

MATRIX

THE WORKSHOP MAGAZINE

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mega macs X
A quick-change artist
for diagnostics and
more

NEW
The high-voltage
measurement
technology module
MT-HV



HELLA GUTMANN

HELLA PAGID
BRAKE SYSTEMS

Perfect prospects

Dear Reader

Special events deserve special attention. Today, in this issue of x-tra Matrix, I am pleased to be able to make you acquainted with the services of our new Dream Team for diagnostics and measurements of all kinds. Just a little while ago, the innovative Bluetooth measurement module MT-HV started working hand in hand with the mega macs X. Both devices are state-of-the-art and communicate wirelessly. For all inputs and displays, you are able to use your favourite operating device, i.e. tablet, notebook or PC of your choice.

The MT-HV with permanently integrated high-voltage measurement technology was created especially for the mega macs X and primarily for work on electric and hybrid vehicles. And indeed this much is certain: such vehicles have definitely arrived in the workshops of Europe. A future without high-voltage systems is now no longer possible.

However, low-voltage systems in vehicles will be with us in the long term, too. Hella Gutmann has not only made the mega macs X ready to meet this technical diversity, but it has also prepared the MT-HV just as thoroughly. In other words, it can do more than just high voltage. A little trick, a small touch of magic, gives the module the power of two hearts. Then, as a classic 2-channel multimeter and oscilloscope, it is also able to provide valuable services in the low-voltage range. These are, in my opinion, excellent prospects for future ways of working in independent workshops.

On the following pages, you can find out how this clever, indeed ingenious little trick works and what future potential you can tap into with our 'Dream Team' today or later. All this here and now.

I wish you pleasant reading.

Your



Rolf Kunold
CEO Hella Gutmann Solutions



Revolution X

The mega macs X is completely different from the old norm: it revolutionises the way we work and communicate even with the latest vehicle models. The most flexible, multi-brand diagnostic tool from Hella Gutmann to date is modern, handy and can adapt to suit any size of workshop. A true dream team is created by combining the mega macs X with the innovative, add-on module MT-HV for high-voltage measurements and more.



Totally rethought from the beginning

Only by completely rethinking and deviating from the usual structures can groundbreaking strategies for the future emerge. The transformation of the mobile phone with buttons into a smartphone is the best example. Now we are witnessing the transformation of vehicles into fully connected all-round geniuses with driving functions. The driver decides completely individually which functions his car should take over and which light and colour should be activated to create the interior ambience and the exterior effect of his vehicle. All this requires enormous amounts of data.

The quick-change artist ready to shape your future

For all these reasons Hella Gutmann has also completely rethought the world of diagnostics and data and has consequently created mega macs X. With ultra-fast protocols such as DoIP and CAN FD, it succeeds in doing what many older diagnostic tools are unable to do: the fast processing of very large amounts of data in new vehicle generations.

And just like the vehicle users, you, too, in the workshops should also be able to decide completely individually which function modules and data types you require for your diagnostics and which control units you would like to use for this purpose. Perhaps one particular way today but a different way tomorrow.

And the X? It stands for X advantages

Although the mega macs X comes from a well-known product family, it has a lot to offer that is new. The main and exciting innovation can be seen with the X benefits which every workshop can freely define and configure to suit itself.

X = Low-cost start

Here the X stands for the economic possibility of a particularly wide range of applications on a modular basis. With the entry-level licence, you have access to cross-brand diagnostics without any financial risk and you can secure, for example, your used car trade with the Read/Delete error code function. Several free software updates every year ensure that there is a high degree of vehicle coverage over the long term. As a display device, you simply use an existing tablet, notebook or your PC with any operating system (Windows, Android, Apple IOS, Linux).

X = Flexible and easy application

In this case the X stands for a new kind of freedom during use, irrespective of a workshop's size and independent of its specialisation or emphasis. The mega macs X diagnostic module can only be used in vehicles with the CARB interface cable. It is operated using a separate display device of your own personal choice. This means there is no need to carry around a heavy diagnostic unit. Plus there is no major expense or work if the notebook or tablet is to be replaced at any time.

