

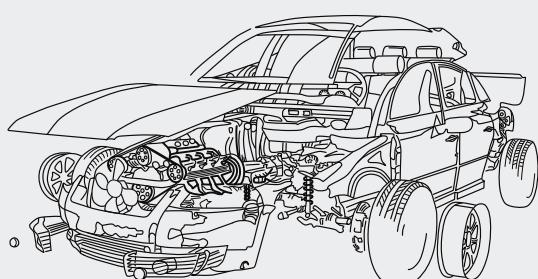
Explain to me  
and I will  
forget

Show me and I will  
remember

Let me do it and I  
will  
understand

Confucius

**THEPRA**  
AUTOMOTIVE TRAINING





## About us

For over 50 years, THEPRA has been developing teaching aids for optimal training and continuing education in automotive professions. Many training institutions, from small driving schools to large state training institutions, rely on our expertise – worldwide.

To this day, the focus remains on offering students and instructors a perfectly coordinated “learning ecosystem.” During development, teaching professionals work hand in hand with engineers, always guided by one maxim: as complex as necessary, as simple as possible. This ensures rapid learning success, keeping trainees up to date with the latest developments and, what's more, making learning fun.

At the same time, THEPRA developers think one step ahead for each module, considering future technical challenges and planning for integration into the overall system. This makes it easy to adapt or expand the system to meet the current needs of the automotive industry. The timeless yet always modern simplicity of the design and the consistency of the functional layout speak for our form of sustainability. THEPRA – the evolution of education!

### Certificates:

ISO 9001:2015 / ISO 14001:2015



## Contact

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## Chapter overview

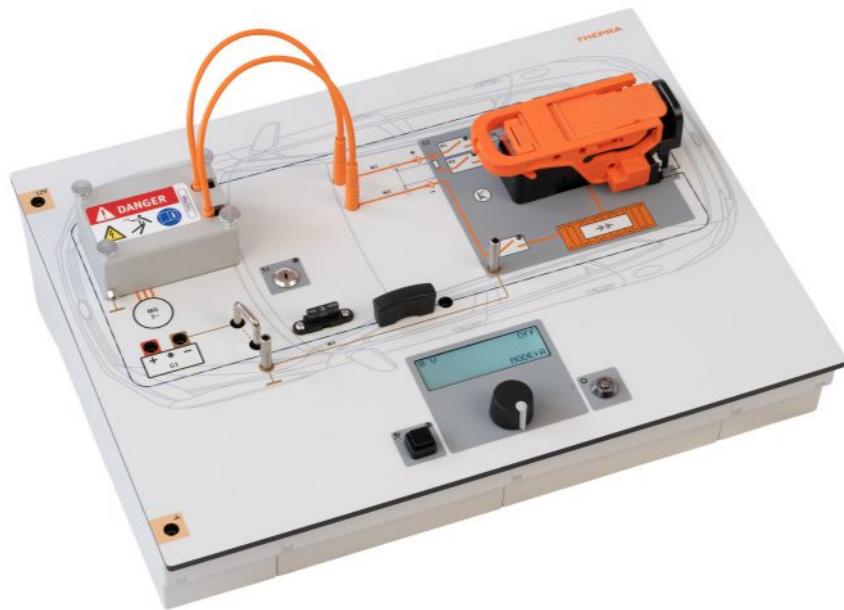
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## Training Packages Laboratory Trainer

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Art.-Nr. 14 025 310

Manual 120 pages	
399 x 150 x 297 mm	
10 V - 15 V DC (3 A)	
EQF-Level	



## Training Package Automotive Lock-out Trainer 2.0

Innovative laboratory trainer for safety in handling HV vehicles. With this flexible system you can safely train different manufacturer methods of deactivation. In addition, insulation testing and equipotential bonding measurements with workshop measuring instruments are possible.

### Features

- Clear representation of the components and circuit with coloured imprint
- LCD display for control and display of all information
- Insulation test with different values
- Equipotential bonding measurements with different values
- Special mode for measuring the charging and discharging process
- Behaviour in case of accident and rescue, different situations
- Voltage reduced 10:1, display 400 V - in fact only 40 V are present
- Original maintenance plug, base lockable with padlock, pilot line measurable

### Equipment

- Laboratory trainer in console housing for use on the table or in DIN A4 support frame
- LCD display with rotary push-button switch, 2 x key switches, original maintenance plug
- 2 x ground contact points for equipotential bonding, 2 x sockets for power supply with 12 VDC
- 13 x connection sockets for measuring, 2 x with jumper plug
- 2 x HV-cable orange, fuse, switch for airbag
- Power supply TS10
- HV-Accessory set universal

### Learning content

- Apply safety rules: disconnect (various methods), secure against reconnection, ensure that there is no voltage, log the steps
- Carrying out insulation tests and equipotential bonding measurements with workshop measuring instruments

### Recommended additional equipment

- Metrahit IM E-Drive BT SW Set



## Training Package Automotive HV-Safety Trainer

Training system for enabling and diagnosing high-voltage vehicles. The extensive fault circuitry includes interlock faults as well as single and multiple insulation and equipotential bonding faults. This makes it possible to safely diagnose situations that could be life-threatening on a real vehicle.

### Features

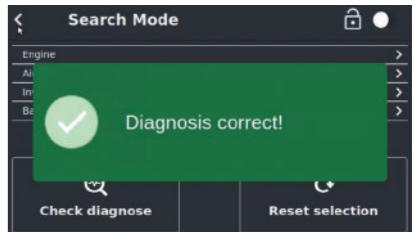
- Disconnecting / reconnecting, various methods, accident situation, pilot line, technical safety principles.
- Charging and discharging curves (parking / accident), inverter and motor signals, actual measurement of high-voltage voltages
- 5 x earth contact points for potential equalisation, 2 x sockets for power supply with 12 VDC.
- 10 practical situations, plus complete work orders and 26 switchable faults
- Diagnostic input mode offers the learner the possibility to have the supposedly found faults and the diagnosis checked by the system.
- Insulation test: motor U V W, air-conditioning A/C + -, battery HV + -, line orange
- Potential equalisation measurements on all individual components
- Special mode for measuring the PWM inverter output signal under voltage
- Use with real 202 V (under 5mA) or 40 V extra-low voltage.
- Original maintenance plug, base lockable with padlock, pilot line measurable.

