operating the product and they must be observed.

1.2 Safety instructions

All safety instructions are available in the separate instructions "Important notes and safety instructions" on Bosch test equipment. These are to be read thoroughly before using, connecting and operating the product and they must be observed.

1.3 Electromagnetic compatibility (EMC)

This product is a Class A product in accordance with EN 55 022.

 This product can cause radio interference in the home; in this case the operator may be asked to implement appropriate measures.

1.4 Disposal



This product is subject to European guidelines 2002/96/EG (WEEE).

Old electrical and electronic devices, including cables and accessories or batteries must be disposed of separate to household waste.

- Please use the return and collection systems in place for disposal in your area.
- Damage to the environment and hazards to personal health are prevented by properly disposing of old equipment.

1.5 Bluetooth limitations

There are limitations in the following countries (e. g. Bluetooth modules may only be used in enclosed rooms) when operating Bluetooth Class 1 modules: Egypt, France, Jordan, Pakistan, Peru, Saudi-Arabia, Sri Lanka, Thailand and Turkey.

In the following countries, **no** Bluetooth modules are to be used (Status: March 2006):

Algeria, Ethiopia, Bolivia, Burma, Georgia, Guatemala, Cambodia, Qatar, North Korea, Senegal, South Africa, Syria, United Arab Emirates, West Sahara.

1.6 Important information regarding Bluetooth

Bluetooth is a wireless connection in the unlicensed 2.4 Ghz-ISM-Band (ISM: Industrial, Scientific, Medical). This frequency range is not subject to any governmental laws and may be used in most countries without a license (Exceptions are found in chap. 1.5). This results in many applications and devices transmitting on this frequency band however. This can cause frequency interference between these devices.

Depending on the environmental conditions, disturbance can occur in the Bluetooth connection, e. g. in WLAN connections (WLAN: Wireless Local Area Network), wireless telephones, radio-controlled thermometers, radio-controlled garage door openers, radio-controlled light switches or radio-controlled alarm systems.

 Bluetooth can lead to interference in the bandwidth of the WLAN-network. The antennas of Bluetooth and WLAN devices should be positioned at least 30 centimeters apart. Bluetooth-USB adapters and WLAN must not be placed in adjacent USB sockets in the PC/Laptop. A USB extension cable (special accessories) should be used to ensure that the Bluetooth-USB adapter is separate from the WLAN stick.

 Generally, people who wear a pacemaker or other essential electronic device should exercise extreme caution when using wireless technology, as it may impair the function of their particular device.

Note the following to ensure that your connectivity is as good as possible:

- The Bluetooth wireless signal always looks for the shortest path. Set up a PC/Laptop with Bluetooth USB adapter so that there are as few obstacles, such as e. g. steel doors and concrete walls, that could disturb the radio signal to and from the KTS 540 or KTS 570 as possible.
- If the PC is in a Bosch trolley (e. g. FSA 740, BEA 850), the Bluetooth USB adapter should be positioned outside of the trolley using a USB extension cable. Use USB extension cable (special accessory) 1 684 465 564 (1 m) or 1 684 465 565 (3 m).
- If there are problems with the Bluetooth connection, you can activate the USB connection and use it instead of the Bluetooth connection.

2. Description of unit

2.1 Application

KTS 530, KTS 540 and KTS 570 (hereinafter referred to as KTS modules) are modules for controller diagnosis. The functionality differences are shown in the following table:

Function	KTS 530	KTS 540	KTS 570
Controller diagnosis	X	X	X
1 channel multimeter	X	X	X
2 channel multimeter	–	–	X
2 channel oscilloscope	–	–	X
2 channel diagnosis oscilloscope	–	–	X
Bluetooth wireless connection	–	X	X
USB connection	X	X	X

KTS modules can perform the following functions with ESI[tronic]:

- **Controller diagnosis**, with e.g.
 - Read error memory
 - Display actual values
 - Initiate actuators
 - Use of other controller-specific functions
- **Multimeter measurements** for
 - Voltage measurement
 - Resistance measurement
 - Current measurement (only with special accessory current measuring clips or shunt)
- **2 channel oscilloscope** for determining measurement values (KTS 570 only).
- **2 channel diagnosis oscilloscope** for testing the controller diagnosis interface (KTS 570 only).

