TERCO

MADE IN SWEDEN BY TERCO

Automotive Electronics

TERCO
TECHNICAL EDUCATION
WORLDWIDE

Two steps to teach modern vehicle electronics

TERCO Automotive Electronics has been divided into two educational stages:
Automotive Step One which covers basic electricity and electronics and is a training package for the basics of automotive electronics. Training equipment makes it possible to create a simple learning situation, minimize the connection and measurement errors, and above all the time to complete all phases of the course in the time available.
The training package is built around power a base unit, which contains the power supply and is holder of the power adapter and the various lab-cards.

Automotive Step Two shows how different things happen in a vehicle by sending signals on two wires. To demonstrate this, there are two circuit boards that represent the dashboard and a car module for illumination and door closing. PCB dashboard each model are respectively coupled to the CPU.

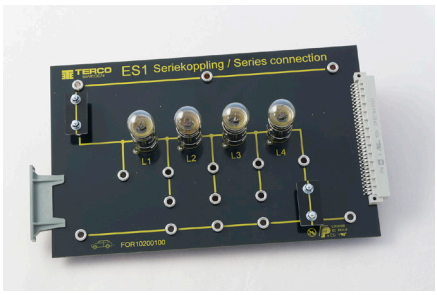
Between CPUs go signals on the two wires (CAN-BUS) for various indications and actions.
A “fault finding unit” placed between CPUs makes it possible to learn the errors that may occur.

Automotive Step One

FOR102000 Base Unit

The power unit contains a power supply and is holder of the power adapter and the various lab cards. Power base unit can also be used to all other lab cards in the System 2000 series.

Mains:	230V / 50Hz
Power Supply:	12V AC and DC, 8A
Dimension:	376x215x355 mm
Weight:	7.8 kg



FOR102001 ES1 Series Connection

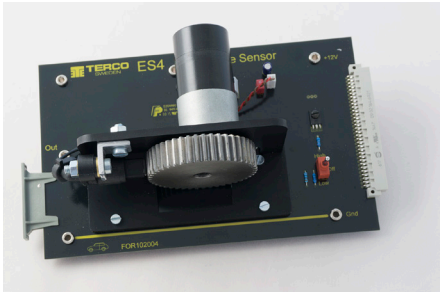
By connecting a number of lamps in series in different ways the student can study the current and the voltage across each lamp.

Dimension:	240x50x140 mm
Weight:	0.3 kg

FOR102002 ES2 Parallel connection

By connecting a number of lamps in parallel in different ways the student can study the voltage and the current through each lamp.

Dimension:	240x50x140 mm
Weight:	0.3 kg



FOR102004 ES4 Inductive Sensor.

This card consists of an inductive sensor and a toothed wheel driven by an electric motor with two different speeds. Speed by switched using a switch. The inductive sensor is an important component in automotive electronics. It is appropriate to use both multimeter and oscilloscope.

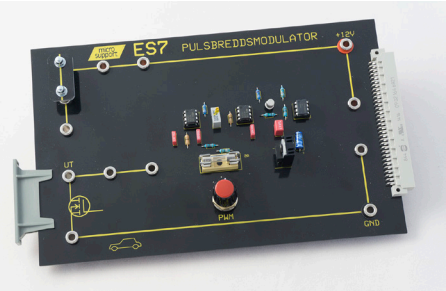
Dimension:	240x80x140 mm
Weight:	0.3 kg

FOR102005 ES5 Hall Sensor.
An electric motor drives a rotor gap where a Hall sensor is placed. Two different speeds can be obtained by means of switches. Measurement done with the oscilloscope.
Dimension: 240x65x140 mm
Weight: 0.3 kg

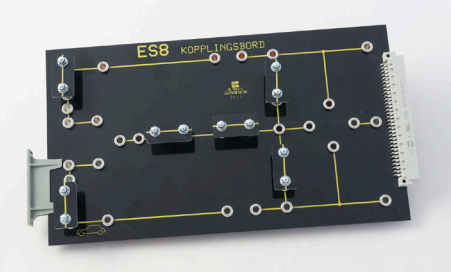
FOR102006 ES6 Relay
The card contains a closing relay, the opening relay and 3 lamp holder. The lamp holder can use bulbs with different power.
Dimension: 260x55x140 mm
Weight: 0.3 kg

FOR102007 ES7 Electronic Power Control PWM.
With electronic control effect can continually be adjusted with pulse width modulation. The losses will be minimal compared to control using resistor.