### Equipment

- Laboratory trainer in desk housing for use on a table or in a DIN-A4 support frame.
- 5 inch touch screen display with multilingual control software, 2 x key switches, original maintenance plug
- 23 x connection sockets for measuring, 7 x with jumper plug, 3 x HV cable orange with shielding, one of them defective.
- Power supply TS10
- HV-Accessory set universal

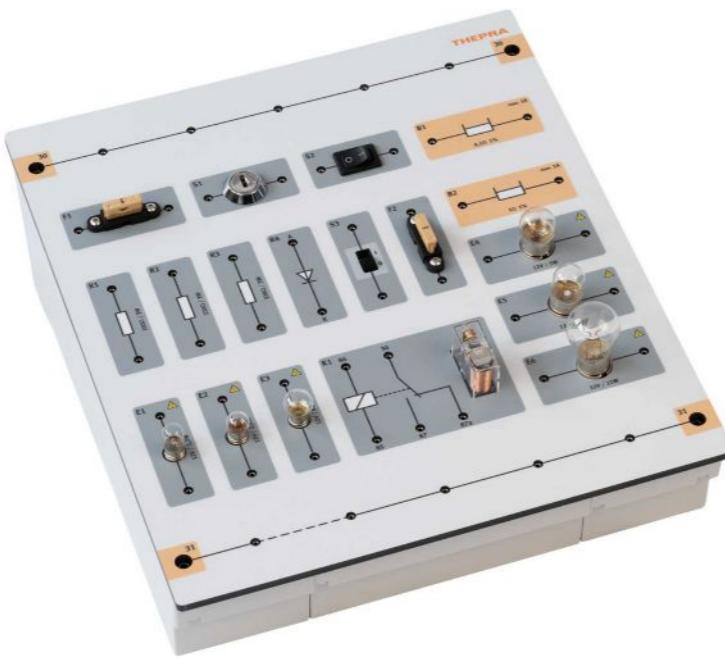
### Accessories

- Metrahit H+E Car Set



Item no. 14 025 020

Manual 60 pages	
266 x 100 x 297 mm	
10 V - 15 V DC (3 A)	
EQF level	

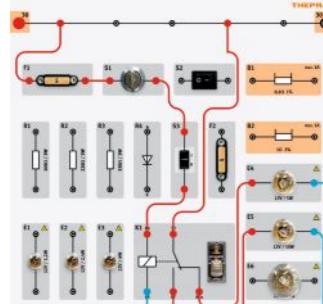


## Training Package Automotive Electrics Trainer

Compact, versatile learning system for automotive electrics - basic laws and circuit diagnosis. All components can be freely wired according to real automotive electrical circuits.

### Features

- Clear display of the available components with coloured imprints
- Wire any circuits - just like with conventional plug-in modules
- Electronically protected components



### Learning content

- Getting to know electrical components and symbols according to equipment
- Interpreting electrical laws in vehicle-related circuits
- Multimeter as a measuring device

### Equipment

- Laboratory trainer in desk housing for use on the table or in the DIN-A4 support frame.
- 3 x various switches, 2 x fuse, 2 x precision shunt, 6 x automotive lamps, 3 x resistor, diode, relay
- 49 x connection sockets for wiring and measuring, 4 x sockets for power supply
- Cable set Lab trainer 2mm
- Power supply TS10

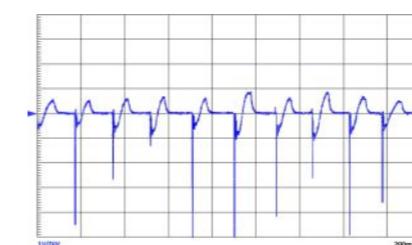


## Training Package Automotive Sensors Trainer

Compact, versatile learning system for automotive sensor technology - diagnostic basics. All components can be freely wired according to real automotive electrical circuits.

### Features

- Clear display of the available components with coloured imprints
- Wire any circuits - just like with conventional plug-in modules
- Electronically protected components



### Equipment

- Laboratory trainer in desk housing for use on the table or in the DIN-A4 support frame.
- 2 x fuse, switch, 5 V DC voltage source, piezo sensor as knock sensor, hot film sensor, induction sensor, Hall sensor and encoder wheel
- 2 x precision shunt, pulse-width frequency generator to control encoder wheel, 2 x temperature-dependent semiconductor resistors (NTC, PTC)
- 3 x resistors, potentiometer, NPN power transistor, photo resistor, lamp, photo diode/photo element, pressure/force sensor
- 54 x connection sockets for wiring and measuring, 4 x sockets for power supply
- Cable set Lab trainer 2mm
- Power supply TS10

### Learning content

- Getting to know vehicle-typical sensors according to equipment
- Interpret sensor-typical voltage values in vehicle-related circuits
- Multimeter and oscilloscope as measuring instruments



Item no. 14 025 220

Manual 57 pages	
266 x 120 x 297 mm	
10 V - 15 V DC (3 A)	
EQF level	2  3  4

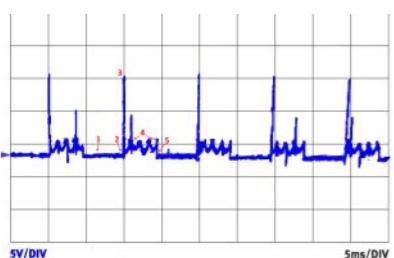


## Training Package Electronics and Actuators Trainer

Compact, versatile learning system for automotive electronics and actuators. All components can be freely wired according to real automotive electrical circuits.

### Features

- Clear display of the available components with coloured imprints
- Wire any circuits - just like with conventional plug-in modules
- Electronically protected components



### Equipment

- Laboratory trainer in desk housing for use on the table or in the DIN-A4 support frame
- 2 x fuse, switch, 2 x precision shunt, pulse width frequency generator for simulation of control units
- 5 V DC voltage source, capacitor, 3 x resistors, potentiometer, rectifier diode, Z-diode, thyristor
- NPN transistor, field-effect transistor, 2 x lamps, relay, proportional solenoid valve, collector motor
- 65 x connection sockets for wiring and measuring, 4 x sockets for power supply
- Cable set lab trainer 2mm
- Power supply TS10

### Learning content

- Getting to know vehicle-typical electronic components and actuators according to equipment
- Interpret typical voltage values in vehicle-related circuits
- Multimeter and oscilloscope as measuring instruments

### Recommended accessories

- Cable set lab trainer 2mm
- Power supply TS10

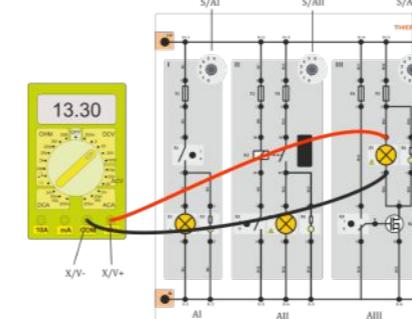


## Training Package Multimeter Diagnosis Trainer

Innovative laboratory trainer for learning the electrical and electronic basics for safe use of the multimeter. Automotive reference with three typical, simple circuits for automotive lamps: conventional, with relay, with transistor.