2.2 Requirements

2.2.1 Hardware

PC/Laptop with at least one free USB interface. KTS modules can be used with the following Bosch products:

- Emissions System Analysis^(*)
- FSA 740
- BEA 810, BEA 840, BEA 850^(*)

^(*) Depending on the software version.

2.2.2 Operating system

Operating system	USB	Bluetooth
WIN XP	X	X

2.2.3 Software

Operation of the KTS modules requires the installation and enabling of software ESI[tronic]-DVD 2006/1 and ESI[tronic]-CD 2006/3 U (blue U) on the PC/Laptop. Extra costs apply in this case.

2.3 Delivery specification

Description	Order Number
System tester KTS 530 ^(*)	1 687 022 437
System tester KTS 540 ^(*)	1 687 022 436
System tester KTS 570 ^(*)	1 687 022 994
Bluetooth USB adapter (KTS 540/KTS 570)	1 687 023 382
OBD diagnosis cable 3 m (KTS 530)	1 684 465 557
OBD diagnosis cable 1.5 m (KTS 540/KTS 570)	1 684 465 555
UNI connection cable 4 core	1 684 463 539
USB connection cable 3 m	1 684 465 562
Power pack	1 687 022 889
Power supply cable	1 684 461 106
Measuring cable blue (KTS 530/KTS 540)	1 684 430 066
Measuring cable yellow (KTS 530/KTS 540)	1 684 430 067
Measuring cable red/black (KTS 570)	1 684 463 214
Measuring cable blue/yellow (KTS 570)	1 684 463 550
Test tip red (1x, with KTS 570 2x)	1 684 485 035
Ground cable black	1 684 430 068
Terminal clip, black	1 684 480 022
Case	1 685 438 145
Mount	1 681 398 030
with sheet-metal screw (2x)	2 910 611 406
and fillister head screw (3x)	2 910 641 118
DVD1 ESI[tronic] 2006/1 Diagnosis and technology	1 987 729 601
DVD2 ESI[tronic] 2006/3 U	1 987 729 041
Important information and safety instructions	1 689 979 922
Product description (KTS 530/KTS 540/KTS 570)	1 689 979 987

^(*) depending on order

2.4 Special accessories

Information on special accessories, such as e.g. vehicle-specific connecting cables, additional measuring cables and connecting cables can be obtained from your Bosch representative.

2.5 System tester

2.5.1 Diagnosis terminals/Masurement terminals

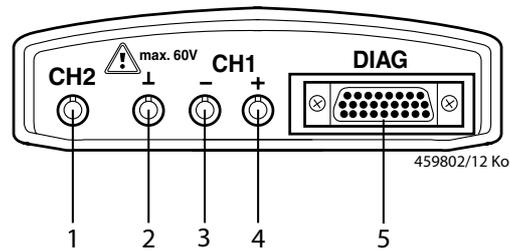


Fig. 1: Diagnosis terminals/Measurement terminals

- 1 Measuring input CH2 (only for KTS 570)
- 2 GND socket
- 3 Measuring input CH1(-)
- 4 Measuring input CH1(+)
- 5 Connection OBD diagnosis cable (DIAG)

2.5.2 Terminal strip

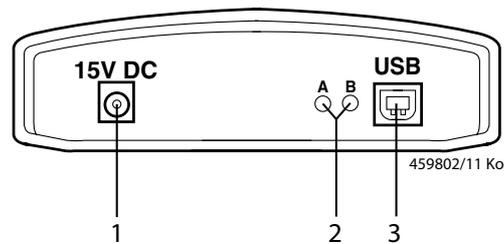


Fig. 2: Terminal strip

- 1 Power supply connection
- 2 LED A and LED B (see chap. 2.5.3)
- 3 USB connection

2.5.3 Functions of LEDs A and B

LED A	Function	Measures
Does not illuminate	No data communication with the controller	Check connection with the controller
Flashes green (irregular)	Data communication with the controller	None
Illuminated green	Fault in hardware/ Firmware	(*)
Illuminated red	Power supply > 35 Volt.	Check voltage in vehicle

LED B	Function	Measures
Does not illuminate	Voltage not present	Check power supply
Flashes green (1 second interval)	KTS ready for operation	None
Illuminated green	Fault in hardware/ Firmware	(*)
Flashes yellow (1 second interval)	Overvoltage on diagnostic cable	(*)
Illuminated yellow	Fault in hardware/ Firmware	(*)
Flashes red (irregular)	Firmware update in operation	None
Illuminated red	Fault in firmware-update	Repeat firmware update

(*) Unplug the USB connection and power supply and connect them again. If the error still exists, contact customer service.