X = Individual configuration of functions

Above all, the X stands for flexible adjustment as regards the scope of services and, therefore, for maximum security of investment. If you want to start with the minimal functions of the Read/Delete error code, then you should select the entry-level licence. It is possible to upgrade to higher licences at any time. Activating over the air then allows your mega macs X to grow really flexibly in tune with your individual needs – right up until it becomes a top diagnostic solution at the level of the mega macs 77 SDI, with guided measurements and new functions or data types for driver assistance systems, lighting systems, and also for e-mobility. In future, two variants will be available for motorbike diagnostics: for purely motorbike workshops, the X-Bike variant is the best choice. Workshops that want to expand their passenger car variant can also book the licence known as the X-Bike add-on licence as an option.

X = Fast, semi-automated initial installation

The mega macs X has been designed according to the “plug & play” concept. This applies especially for the browser-based initial commissioning when using the display device of your choice. After the scanning of a QR code or the entering of it manually, the so-called SDI setup starts automatically. You are then given a self-explanatory guide to complete the installation and link the mega macs X to your display device.

X = Soft-touch housing, designed for durability

The best repair is the one that never has to happen: high-quality material and a partial, shock-absorbing TPE element not only protect your mega macs X but also your customers' vehicles against damage. However, if ever the battery performance should decrease or a CARB connector be damaged, we have taken the necessary precautions. So as to keep repair times and costs as low as possible, we have taken into consideration the new device's repair-friendliness and designed it conceptually with a double-shell housing. The OBD cable and also the battery can both be replaced individually.

You always have the choice: for the hardware ...

It is entirely up to you which terminal you want to pair with the mega macs X in order to begin operating with it: your existing tablet, notebook or PC with any operating system. Or you can opt for the robust, pre-configured Hella Gutmann tablet.

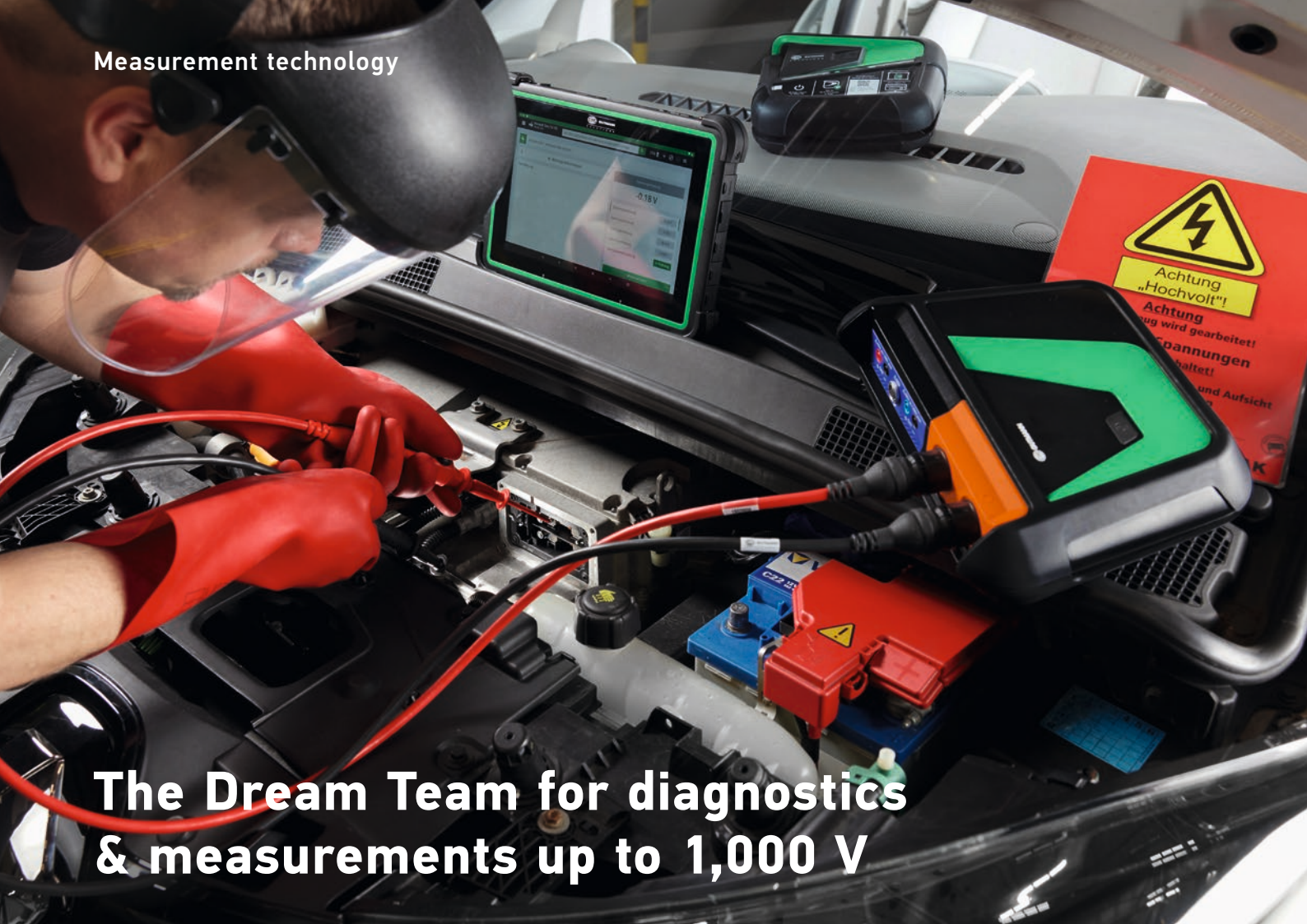
And for electrical measurements, you also have the choice between two measuring modules: MT-USB for measurements in the range of up to 60 V and MT-HV for high-voltage measurements. The MT-HV also opens up other functions, such as the imaging of fast signals and pressure measurements.