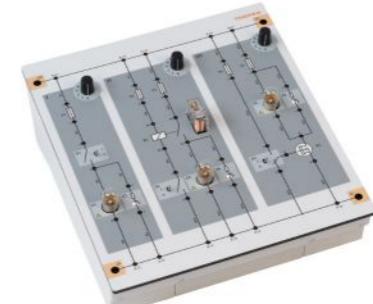
### Features

- Automotive reference with three typical, simple circuits for automotive lamps: conventional, with relay, with transistor.
- Six individual faults can be selected in each circuit via rotary switch
- 47 measuring sockets are available for troubleshooting and voltage drop measurements
- Colour-printed circuits in standard-compliant representation



### Learning content

- Getting to know typical lamp circuits
- Using the multimeter to measure voltage
- Measuring at the right place in the wiring harness
- Interpret measured voltages correctly and thus identify the actual cause of a fault
- Using partial voltage measurements in intact and defective circuits as a diagnostic method
- Create and evaluate setpoint/actual value protocols



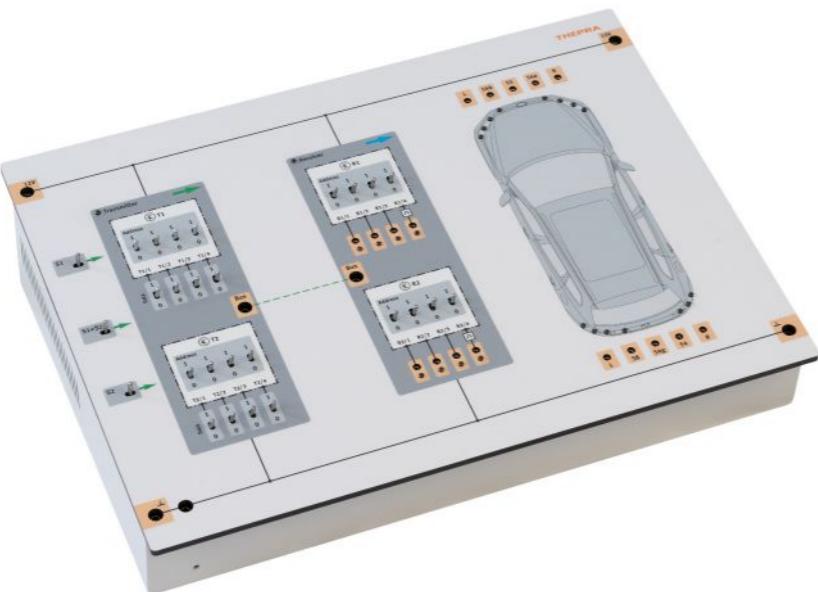
### Equipment

- Laboratory trainer in desk housing for use on the table or in the DIN-A4 support frame
- 3 x rotary switches with seven positions for errors, 3 x toggle switches for on/off
- 3 x car lamp sockets fitted with 10 W lamps (12 V), 3 x LED, 1 x relay
- 47 x measuring sockets, 4 x sockets for power supply
- Detailed documentation and extensive worksheets for teachers and students
- Power supply TS10



Item no. 14 025 060

Manual 57 pages	
665 x 150 x 297 mm	
10 V - 15 V DC (3 A)	
EQF level	2 3

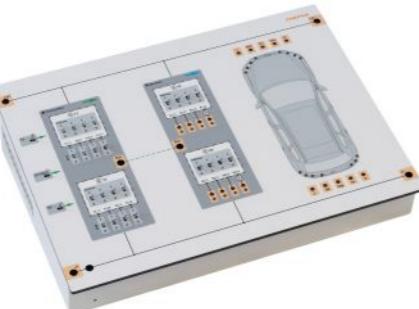


## Training Package Automotive Bus Systems Basics Trainer 2.0

This laboratory trainer is excellent for initiating the transition from conventional circuits to networked systems. You define addresses for the control units and send free messages. At the outputs, you connect existing lighting units or use the integrated LED lights.

### Features

- Two transmitting and two receiving units, each unit can be freely assigned a 4-bit address for communication.
- The two transmitting units can each send 4-bit freely defined messages at the push of a button, either individually or simultaneously
- Messages on the bus line can be measured and recorded with an oscilloscope
- Outputs with power relays for use of automotive lamps
- Use of workshop-standard measuring instruments, oscilloscope
- 6 x connectors in 4mm safety version, 14 x connectors in 4mm safety version
- Didactically prepared documents with tasks and worksheets as well as the corresponding solutions



### Equipment

- Laboratory trainer in a desk housing for use on a table or in a DIN-A4 support frame.
- 3 x transmit switches, 8 x data switches, 16 x address switches
- 1 x transmitting unit with transparent window, 1 x receiving unit with transparent window with 8 indicator LEDs
- 8 x outputs with LEDs
- 15 x LED's in imprinted vehicle
- Detailed documentation and extensive worksheets for teachers and students
- Power supply TS10

### Learning content

- Introduction to networked systems in modern vehicles
- Bus systems and topology
- Serial communication, information packets Addresses and data blocks, processing
- Data in binary mode, binary system, conversion of values, bit meaning LSB / MSB addresses
- Conversion of binary values into hexadecimal address assignments
- Collisions of data packets
- Using the oscilloscope, identifying and interpreting messages
- Controlling vehicle lighting in different situations by sending different messages to the respective receivers via a single line



## Laboratory Trainer Accessories

Item no. 12 150 B10



### Power supply TS10

This power supply fits all THEPRA laboratory trainers. It offers a variable 4-15 V DC voltage output at  $I_{max}$  6 A.

Item no. 12 090 405



### Table frame DIN A4

Aluminium design, suitable for all THEPRA laboratory trainers with console housings. Various dimensions available.

Item no. 38 066 050



### HV accessory set universal

Accessory set for safe work on high-voltage vehicles and teaching equipment. The case contains gloves, voltage testers, etc.

Item no. 16 162 150



### Metrahit H+E Car-Set

Test case kit with: Metrahit 27 in protective rubber cover orange, test probes, 1 pair of test leads 2 m, 1 pair of Kelvin test leads with crocodile clips

Item no. 16 062 014



### Digital multimeter Fluke 175

Universal digital multimeter with outstanding technical capabilities. Simple operation, TrueRMS true effective value.

Item no. 16 152 040



### PicoScope 4-Channel Starter Set

USB oscilloscope 4-channel for car diagnosis. The set includes the oscilloscope, the software and common test leads.



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## Training Packages T-Varia

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Item no. 14 025 070

Manual 123 pages	
71 x 110 x 178 cm	
13,8 V DC (40 A)	
EQF level	



## Training Package T-Varia Lighting

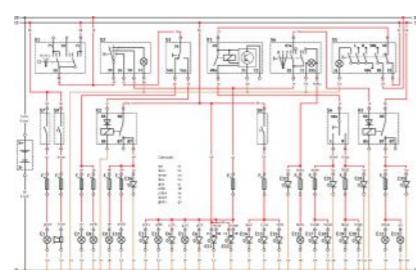
The basic equipment of the modular training systems for T-Varia Connect. This is ideal for assembling individual components into a complete system. Here, trainees learn to create and read circuit diagrams, assign terminal designations and wire the system in a functional way.