2.5.4 Adapter insert (IBOX 01)

The adapter insert (Fig. 3, Item 8) contains all of the existing capabilities for establishing communication with the vehicle diagnosis interfaces that are known. In order to flexibly adapt to future expansions in diagnosis protocols, the adapter insert can be changed quickly without any tools.

 KTS modules only function with the adapter insert connected.

2.6 Bluetooth

2.6.1 Bluetooth USB adapter

The Bluetooth USB adapter, which is included with delivery, allows wireless connection with KTS 540 and KTS 570. It is connected to the PC/Laptop and shows that it is ready for operation when the red LED is illuminated.

 Do not put any mechanical stress on the Bluetooth USB adapter and do not use it for gripping. This can damage the laptop or Bluetooth USB adapter.

2.6.2 Information regarding Bluetooth symbols

Bluetooth Manager symbol  (in toolbar) when the control unit diagnosis function is active::

Color	Function
Green	Bluetooth USB adapter active and communicating with KTS 540 or KTS 570.
White	Bluetooth USB adapter plugged into PC/laptop, but Bluetooth connection inactive.
White/green in 7-sec. cycle.	Bluetooth USB adapter tries to create a wireless connection to the KTS module.
Red	Bluetooth USB adapter not plugged into PC/laptop.

Bosch Bluetooth Device symbol  (in toolbar) when the control unit diagnosis function is active::

Color	Function
Green	Field strength of Bluetooth wireless link OK.
Red	Field strength of Bluetooth wireless link too low. Reduce distance between Bluetooth USB adapter and the KTS module or avoid obstacles such as e. g. steel doors or concrete walls.
Symbol not there.	No Bluetooth wireless connection. Follow the instructions in chapter 2.8.

 Interrupting the Bluetooth connection with the KTS 540 and KTS 570 can activate an acoustic alarm signal in the PC/Laptop (see Online Help DDC). If a fault occurs, the USB connection can be activated and used instead of the Bluetooth connection.

2.7 Operation

KTS 530 can only be connected with the PC/Laptop via the USB interface. KTS 540 and KTS 570 can be linked with the PC/Laptop via wireless connection (Bluetooth) or via the USB interface. Insert the Bluetooth USB adapter in the PC/Laptop for a wireless connection.

i The radio connection between KTS 540/KTS 570 and the PC/Laptop can **only** be made with the Bluetooth USB adapter provided in the delivery.

2.7.1 Connection diagram

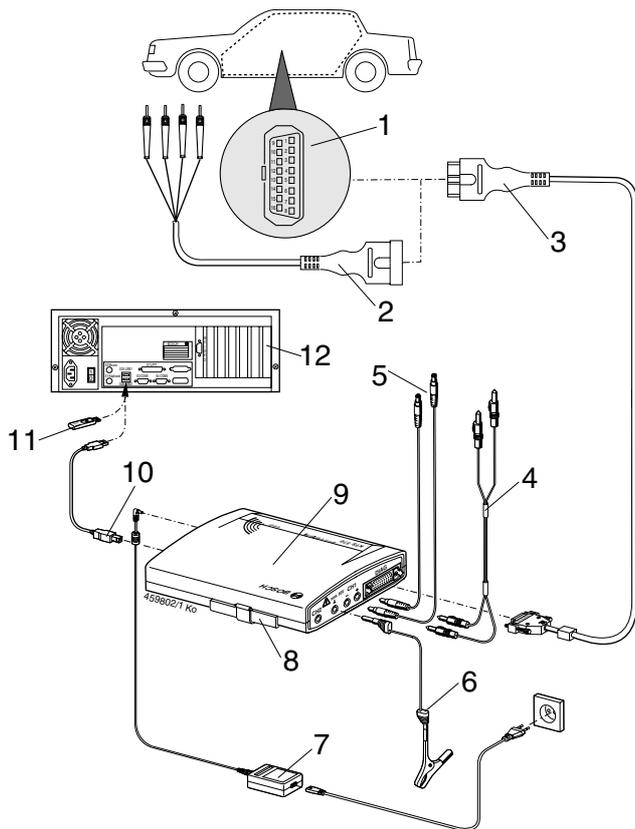


Fig. 3: Connection diagram in an example for the KTS 570

- 1 OBD interface in vehicle
- 2 UNI connection cable
- 3 OBD diagnosis cable
- 4 Measurement cables (KTS 570)
- 5 Measurement cables (KTS 530, KTS 540)
- 6 GND lead
- 7 Power pack
- 8 Adapter insert (IBOX 01)
- 9 KTS 570
- 10 USB connecting cable
- 11 Bluetooth USB adapter
- 12 PC (Laptop)

2.7.2 Notes concerning controller diagnosis

KTS modules are either powered via the power supply that is delivered or through the OBD interface of the vehicle.