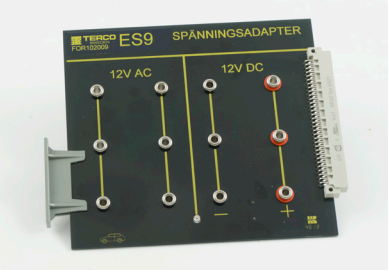
The technique of varying the pulse width of the pulsating DC voltage is used in many applications in vehicles.
Dimension: 240x36x140 mm
Weight: 0.3 kg



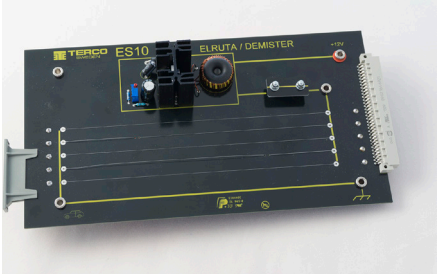
FOR102008 ES8 Terminal Board
The card consists of a number of 4mm connection socket where you can connect components contained in kit component (plug-in components). There are a number of exercises using components which are common in vehicles.
Dimension: 260x18x140 mm
Weight: 0.3 kg



FOR102009 ES9 Power Adapter
12V AC and DC
Dimension: 130x18x140 mm
Weight: 0.1 kg



FOR102010 ES10 Demister
The card is an example of an electrically heated car window. Because the card has a smaller area than a normal car window it uses a lower voltage at the trials so that no overheating occurs.
Dimension: 260x42x140 mm
Weight: 0.2 kg



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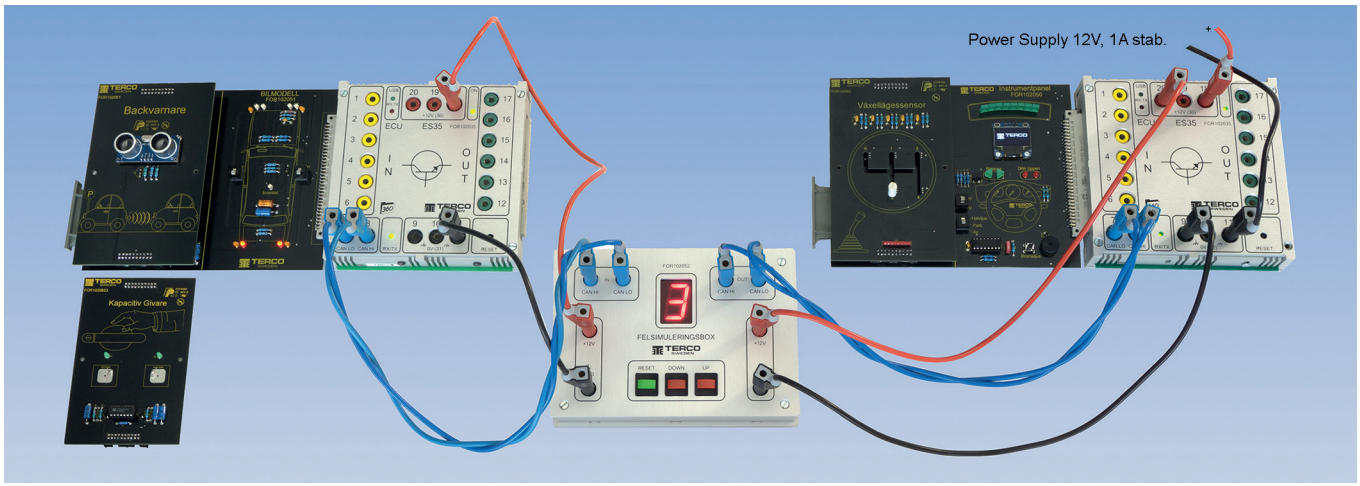
FOR102011 ES11 Component Kit
Component kit for coupling table ES8. The Component kit contains various electrical and electronics components:

- Resistors
- PTC and NTC resistors
- Capacitors
- Diodes
- Transistors
- Switches
- Coil with an iron core
- Lamps
- Wires

Dimension: 335x50x255 mm
Weight: 1.3 kg

Automotive Step Two - CAN-BUS basic



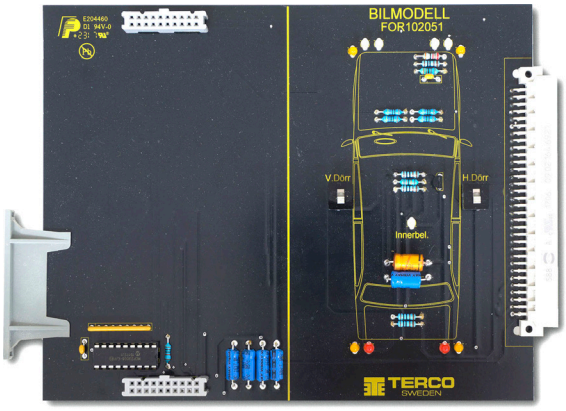
The equipment provides an easy way to visualize communication with CAN-BUS. With the two ES35 control boxes, coupled with the driver's function card (dashboard) and the car's exterior (car model), the communication becomes clear and easy to access.

With the PC-CAN view software, you can watch the data packets sent via the CAN bus communication and thus see how the information differs when activating, for example, the direction and direction indicators right and left. You can also send signals from the software to the control box, thus activating functions.

The two function cards have expansion locations where sensors and actuators can be connected to get additional features to work with. Each expansion card has its own address, which means that the ES35 control box recognizes which card has been connected and communicates with the correct function on the receiving device.

The CAN bus signal can be sent via a fault simulation box where 8 different electrical errors can be advanced via buttons on the panel. Examples of common errors that can be generated:

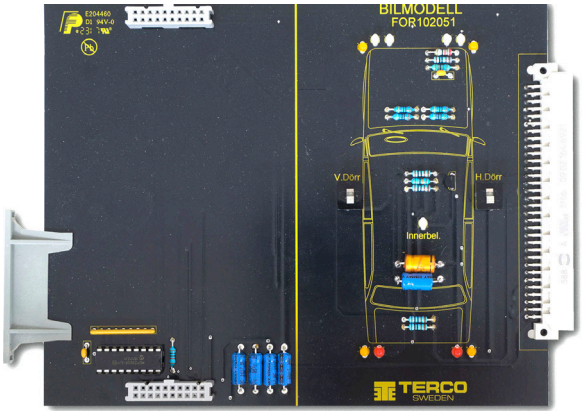
- Short circuit between CAN H and CAN L
- Short circuit between CAN H and +
- CAN H interruption
- Incorrect resistance in termination



FOR102060 Car model with expansion site

- Indicator for interior lighting, headlights, tail lights, brake lights and blinkers
- Indication of open door

Dimension: 175x140x20
Weight: 0.3 kg

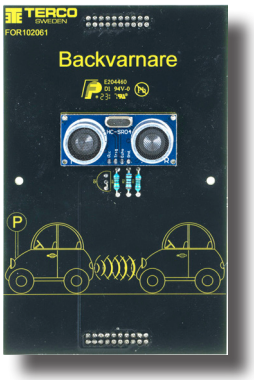


FOR102059 Instrument panel with expansion site

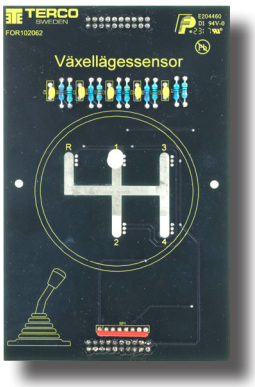
- Switch for parking lights, dipped beam, blinkers and brake lights
- Indicator of blinker / solved door
- Display for displaying messages
- Diodes for simulation of windscreen wipers (rain sensor)