### Features

- Wiring of all original automotive components according to circuit diagrams
- Terminal designations according to DIN 72552, with schematic printing
- Quick and easy hidden insertion of practical faults into the circuit structure
- Additional integrated fault circuit with 20 faults, lockable with cover
- Use of workshop-standard test equipment for diagnosis and troubleshooting.
- All connections in 4mm / 6mm safety version for wiring and measuring
- Didactically prepared documents with tasks and worksheets as well as the corresponding solutions

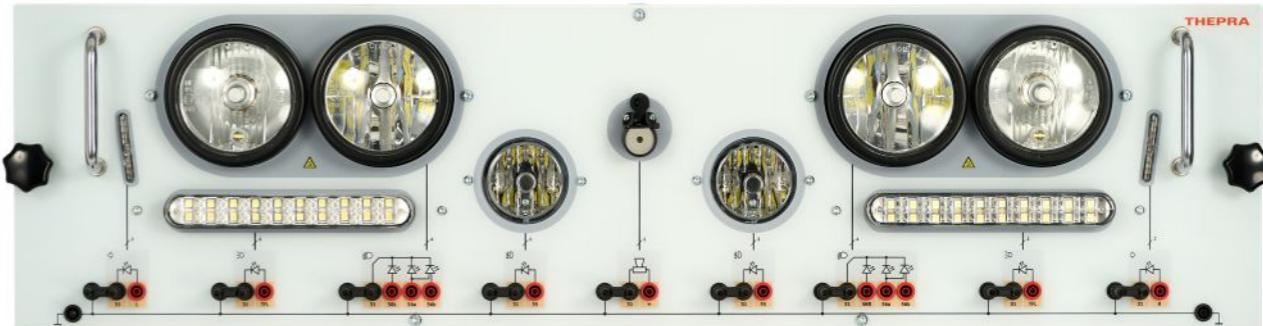
### The starter set contains

- T-Varia cart in aluminium design
- T-Varia front lighting
- T-Varia controls with 20 switchable faults
- T-Varia rear lighting
- T-Varia Trailer
- Cable set, various lengths and colours
- Power supply 3-15 V, 40 A



### Learning content

- Understand and apply automotive circuit diagrams
- Naming electrical and electronic components, assemblies and systems
- Testing and repairing electrical and electronic circuits
- Selecting and using electrical measuring and testing equipment
- Measuring and evaluating electrical quantities and signals
- Documenting work results and evaluating them by comparing them with calculated values and manufacturer's specifications.



## T-Varia Front Lighting

### Features

- Wiring of all original automotive components in accordance with circuit diagrams
- Terminal designations according to DIN 72552, with schematic printing
- Quick and easy hidden insertion of practical faults into the circuit diagram, also combined with fault circuitry of the system panel "control panels"
- Use of workshop-standard inspection and test equipment for diagnosis and troubleshooting.
- 32 x connections in 4mm safety version, 4 x

with jumper plugs for wiring and measuring

- Didactically prepared documents with tasks and worksheets as well as the corresponding solutions

### Equipment

- T-Varia system panel suitable for T-Varia equipment cart
- Design with coloured digital print behind Plexiglas, circuit diagrams and symbols, two chrome-plated handles for easy handling, as well as rear cover.
- 2 x double headlamps with H7 bulb for high beam and H4 bulb for low beam. And one lamp each 12V 5W (W5W) in glass base design for parking light.
- 2 x modern fog lights in clear glass version with free-form reflectors and H3 bulbs.
- 2 x daytime running light lamps in LED version
- 2 x modern indicator lamps in LED version orange
- 1 x horn electronic



## T-Varia Controls

### Features

- Wiring of all original automotive components in accordance with circuit diagrams
- Terminal designations according to DIN 72552, with schematic printing
- Quick and easy hidden insertion of practical faults into the circuit structure
- Additional integrated fault circuit with 20 faults, lockable with cover
- Use of workshop-standard test equipment for diagnosis and troubleshooting.
- 85 x connections in 4mm safety version, including 2 x with 6mm safety version, for wiring and measuring
- Didactically prepared documents with tasks and worksheets as well as the corresponding solutions

ke lights, 1 x rocker switch for e.g. reversing lights

- 1 x flasher relay standard version, 2 x working relay switch version
- 5 x indicator lights in red, green, yellow and blue
- Lockable fault switch box with 20 jumper plugs for interruption or for insertion of transition or load resistor



## T-Varia Rear Lighting

### Features

- Wiring of all original automotive components according to circuit diagrams
- Terminal designations according to DIN 72552, with schematic printing
- Quick and easy hidden insertion of practical faults in the circuit diagram, also combined with fault circuit of the system panels "controls"
- Use of workshop-standard inspection and test equipment for diagnosis and troubleshooting.
- 33 x connections in 4mm safety version, 2 x of which with jumper plugs for wiring and measuring

### measuring

- Didactically prepared documents with tasks and worksheets as well as the corresponding solutions

### Equipment

- T-Varia system panel suitable for T-Varia equipment cart
- Design with coloured digital print behind Plexiglas, circuit diagrams and symbols, two chrome-plated bow handles for easy handling, as well as rear cover
- 2 x rear lights in modern LED design with rear light, brake light and indicator functions
- 1 x number plate light in LED version, 1 x third brake light, 1 x rear fog light in modern clear-glass version, 1 x reversing light in modern clear-glass version
- 1 x trailer socket in 13-pin version