! In testing steps that require starting the motor, the battery voltage may drop to a point that the supply is no longer guaranteed via the vehicle. In these cases, it may be required to supply the KTS module with the power supply.

i On some vehicles, the power supply through the OBD interface may only be fed after switching the ignition on.

The connection to the diagnosis interface in the vehicle is made via

- the OBD diagnostics cable (Fig. 3, item 3) or
- the OBD diagnostics cable and the UNI connecting cable (Fig. 3, item 2) or
- the OBD diagnostics cable and a vehicle-specific adapter line (special accessories).

! The connection to the diagnosis interface in the vehicle takes place via the OBD-diagnosis cable (Fig. 3, Pos. 3) or additionally via the UNI-connection cable (Fig. 3, Pos. 2) and vehicle-specific adapter cables (special accessories).

i Notes on controller diagnosis can be found in the Online-Help.

2.7.3 Notes concerning the multimeter and oscilloscope



Danger from high voltage!
 If measurements are taken without a ground lead, potentially deadly voltages can be generated.

- If no diagnosis cable is connected, a ground connection is to be made from the KTS modules before making any V-, R- or I-measurements (Fig. 1, Item 2) made connection to vehicle ground with the ground cable provided!
- Connect the ground cable as close as possible to the measurement object!
- Use KTS modules only on the vehicle and not for measurements for voltages > 60 volts! Do not perform any measurements on ignition systems!
- Only use the accompanying measuring cables with touch protection!
- Always insert measuring cables in the KTS modules first and then into the vehicle!
- Do not route unshielded measuring cables close to high-power sources of interference, such as e.g. ignition cables!

! To prevent KTS 570 failure, before calling menu point "**Oscilloscope**", measurement input CH1(-) must be connected with vehicle ground. In menu point "**Oscilloscope**", measuring input CH1(-) and measuring input ground are connected internally (floating measurement, see chap. 5.5).

2.7.4 Firmware update

After an update of ESI[tronic], the firmware of the KTS modules is updated automatically when the controller diagnosis is started. To update the firmware, supply the KTS module using the supplied power supply and connect to the PC/Laptop using the USB connection cable. During the firmware update, the USB connection is not to be interrupted. The firmware update can also be done using DDC (Diagnostic Device Configuration) (see Online help DDC).

! The firmware update must always be done using the USB connection cable (not via Bluetooth) with the KTS 540 and KTS 570.

2.8 Notes concerning faults

2.8.1 Diagnosis hardware has not been found.

When the control unit diagnosis software was started or during communication with the control unit, no diagnosis so diagnosis hardware (KTS module) was found. The fault message "**Connect diagnosis hardware and supply it with external voltage**" or "**Wireless connection to the KTS module is faulty**".

Possible causes	What can you do
No external voltage supply.	Check whether the KTS module has an external voltage supply (power pack or OBD diagnostics cable). LED B on the KTS module must be flashing green.
KTS module not active or incorrectly configured.	<ol style="list-style-type: none"> 1. Terminate ESI[tronic] and control unit diagnosis. 2. Start the DDC ("Start >> Settings >> Control panel"). 3. In the DDC, check whether the KTS module is correctly configured and has been activated. 4. Finally, test the KTS module.
Bluetooth connection faulty or non-existent.	Bluetooth manager symbol  flashing white or white/green <ol style="list-style-type: none"> 1. Reduce the gap between the Bluetooth USB adapter and the KTS module. 2. Test the KTS module in the DDC. 3. If the Bluetooth connection does not test OK, initialize Bluetooth drivers (see Chapter 2.8.3). 4. Reboot PC/laptop.
No Bluetooth USB adapter.	Bluetooth manager symbol  red <ol style="list-style-type: none"> 1. Plug in the Bluetooth USB adapter. 2. Re-start the control unit diagnosis.