... and for the scope of services

Thanks to the tiered working software SDI X¹ to SDI X⁵ and also SDI X-Bike, you can perfectly tailor the performance of your mega macs X to suit your individual needs. You invest just the once in exactly the operational performance, i.e. in the SDI software, that you need. It is also no problem to add on extensions at a later date. In parallel to the software selection, you choose your monthly user licence X¹ to X⁵ or X-Bike or the X-Bike add on. You can upgrade and downgrade selections yourself at any time.

Hardware	Software	Licences
One-off investment	One-off investment	Running costs
<p>mega macs X</p> <p>Hella Gutmann tablet (optional)</p> <p>Measuring technology (optional) from page 6</p>	<p>SDI X¹ for Licence X¹</p> <p>SDI X² for Licence X²</p> <p>SDI X³ for Licence X³</p> <p>SDI X⁴ for Licence X⁴</p> <p>SDI X⁵ for Licence X⁵</p> <p>SDI module X-Bike for Licence X-Bike</p>	<p>Licence X¹</p> <p>Licence X²</p> <p>Licence X³</p> <p>Licence X⁴</p> <p>Licence X⁵</p> <p>Licence X-Bike</p> <p>Licence X-Bike Add-on</p>

Software modules and licences may vary from country to country.



The Dream Team for diagnostics & measurements up to 1,000 V

Paired with the new MT-HV add-on module, the mega macs X revolutionises work on high-voltage vehicles

The most striking features of the mega macs X so far are its dynamic ability to adapt to changing diagnostic needs in the workshop and its forward-thinking ability to communicate even with the most modern 'Ethernet vehicles'. Now, thanks to another special feature, it stands out in sharp relief from other diagnostic units: in collaboration with the MT-HV measurement technology module, it presents the new Dream Team for work on electric and hybrid vehicles.

Even at first glance, it is easy to see the "partner look": This measurement technology module is part of the mega macs X. The MT-HV not only has the same stylish design as the mega macs-X, but it is also just as flexible. And as you might expect from sister devices of the latest generation, both connect wirelessly via Bluetooth.

The MT-HV measurement technology module, customised for the mega macs X, was created specifically for work on electric and hybrid vehicles. It has permanently integrated high-voltage measurement technology and a module slot into which the familiar MT-56 and MT-77 low-voltage measurement technology modules can be inserted. Such an ingenious trick transforms the MT-HV into a wireless measurement technology module for low and high voltage measurements – a particularly attractive solution if the add-on module of a mega macs 56/77 is already there. The MT-HV and the MT-77 are also available in the package as options.

Provided that the right accessories are used, such as the appropriate measuring tips and terminals and also the ampere clamps matching the current, the MT-HV with an inserted low-voltage module can already be used starting from software/licence level X⁴. Then, however, the measurement technology functions exclusively as a digital 2-channel multimeter and ultra-fast 2-channel oscilloscope for low-voltage measurements. In addition, the inserted MT-77 allows you to connect your LPD kit sensors and to perform pressure measurements.