## T-Varia Trailer

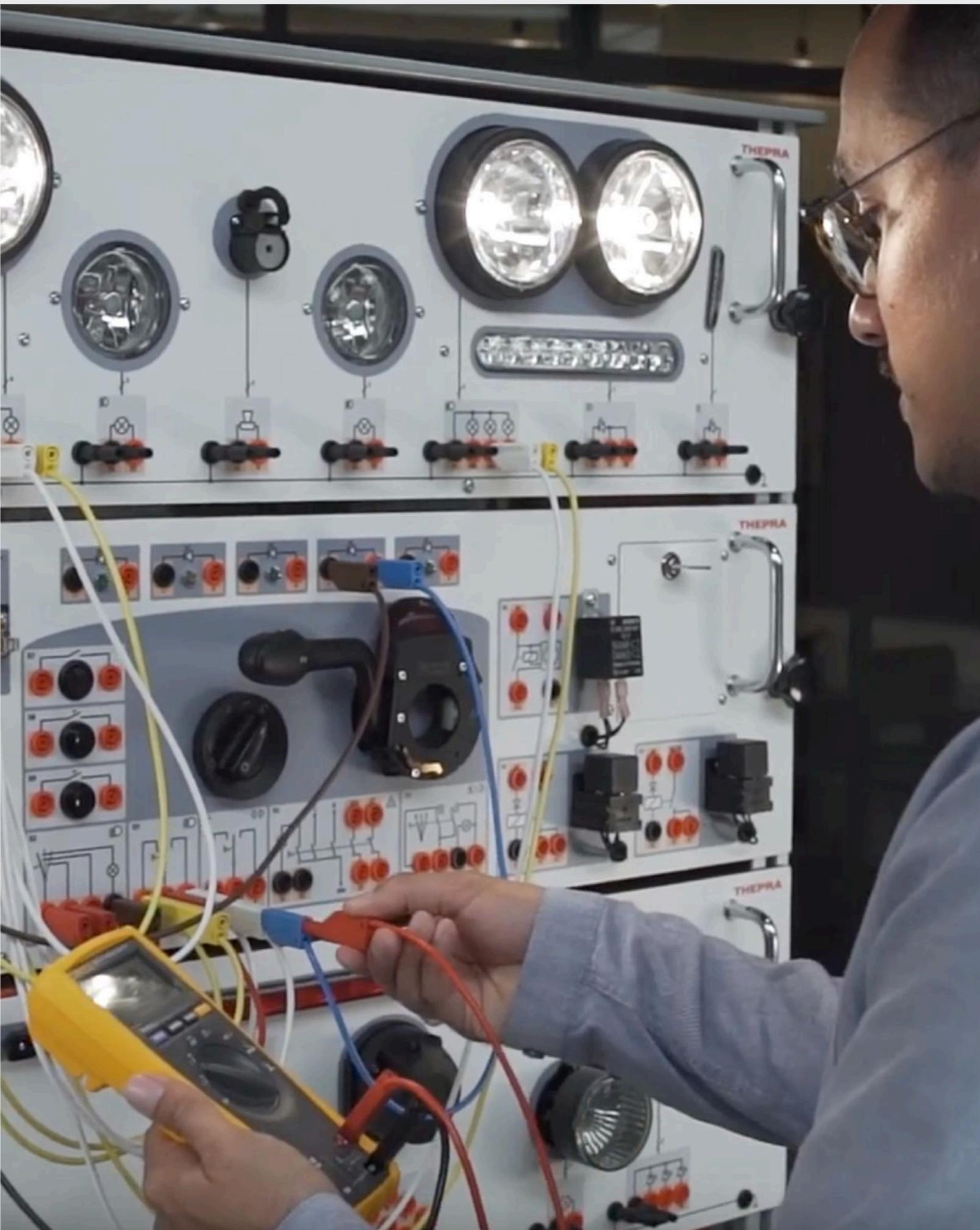
### Features

- Wiring of all original automotive components in accordance with circuit diagrams
- Terminal designations according to DIN 72552, with schematic printing
- Quick and easy hidden insertion of practical faults in the circuit layout
- Use of workshop-standard inspection and test equipment for diagnosis and troubleshooting
- 43 x connections in 4mm safety version, 10 x of which with jumper plugs for wiring and measuring
- Didactically prepared documents with tasks and worksheets as well as the corresponding solutions

### and worksheets as well as the corresponding solutions

### Equipment

- T-Varia system panel suitable for T-Varia equipment cart
- Design with coloured digital print behind Plexiglas, circuit diagrams and symbols, two chrome-plated bow handles for easy handling, and rear cover
- 2 x trailer tail light (left/right) with the functions tail light, brake light, indicator, number plate light, rear fog light and reversing light
- 1 x trailer plug with 50cm cable for connection with T-Varia rear lighting
- Cable set complete with matching laboratory cables in safety version



Item no. 14 025 170

Manual 105 pages	
71 x 110 x 178 cm	
13,8 V DC (40 A)	
EQF level	2 3

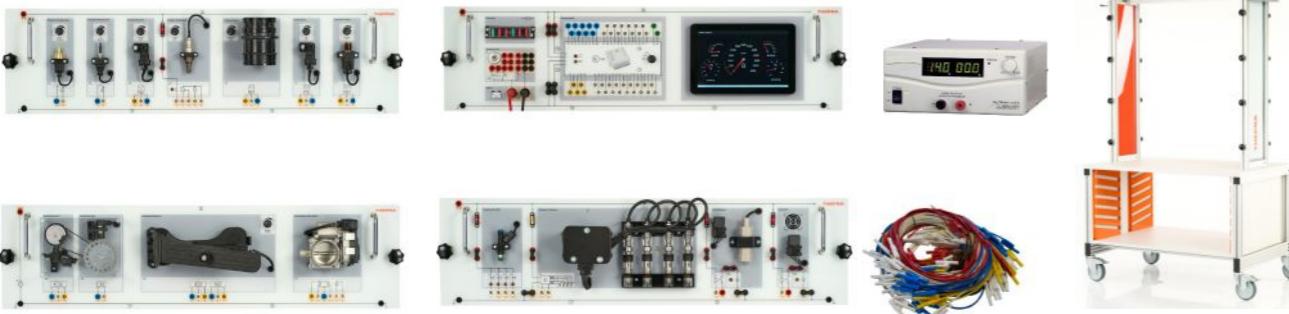


## Training Package T-Varia Motor management

The basic equipment of the modular training systems for T-Varia Connect engine management. The ideal system for getting to know the complex interaction of electrical and electronic vehicle components in a practical way using original parts: engine management basics - error-free, low-noise, without emissions.

### Features

- The T-Varia Connect System engine management enables the fully functional operation of MPI, FSI and TDI engine management systems: Simply preselect the operating mode and replace the actuators system panel!
- The engine control unit is error-free in every situation, the display provides additional measured values.
- The system allows operation with individual components, and thus a step-by-step build-up to the complete system.
- Wiring of all original car components according to the wiring diagram
- All connections in 4mm / 6mm safety version for wiring and measuring
- Didactically prepared documents with tasks and worksheets as well as the corresponding solutions



### The starter set contains

- T-Varia cart in aluminium design
- T-Varia engine sensors
- T-Varia engine management control unit
- T-Varia engine drive unit
- T-Varia engine management actuators MPI or FSI
- Cable set, various lengths and colours
- Power supply 3-15 V, 40 A

### Classification of the system

The T-Varia engine management system is designed for thematic entry. There is no OBD plug, as no system diagnosis is trained.

### Learning content

- Working with circuit diagrams
- Naming electrical and electronic components, assemblies and systems
- Selecting and using electrical measuring and testing equipment
- Measuring and evaluating electrical quantities and signals
- Documenting work results and evaluating them by comparing them with calculated values and manufacturer's specifications.