2.8.2 No communication with the control unit

During the control unit diagnosis, the following fault message appears: "**No communication with the control unit. Adapter lead connected?**"

Possible causes	What can you do
Incorrect lead connected.	Check if the correct lead has been used.
Incorrect PIN selected in the multiplexer menu.	Consult the SD Help function to see which PIN must be used.

Measures for other possible faults are described in chapters 1.6, 2.5.3 and 2.6.2.

 If problems of a different nature occur, please contact the ESI[tronic] service hotline directly.

2.8.3 Initializing Bluetooth drivers

If the Bluetooth connection is faulty or absent or alternative remedial measures failed (see Chapter 2.8.1), the Bluetooth drivers must be initialized.

Proceed as follows:

1. Double-click on the Bluetooth manager icon .
 - ⇒ Bluetooth settings will open

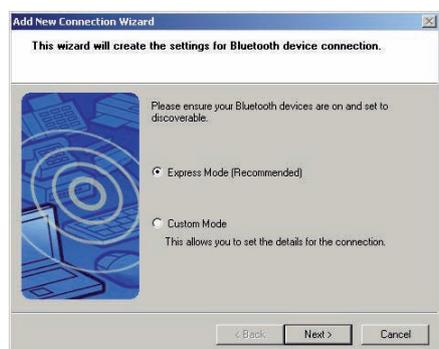


 If the "Add New Connection Wizard" dialog window opens, continue from Item 4.

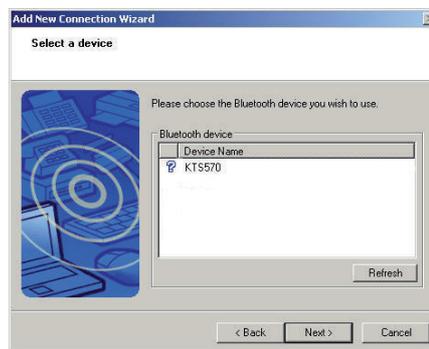
2. Check whether a KTS module appears under the entered Bluetooth devices.
3. If no KTS module is entered: select **<New connection>** and then proceed from Item **or**
3. If a KTS module is entered: delete KTS module.

- If KTS module is connected : Select **"Bluetooth >> Disconnect"** menu option.
- Select **"Bluetooth >> Delete"**.
- Select **<New connection>**.

⇒ "Add new Connection Wizard" dialog window will open.



4. Select **Express mode** option.
5. Select **<Next>**.
 - ⇒ Bluetooth devices will be searched and displayed.



6. Select **<Cancel>**.
7. Confirm prompt **Are you sure you want to close the Assistant?** with **<Yes>**.



8. In the "Bluetooth settings" dialogue window, select **"Bluetooth >> Terminate"**.

→ Bluetooth drivers are now initialized.

3. Initial start-up

! Do not plug in the Bluetooth USB adapter until requested to do so during installation of the Bluetooth driver on your PC or laptop (Message: Connect Bluetooth device).

If the Bluetooth USB adapter is plugged in too soon, the Windows hardware assistant is opened. The Windows hardware assistant must be terminated and the Bluetooth USB adapter removed.

3.1 Assembly mount

The mount included with the delivery allows fastening and loosening the KTS modules on the Bosch trolley (possible as of production date 03-2006 only).

1. Screw in the three fillister head screws on the Bosch trolley (see Fig. 4).

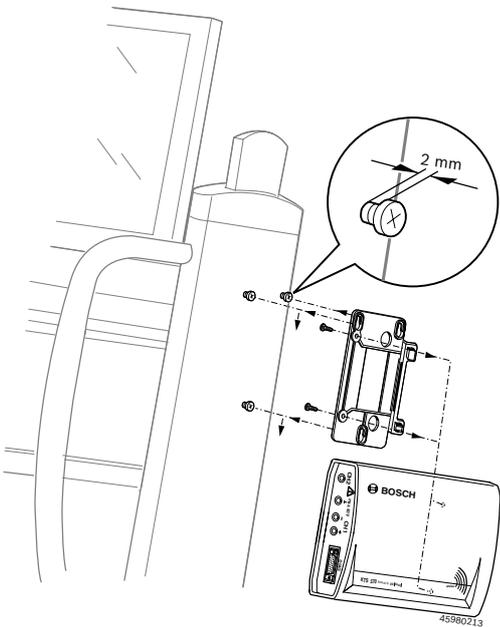


Fig. 4 Assembly mount

2. Using the sheet-metal screws included with the delivery, screw the mount onto the KTS module (holes for mounting are on the rear of the module).
3. Correct the screw penetration of the fillister head screws on the vehicle so that the KTS modules are solidly and securely seated in position following installation.