Operating and adjusting using the tablet of the mega macs X

In the high-voltage range, the mega macs X and MT-HV device team covers all measuring technology functions required in connection with electric and hybrid vehicles – provided the mega macs X is equipped with the highest SDI software X⁵ and enabled with the X⁵ licence:

- High voltage measurements up to 1,000 V
- Insulation resistance measurements with variably adjustable test voltage
- Potential equalisation measurements on HV components
- Resistance measurements (HV service connector)



Specially designed for high-voltage measurements, the cables with a thick cross-section have safety features such as the contact switch that must be held during the taking of measurements – and thanks to its practical size, holding this with protective gloves presents no problem at all. The measuring tips can be easily replaced if necessary and can even be used with vehicle manufacturer-specific, high-voltage adapters.

Apart from the impressive measuring cables, the MT-HV operates wirelessly. Bluetooth is used to communicate with the mega macs X and its control unit. A battery provides the power supply. In this way there is no other cable which could be a distraction when focused work is being carried out on high-voltage components.

Guided low-voltage measurements with inserted MT-77

As is known from the functional scope of the mega macs 77, the device team mega macs X and MT-HV with inserted low-voltage module also supports the well-known 'Guided Measurements'. As part of this luxury function, the relevant measuring settings are fully automatically taken over by mega macs X and the measured values are then analysed. However, in view of the special liability challenges in the high-voltage range, 'guided measurements' will initially remain limited to the low-voltage range. Extending this feature to high-voltage measurements is being considered for the future.

Nevertheless, the mega macs X also provides support for HV measurements. The user can find vehicle-specific information such as methods, measuring points and the appropriate target values after the vehicle has been selected in the menu item "E-mobility > Information".

All measurements and interactions are displayed in the menu item "Measurement Technology of the mega macs X". A corresponding log in the car history of the CDI software with details of the person carrying out the work serves as proof that the work complies with guidelines.



The mega macs X communicates with the operating/display unit via WiFi (WLAN), and with the MT-HV via Bluetooth.

Measurement technology briefly explained

Low voltage (LV) and high voltage (HV) – In the vehicle sector, alternating voltages (AC) up to and including 30 V or direct voltages (DC) up to and including 60 V are considered to be low voltage (LV) – anything above is considered to be high voltage (HV). Most electric vehicles operate at around 400 V, particularly powerful models at up to 800 V.

Digital multimeter

A measuring device with adjustable measuring ranges for current (A), voltage (V) and resistance measurements (Ohm). Simple multimeters have one input channel. Higher-quality, 2-channel multimeters can record two signals simultaneously and display them graphically. However, the significance with regard to the time axis is directly dependent on the sampling rate and bandwidth. **Our 2-channel measuring modules:** MT-HV and MT-56 up to 60 V with sampling rate 1 MSa/s, max. bandwidth 100 kHz and MT-77 up to 200 V with sampling rate 64 MSa/s, max. bandwidth 10 MHz.

Measuring cable, tips, terminals, current clamp

Measuring cables with measuring tips and terminals are used to tap the electrical values at the bare part of current-carrying cables and pins. The current clamp enables non-contact current measurement during operation. **Our tip: current clamp blue 40 to 700 A, current clamp green up to 40 A. Measuring cable, black-blue for input channel 1, measuring cable, black-red for input channel 2.**

Oscilloscope

An oscilloscope can display the time curve of electrical voltage (period duration). Rapid processes become visible. Preferably 2 or 4 input channels are available in order to be able to display and compare several voltage signals superimposed on an x and a y axis. These fast, oscillating and partly pulse-width modulated control signals only occur in the low-voltage range up to 60 volts. The quality of an oscilloscope increases with the degree of its speed. If it is too sluggish, signal errors remain invisible. A 2-channel oscilloscope is usually sufficient for the needs of the automotive workshop. **Our tip: mega macs X + MT-HV + MT-77, oscilloscope with 2 galvanically isolated input channels, sampling rate 64 MSa/s and max. bandwidth 10 MHz.**

High-voltage multimeter

A high-voltage measuring device for voltage and resistance. The following features are important for use in high-voltage vehicles: voltage measurements between 0 V and approx. 1,000 V, insulation resistance measurements, adjustable in variable steps, potential equalisation measurements on HV components and resistance measurements, e.g. on the HV service connector. One input channel is sufficient for these HV measurements. **Our solution: mega macs X + MT-HV up to 1,000 V**

High-voltage measuring cables and tips

Cables specially designed for high-voltage measurements with a thick cross-section and safety features such as a contact button held manually. **Our tip: HV measuring cables, black-red with extra large contact.** The measuring tips can be exchanged if necessary and it is possible to attach manufacturer-specific adapters.