Dimension: 175x140x20mm
Weight: 0.3 kg

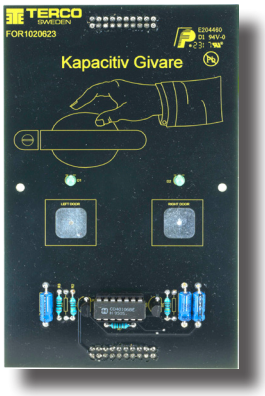
FOR102061 Parking Sensor
With ultrasound, transmitter and receiver,
Indicates distance to obstacles on the dashboard display.
Active distance is 3 - 50cm, at distances less than 30cm, an audio signal is also activated.



FOR102062 Gear Indicator
With the help of hallgivers is indicated on the display in which mode the gear selector is

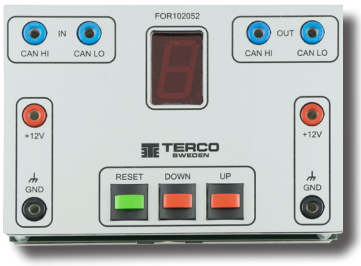


FOR102063 Touch Sensor
2 capacitive sensors, which in this case indicate that the hand approaches the door and unlocks. (In reality, this is combined with signal from the start key.)



FOR102035 ES35 Control Unit
The card has:
6 digital inputs. 6 digital outputs
USB connector
Program and USB cable included

FOR102052 Troubleshooting box for CAN bus. With the troubleshooting box,
8 electrical, Commonly occurring errors are generated.



Using an oscilloscope, CAN-BUS examines the signals, and the error can be detected.

The errors can be set by the teacher with two buttons on the front of the device, and there is also a reset button (reset) of the device.

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MÄT220575 Professional oscilloscope with 20MHz bandwidth, two galvanically insulated channels and two independent 8000 digit multimeters with power measurement.

TFT color screen with 320 x 240 pixels resolution and with LED backlight for clear and accurate reading of measurement data.

Up to 2MB of data can be stored in memory as a wave-form or text file as well as screenshots such as images, bmp. Configuration settings can also be saved.
With insulated USB that has SCPI protocol, it's easy to use remote control. With the rechargeable batteries available up to 8 hours of use.

Delivered with:
- 2 probes 1/10 500 MHz
- 2 banana adapters
- cable set, red / black with crocodile clips and measuring tips
- charger 230 V AC and rechargeable batteries
- bag
- USB cable HX0056-Z and 1 CD with SX-Metro software
- USB drivers

Specifications

Channels	2
Inputs/ Bandwith	2 X 600V Isolated channels / 20MHz
Max. sampling rate	2GS/s in ETS – 50MS/s in Single Shot Mode on each channel (9 bits
Sensitivity	≤ 1.2 divisions p-p up to 20 MHz
Communication	USB
Memory Depth	2500 points/channel
Warranty	3 year
Safety	IEC/EN 61010-1 (1000V CAT II; 600V CAT III), IEC 1326-1

MÄT220118 Digital multimeter
TRMS multimeter with a bandwidth up to 1 kHz. The instrument has built-in voltage indication, so-called ”phase function”.

Measurement of current up to 10 A as well as capacitance and temperature with thermocouple type K. Further available is Min / Max function and relativity measurement.

The instrument is rated for category IV 600V and has a large, backlit 6000-digit display with
bargraph function.