3.2 ESI[tronic] software installation

1. ESI[tronic] 2006/3 U* (with blue U*).

I Depending on the type of installation selected, you will be asked to insert ESI[tronic] 2006/1 during the installation.

2. If the ESI[tronic] has not been enabled yet, enable it now.

I How to install and enable the ESI[tronic] is described on the "ESI[tronic] DVD 1 Diagnosis and technology" in the directory 'DOCS\SETUP\INFO_XXX.PDF'.

3.3 Connection

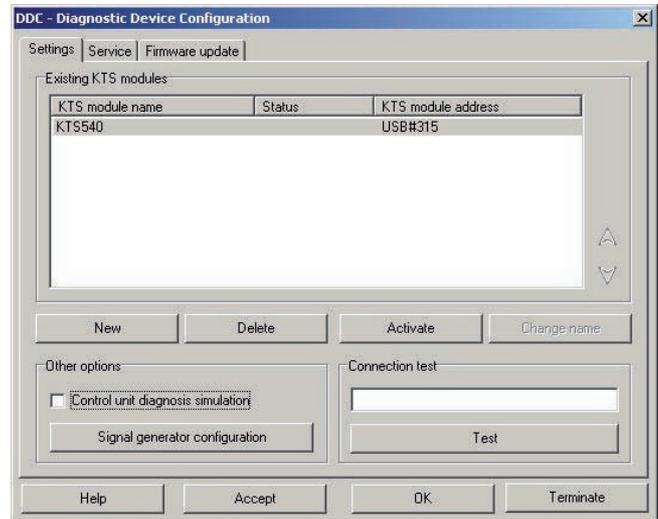
1. Connect the KTS module with the power supply included with the delivery.
2. Connect the KTS module with the PC/Laptop using the USB connection cable.

I The message "Found new hardware" will appear on the screen the first time that the KTS modules are connected using the USB connection cable. This indicates that the USB connection to the KTS modules has been recognized.

3.4 Configuration (DDC)

I The function of the DDC (Diagnostic Device Configuration) software is to configure, activate and test the KTS modules.

1. Start the DDC ("Start >> Settings >> Control panel").
2. Confirm the DDC fault message with <OK>.



3. Always remove the sample entry "KTS 540".
4. Add the KTS module via "New".

I Other procedures for configuration concerning the initial start-up are described in the online help. Use <Help> to open the online help. All other important information concerning DDC is found here as well.

I If you have any questions which cannot be answered by the online Help, please contact the ESI[tronic] service hotline directly.

4. Maintenance

4.1 Cleaning

The housing of the KTS modules are only to be cleaned using a soft cloth and a neutral cleaning agent. Do not use any abrasive cleaning agent or rough cleaning cloths.

4.2 Maintenance

The tab **Customer service** can be used for performing various tests in DDC. A portion of these tests can only be performed by customer service.

4.3 Spare and wearing parts

 Replacement and wear parts only concern parts received in the respective delivery.

Description	Order Number
System tester KTS 530	1 687 022 437
System tester KTS 540	1 687 022 436
System tester KTS 570	1 687 022 994
Adapter insert	1 688 000 349
OBD diagnosis cable 3 m (KTS 530) ^(*)	1 684 465 557
OBD diagnosis cable 1.5 m (KTS 540/570) ^(*)	1 684 465 555
Power pack	1 687 022 889
Power supply cable ^(*)	1 684 461 106
Measuring cable blue (KTS 530/540) ^(*)	1 684 430 066
Measuring cable yellow (KTS 530/540) ^(*)	1 684 430 067
Ground cable black ^(*)	1 684 430 068
Measuring cable red/black (KTS 570) ^(*)	1 684 463 214
Measuring cable blue/yellow (KTS 570) ^(*)	1 684 463 550
Test tip red (1x, with KTS 570 2x)	1 684 485 035
Terminal clip black ^(*)	1 684 480 022
Connection cable USB 3 m ^(*)	1 684 465 562
UNI connection cable 4 core ^(*)	1 684 463 539
Case	1 685 438 145
Mount parts set	1 687 001 853
Bluetooth USB adapter (KTS 540/570)	1 687 023 382