## T-Varia Engine Sensors

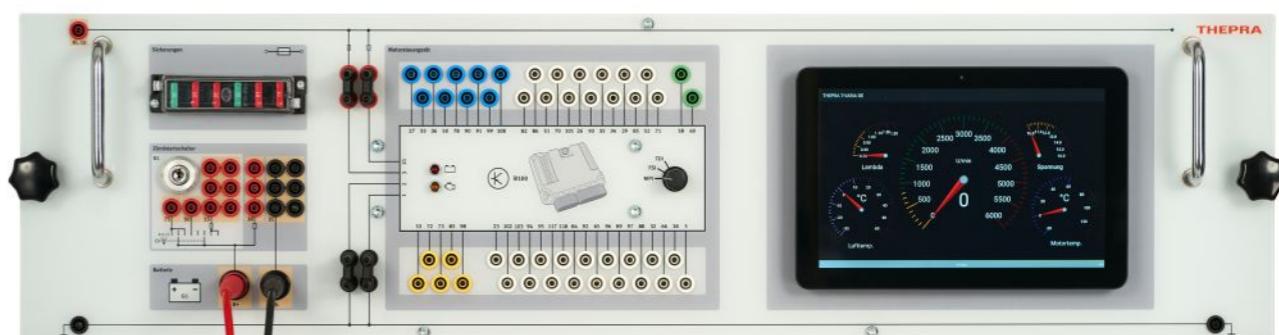
### Features

- Wiring of all original vehicle components in accordance with the wiring diagram
- Each sensor can be operated, controlled and measured individually
- Each sensor is adjustable and provides correct signals
- All components required for the intended operation of an MPI, FSI or TDI engine are included
- Terminal designations with schematic printing

### Equipment

- T-Varia system panel suitable for T-Varia equipment cart
- Design with coloured digital print behind Plexiglas, circuit diagrams and symbols, two chrome-plated bow handles for easy handling, and rear lid
- Original cooling water temperature sensor, potentiometer for signal adjustment
- Original intake air temperature sensor, potentiometer for signal adjustment
- Original intake manifold pressure sensor,

- potentiometer for signal adjustment
- Original wideband lambda sensor, potentiometer for signal adjustment
- Original hot-film air mass sensor, potentiometer for signal adjustment
- Original boost pressure sensor, potentiometer for signal adjustment
- Original fuel pressure sensor, potentiometer for signal adjustment



## T-Varia Engine Control Unit

### Features

- Wiring of all original vehicle components according to wiring diagrams
- Programmable control unit with mode selector switch
- Optional operation of an MPI, FSI or TDI control unit
- Colour coding of the connections: Minus 5 volts (blue), plus 5 volts (yellow), signals (white), pulse 12 volts (red), minus 12 volts (black)
- Didactic arrangement: Inputs at the top, outputs at the bottom
- All important signals and data are shown "live" on the integrated 10 inch touch screen display. By swiping, you can choose

between 4 different screens/arrangements

- MPI, FSI, TDI
- Fuse box, ignition lock, 2 x indicator lights for ignition/fault

### Equipment

- T-Varia system panel suitable for T-Varia equipment cart
- Design with coloured digital print behind Plexiglas, circuit diagrams and symbols, two chrome-plated bow handles for easy handling, and rear cover
- Engine control unit with selector switch for



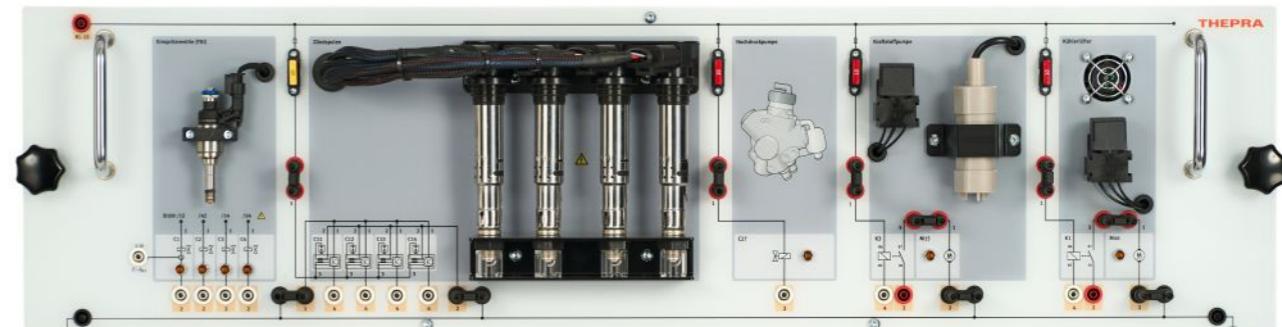
## T-Varia Engine Drive Unit

### Features

- Wiring of all original vehicle components in accordance with the wiring diagram
- Original components connected to the engine control unit according to the circuit diagram
- All components for the intended operation of an MPI, FSI or TDI engine are included
- Rotating parts protected against contact
- Terminal markings with schematic printing
- 20 x terminals in 4mm safety version for wiring and measuring

### Equipment

- T-Varia system panel suitable for T-Varia equipment cart
- Design with coloured digital print behind Plexiglas, circuit diagrams and symbols, two chrome-plated handles for easy handling, as well as rear cover
- Original Hall sensor as camshaft sensor, original inductive speed sensor as crankshaft sensor
- Signal pulleys electrically driven via toothed belt
- Original accelerator pedal, potentiometer for optional value setting at the accelerator pedal, original throttle valve unit



## T-Varia Engine Actuators FSI (Additional Equipment)

### Features

- Wiring of all original vehicle components in accordance with the wiring diagram
- Original components connected to the engine control unit according to the circuit diagram
- The modular T-Varia system becomes a fully functional FSI petrol direct injection system
- Actuators can be operated and measured individually
- Terminal designations with schematic printing

### Equipment

- T-Varia system panel suitable for T-Varia equipment cart
- Design with coloured digital print behind Plexiglas, circuit diagrams and symbols, two chrome-plated handles for easy handling, as well as rear cover
- Original FSI injection valve with 4 x LED, 4 x original single spark ignition coil with 4 x LED
- 4 x original spark plugs, representation of high-pressure pump with fuel pressure control valve and LED
- Fuel pump with relay and LED, cooling fan with relay and LED, 4 x fuse