Guided measurements

Semi-automatic user guidance with precise indications of the measuring equipment to be used at defined interfaces. In addition, in the low-voltage range, automatic setting of the measuring ranges and automatic evaluation of the measured values in relation to vehicle-specific/component-specific target values. **Our solution: mega macs X + MT-HV (with MT-77) from licence X⁴.**

Measuring offers for various starting points

This page shows different examples of configurations.
The actual country specific scope is to be found on page 11.

Required MT-HV hardware Required Software + Licence

Example 1	There is already an MT-56 in the workshop and its functions are sufficient.	BASIC	X ³
Example 2	There is already an MT-77 in the workshop. There is no need for HV measurements.	BASIC	X ³ /X ⁴
Example 3	The mega macs X is intended exclusively for high-voltage measurements.	PLUS	X ⁵
Example 4	An MT-56 is available. In addition, HV measurements are to be carried out.	PLUS	X ⁵
Example 5	An MT-77 is available. In addition, HV measurements are to be carried out.	PLUS	X ⁵
Example 6	No MT-56/77 available. HV and LV measurements are to be carried out with the mega macs X.	PRO	X ⁵

Measurement technology in conjunction with licences

Variants	Licence X ³	Licence X ⁴	Licence X ⁵
MT-USB	Multimeter (A/V/Ω)	Multimeter (A/V/Ω)	Multimeter (A/V/Ω)
MT-HV BASIC + MT-56 (already available in the workshop)	Multimeter (A/V/Ω)	Multimeter (A/V/Ω)	Multimeter (A/V/Ω)
MT-HV BASIC + MT-77 (already available in the workshop)	Multimeter (A/V/Ω)	Multimeter (A/V/Ω) 2-channel oscilloscope Pressure measurements Guided measurements	Multimeter (A/V/Ω) 2-channel oscilloscope Pressure measurements Guided measurements
MT-HV PLUS + HV measuring cable			(Guided) measurements HV
MT-HV PLUS + MT-56 (already available in the workshop) + HV measuring cable	Multimeter (A/V/Ω)	Multimeter (A/V/Ω)	Multimeter (A/V/Ω) (Guided) measurements HV
MT-HV PLUS + MT-77 (already available in the workshop) + HV measuring cable	Multimeter (A/V/Ω)	Multimeter (A/V/Ω) 2-channel oscilloscope Pressure measurements Guided measurements	Multimeter (A/V/Ω) 2-channel oscilloscope Pressure measurements Guided measurements (Guided) measurements HV
MT-HV PRO + MT-77 (included with Pro) + HV measuring cable	Multimeter (A/V/Ω)	Multimeter (A/V/Ω) 2-channel oscilloscope Pressure measurements Guided measurements	Multimeter (A/V/Ω) 2-channel oscilloscope Pressure measurements Guided measurements (Guided) measurements HV

MT-USB



consisting of MT-HV

PLUS

consisting of MT-HV + high-voltage measuring cables, black/red



PRO


consisting of MT-HV + high-voltage measuring cables, black/red + MT-77 + measuring cable black/blue + measuring cable, black/red

At a glance: the technical data

TECHNICAL DATA MT-HV	
Supply voltage	12–32 V
Power consumption	10 W type
Current consumption	1 A
Dimensions	300 x 360 x 80 mm (L x W x H)
Degree of protection	IP20
Overload protection	Max. 1,000 volts
Measuring channels	1 (galvanically isolated)
Measured variables HV modules	<ul style="list-style-type: none"> • High voltage measurements up to 1,000 V • Potential equalisation measurement • Insulation resistance measurement • Resistance measurement (service connector)
Interfaces	USB-C, Bluetooth, RJ45
High-voltage measuring cable, red	<ul style="list-style-type: none"> • Length: 1,500 mm • Handpiece with function button with 4 mm test connection (safety connector) for manufacturer-specific test adapters • including attachable measuring tip
High-voltage measuring cable, black	<ul style="list-style-type: none"> • Length: 1,500 mm • Handpiece with 4 mm test connection (safety connector) for manufacturer-specific test adapters • including attachable measuring tip