Automatic voltage detection and auto shutdown. Built-in shock protection and high enclosure class

Exercises are included and covers the following areas:
Part 1
- Basic concepts
- Basic measurement techniques in the electricity
- Series and parallel connection
- Lines and connections
- Thermistors
- The useful magnetism
- Resistor and capacitor
- Diode - Zener diode - Conformity
- Transistor
- Electronic power control PWM

Part 2
- Basic exercises on CAN-BUS
- Fault finding (see Fault finding Unit above)

ORDER SPECIFICATION part 1		
Order code	Description	**Pcs**
FOR102000	Base Unit	1
FOR102101	ES1 Series connection	1
FOR102002	ES2 Parallel connection	1
FOR102004	ES4 Inductive Sensor	1
FOR102005	ES5 Hall Sensor	1
FOR102006	ES6 Relay	1
FOR102007	ES7 Electronic Power Control PWM	1
FOR102008	ES8 Terminal Board	1
FOR102009	ES9 Additional Power Supply	1
FOR102010	ES10 Demister	1
FOR102011	ES11 Component Kit	1
ELE102004	Storage rack 2-row & CA5233 Multimeter	1
MAT220575	OX5022-CK Hand oscilloscope 20MHz incl. software	1
MAT2200118	CA5233 Digital Multimeter TRMS	1
	Exercises part 1 CAN-BUS Basic.	1

ORDER SPECIFICATION part 2		
Order code	Description	**Pcs**
FOR102000	Base Unit	1
FOR102058	Base card Sensor for Automotive Electronics	1
FOR102061	Parking Sensor	1
FOR102062	Gear Indicator	1
FOR102063	Touch Sensor	1
FOR102064	Rain Sensor	1
FOR102035	ES35 DATABOX	2
FOR102059	Instrument Panel, CAN-BUS Card	1
FOR102060	Car model, CAN-BUS Card	1
FOR102052	Fault Simulator Box, CAN-BUS (ES35)	1
FOR102057	Base Unit without power supply	1
MAT220575	OX5022-CK Hand oscilloscope 20MHz incl. software	1
MAT2200118	CA5233 Digital Multimeter TRMS	1
	Exercises part 2 CAN-BUS Basic.	1

TERCO HEADOFFICE

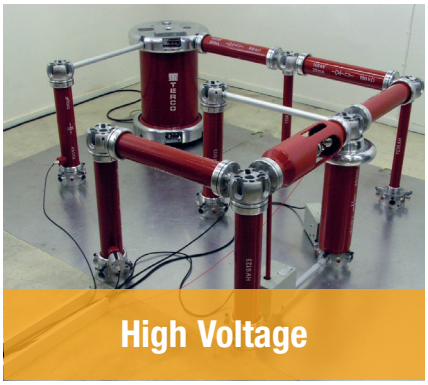
TERCO headoffice and factory outside Stockholm, Sweden

TERCO AB was founded in 1963 with the aim of producing and supplying practically oriented equipment for technical education.

TERCO develops, manufactures and markets advanced equipment and systems for technical education. TERCO is today represented in more than 50 countries world wide.

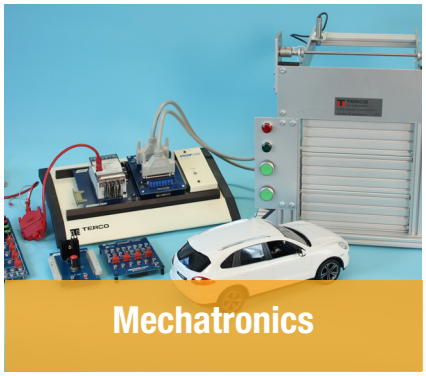
TRAINING FOR TOMORROW´S WORLD

Power Systems

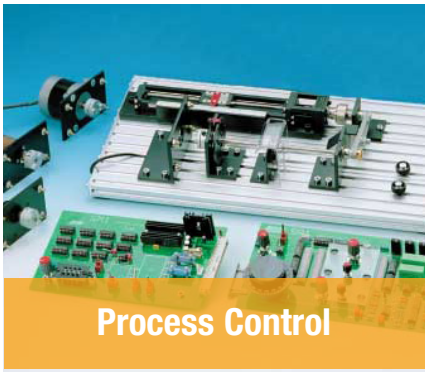


High Voltage

Electrical Machines & Drives



Mechatronics



Process Control

Energy

Material Testing

Furniture & Power Distribution

Training

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