## T-Varia Engine Actuators MPI

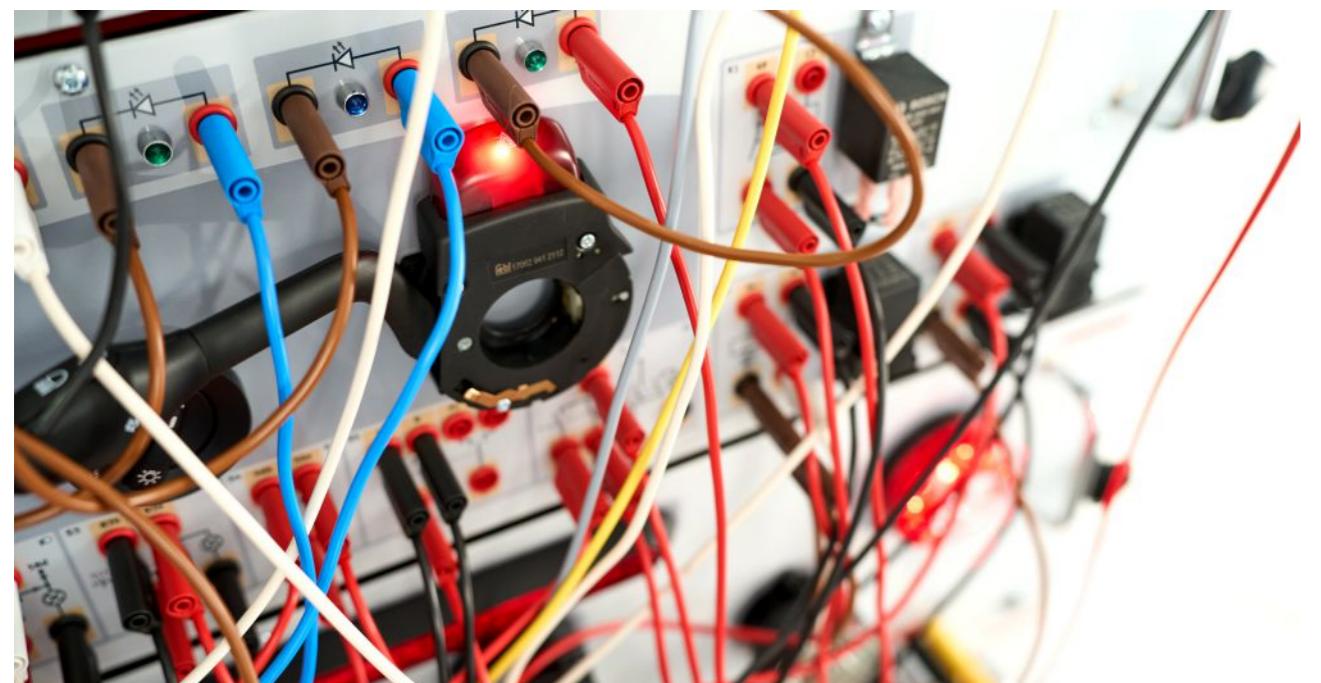
### Features

- Wiring of all original vehicle components in accordance with the wiring diagram
- Original components connected to the engine control unit according to the circuit diagram
- The modular T-Varia system becomes a fully functional multipoint petrol injection system
- Actuators can be operated and measured individually
- Terminal designations with schematic printing
- 31 x terminals in 4mm safety version for wiring and measuring
- Didactically prepared documents with tasks and worksheets as well as the corresponding solutions

### Equipment

- T-Varia system panel suitable for T-Varia equipment cart
- Design with coloured digital print behind Plexiglas, circuit diagrams and symbols, two chrome-plated handles for easy handling, as well as rear cover
- Original injection valve MPI with 4 x LED, original double spark ignition coil
- 4 x original spark plugs, fuel pump with relay and LED
- Radiator fan with relay and LED, 4 x fuse





## Accessories T-Varia

Item no. 11 010 020



### T-Varia cart

The mobile cart for holding up to eight T-Varia system panels. Loading from the front and rear.

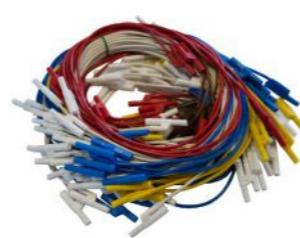
Item no. 11 035 170



### Cable set 4mm T-Varia

106 pieces of highly flexible cables with 4mm spring plugs in matching colours and lengths in safety version. Cable cross-section 2.5 mm<sup>2</sup>.

Item no. 11 035 180



### Cable set T-Varia Motormanagement

Complete cable set of highly flexible cables in 4mm safety design in suitable colours and lengths. Cable cross section 2.5 qmm. 2 x cables with 6.0 mm<sup>2</sup> cable cross-section with plug and fork connection

Item no. 10 138 100



### Power supply unit 40A

Laboratory power supply unit 3-15V and 40A with LED display for voltage and current. The unit is short-circuit proof and has an insulated housing.

Item no. 16 062014



### Digital Multimeter Fluke 175

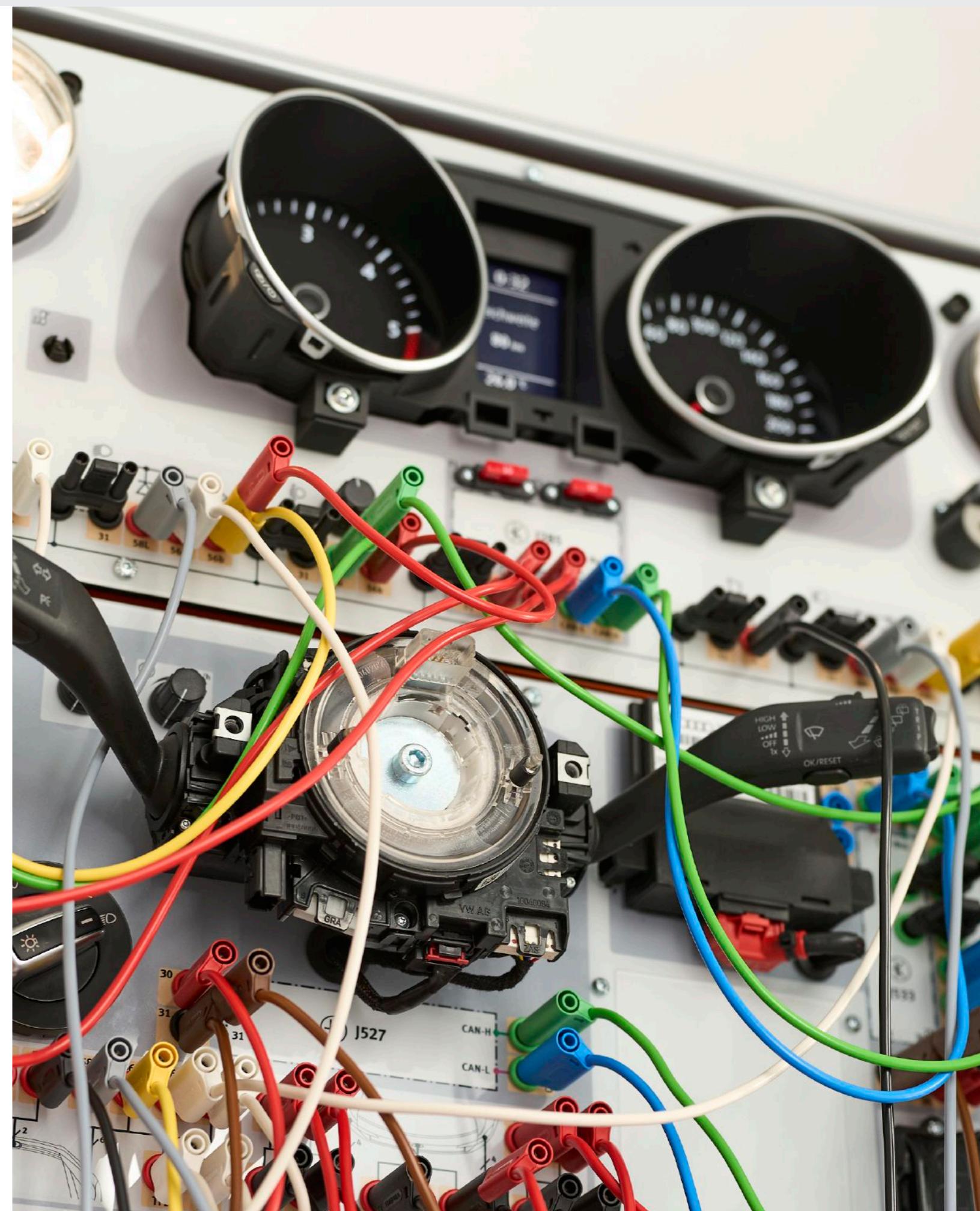
Universal digital multimeter with outstanding technical capabilities. Simple operation, TrueRMS true effective value.