^(*) Part subject to wear

5. Technical data

5.1 General data

Property	Value/Range
Operating voltage	7 VDC – 30 VDC
Power consumption through vehicle battery or power supply	approx. 6 Watt
Dimensions (L x W x H)	170 x 120 x 40 mm
Weight (without connecting cables)	325 g
Operating temperature	0 °C – 40 °C
Relative humidity	90 % (at 25 °C)

5.2 Interface protocols

The following interfaces with respective protocols are supported for controller diagnosis in conformance with ISO 15031:

- ISO 9141-2 (Communications lines K and L)
- SAE J1850VPW and SAE J1850PWM (Communication lines BUS+ and BUS-)
- CAN ISO 11898 ISO 15765-4 (OBD) (Communication lines CAN-H and CAN-L)
- CAN Single Wire
- CAN Low Speed

5.3 Power pack

Property	Value/Range
Input voltage	90 – 264 VAC
Input frequency	47 – 63 Hz
Output voltage	15 V
Operating temperature	0 °C – 40 °C

5.4 Multimeter specifications

- CH1 zero potential (blue input is not allowed to be connected with voltage carrying measuring points). Input resistance > 900 kOhm.
- CH2 potential based (black ground input must be connected with vehicle ground). Input resistance > 900 kOhm.

5.4.1 DC measurement (CH1 and CH2)

Property	Value/Range
Measurement range	200 mV – 200 V
Precision CH1	±0.75 % of measurement value, additional ±0.25 % of measurement range
Precision CH2	±2 % of measurement value, additional ±0.5 % of measurement range
Resolution	100 µV – 100 mV (depending on measuring range)

5.4.2 AC and effective value measurement (CH1 and CH2)^{*)}

Property	Value/Range
Frequency range AC	10 Hz – 400 Hz (-3 dB)
Measurement range	200 mV – 200 V
AC precision at 100 Hz EFF precision at ≤ 100 Hz	±2 % of measurement value, additional ±0.5 % of measurement range
Resolution	100 µV – 100 mV (depending on measuring range)

^{*)} The measuring ranges and types of measurement "U" and "I" are peak-to-peak values. This results in the digital display field being grayed out as soon as the defined measuring range has been exceeded for a short time (Overload).

5.4.3 Resistance measurement (CH1)

Property	Value/Range
Measurement range	100 Ω – 1 MΩ
Precision up to 200 KΩ	±0.75 % of measurement value additional ±0.25 % of measurement range
Precision up to 1 MΩ	±2 % of reading additional ±0.25 % of measurement range
Resolution	0.1 Ω – 1000 Ω (depending on measuring range)
Input resistance	> 9 MΩ

5.4.4 Current measurement (CH1 and CH2)

sensor	Measurement range
Shunt (CH1 only)	±600 mA
30 A clamp (CH1 only)	±30 A
100 A clamp	±100 A
600 A clamp	±600 A
1000 A clamp (CH1 only)	±1000 A

5.4.5 Continuity tester (CH1)

Property	Value/Range
Measurement current	2 mA
Open circuit voltage	≤ 5 V
Continuity	< 10 Ω (with acoustic response)

5.4.6 Diode measurement (CH1)

Property	Value/Range
Measurement current	2 mA
Open circuit voltage	≤ 5 V
Maximum diode voltage	2 V

5.5 Oscilloscope specifications

- CH1 and CH2 are potential based (Measuring input CH1(-) or measuring input ground must be connected to the vehicle ground).
- Input resistance > 900 kΩ.

Property	Value/Range
Measurement range	0 – 200 V
Coupling	DC, AC, DC(+) (only positive range is shown), DC(-) (only negative range is shown).
Signal source	U, 30 A (CH1 only), 100 A, 600 A, 1000 A (CH1 only), Diagnosis pins 1 to 15 (not pins 4, 5)
X-deflection	50 µs – 1 s
Trigger mode	Manual, Auto-Time, Auto-Level
Trigger source	CH1, CH2
Pretrigger time	0 – 80 %
Frequency range	> 1 MHz (typical 5 MHz)
Memory depth per channel	50 signal curves with 512 coordinates

5.6 Bluetooth Class 1

Wireless connection KTS 540, KTS 570 to PC/Laptop	Minimum range
Workshop environment in the open space	30 meters
If the vehicle door or window is open and the engine is still running in the vehicle interior	10 meters