Item no. 11 010 026



### Adapter DIN A4

Adapter strip for fixing to T-Varia system panels on both sides. Enables T-Varia panels to be hooked into DIN A4 element rails.





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## Training Packages General Basics

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Item no. 18 010 010

Manual 31 pages	
17 x 27 x 7 cm	
EQF level	2



## T-Box Vernier Caliper

The T-Box Vernier Caliper contains a ruler, a caliper and three measuring objects. Tolerances are getting smaller and smaller, knowledge about the measuring accuracy of the measuring tools is very important.

### Description

The practised use of mechanical measuring equipment, such as the caliper gauge, is still one of the basic skills of an automotive mechatronics technician. It is therefore important to learn this basic skill in a didactically well-prepared course. The trainees are guided through the work assignments for the caliper gauge box and introduced to measuring practice in a well-founded manner.

The trainees are accompanied by the work orders for the T-Box and introduced to measuring practice in a well-founded manner. They learn the most common methods for measuring internal and external dimensions.

### Learning content

- Use the caliper gauge
- Read the caliper correctly
- Compare and assess the accuracy

### Equipment

- Carrying case with matching foam insert
- Manual caliper gauge
- Steel ruler
- 3 x measuring objects with various tolerance deviations

## T-Box Micrometer

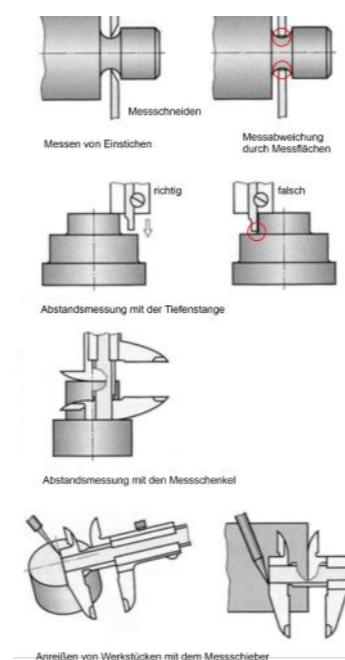
The T-Box Micrometer box contains a micrometer screw, a calibration block, setting spanners and three measuring workpieces. Manufacturing tolerances are getting smaller and smaller and accurate measurement with measuring tools is becoming more and more important.

### Learning content

- Be able to use a micrometer screw correctly.
- Being able to describe the influence of temperature on the measurement results.
- Be able to read a micrometer screw correctly.
- compare and assess the accuracy

### Equipment

- Carrying case with matching foam insert
- Outside micrometer
- Calibration block, adjustment key
- 3 x measuring objects with various tolerance deviations



Item no. 18 010 060

Manual 31 pages	
17 x 27 x 7 cm	
EQF level	



## T-Box Protractor

The T-Box Protractor contains a hair square, a protractor and three measuring objects. Tolerances are becoming smaller and smaller, knowledge about the measuring accuracy of the measuring tools is very important.

### Description

Practised use of mechanical measuring equipment such as the protractor is one of the basic skills of a vehicle mechatronics technician. It is therefore important to learn this basic skill in a didactically well-prepared course.

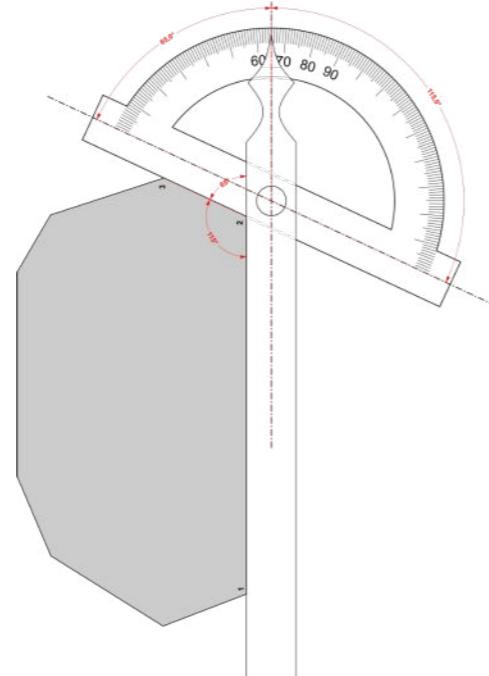
The trainees are guided through the work assignments on the T-Box and introduced to measuring practice in a well-founded manner and learn the most common methods for measuring angles and flatness.

### Learning content

- Use the beveled square, right angle and flatness
- Reading the beveled square correctly
- Use the protractor and read correctly
- Compare and judge the accuracy

### Equipment

- Carrying case with matching foam insert
- Protractor
- Precision control square with two bevelled edges
- 3 x measuring objects with various tolerance deviations



## T-Box Viscosity

The T-Box Viscosity contains three cylinders of lubricating oil and a stopwatch. The aim of this course is to grasp the meaning of the term viscosity and to distinguish the properties of lubricating oil.

### Description

- Engine oil EU
- Lubricating oil properties

### Learning content

- Viscosity
- Lubricating oil properties

### Equipment

- Carrying case with matching foam insert
- Manual stopwatch
- 3 x measuring cylinders transparent, filled with various automotive lubricating oils and one steel ball each