MEGA MACS X	
Processor	ARM dual processor 1.2 GHz RAM 2 GB DDR3, EMMC 32 GB
Interfaces	USB-C, Ethernet
Supply voltage	12 V ... 24 VDC
Dimensions	210 x 193 x 80 mm (H x W x D)
Requirements for an external display unit	<ul style="list-style-type: none"> • Screen diagonal 25.4 cm (10 inch) • Screen resolution at least 1024*768 pixels • WLAN in accordance with IEEE 802.11 n • Browser Google Chrome at least version 81

TECHNICAL DATA MT-77	
Supply voltage	5 V DC (via module interface)
Power consumption	10 W
Current consumption	Max. 2 A
Dimensions	43 x 110 x 136 mm (H x W x D)
Degree of protection	IP20
Bandwidth	Max. 10 MHz
Sampling rate	64 MSa/s 10 mmX
Storage depth	64 kB
Amplitude resolution	14 bit
Measuring channels	2 (galvanically isolated)
Measured variables	<ul style="list-style-type: none"> • Voltage max. 200 V • Current (external current clamp*) • Resistance • Pressure (external LPD kit*)

MEASUREMENT TECHNOLOGY MT-USB	
Supply voltage	5 V  (via USB)
Power consumption	Max. 2.5 W
Current consumption	Max. 500 mA
Dimensions	38 x 102 x 130 mm (H x W x D)
Degree of protection	IP20
Bandwidth	Max. 100 kHz
Sampling rate	1 MSa/s
Amplitude resolution	12 bit
Measuring channels	2
Measured variables	<ul style="list-style-type: none"> • Max. 60 V • Current (external current clamp*) • Resistance

HELLA GUTMANN TABLET	
Software	Android 9.0
Display	X10.1" WUXGA 1200x1920 IPS 470 nits
Interfaces	Docking station, USB 3.0, USB 2.0, Micro USB 2.0
Wireless interfaces	WLAN IEEE 802.11 a/b/g/n/ac, Bluetooth® 4.1, Bluetooth® 4.2
Battery life	Up to 8.5 hours
Dimensions	283.4 x 192 x 21.9 mm

* Further accessories required

Simply configure the scope of services

For the activation of your required services, licence and software modules of your mega macs X must be compatible.

SOFTWARE MODULES			
SDI module X ¹	SDI module X ²	SDI module X ³	SDI module X ⁴
LICENSES*			
License X ¹	License X ²	License X ³	License X ⁴
FUNCTIONS			
<ul style="list-style-type: none"> Reading/deleting trouble codes (without global check) DoiP technology 	<ul style="list-style-type: none"> Reading/deleting trouble codes DoiP technology Service reset Basic setting Parameters Codings Actuator test Test function Cyber Security Management Automated retrieval of kilometer/mileade reading 	<ul style="list-style-type: none"> Reading/deleting trouble codes DoiP technology Service reset Basic setting Parameters Codings Actuator test Test function Proposed online solutions based on trouble codes Cyber Security Management Automated retrieval of kilometer/mileade reading 	<ul style="list-style-type: none"> Reading/deleting trouble codes DoiP technology Service reset Basic setting Parameters Codings Actuator test Test function Proposed online solutions based on trouble codes Cyber Security Management Automated retrieval of kilometer/mileade reading
MEASURING TECHNOLOGY**			
		<ul style="list-style-type: none"> Multimeter 2-channel oscilloscope 	<ul style="list-style-type: none"> Multimeter 2-channel oscilloscope Guided measurements Pressure measurements Guided high-voltage measurements*
		Required measurement technology (minimum): MT-HV with MT-56 or MT-USB	Required measurement technology (minimum): MT-HV with MT-77
DATA			
		<ul style="list-style-type: none"> Component test values Component location Timing belt data Wiring diagrams Cabin air filter Fuses/relays Flat rate units Service data HGS Data Battery management 	<ul style="list-style-type: none"> Component test values Component location Timing belt data Wiring diagrams Cabin air filter Fuses/relays Flat rate units Service data HGS Data Battery management PIN data Service information Diesel information Interactive wiring diagrams Symptom-based solutions
SERVICES			
	<ul style="list-style-type: none"> Technical Help Line 	<ul style="list-style-type: none"> Technical Help Line 	<ul style="list-style-type: none"> Technical Help Line
NEW FUNCTIONS AND DATA TYPES			
			<ul style="list-style-type: none"> ADAS & LIGHTING E-mobility

Software modules and licences may vary from country to country. For motorcycle diagnostics we will offer two versions: The X-Bike version is intended for plain bike workshops. Workshops which want to offer bike diagnostics as well can book the Bike-X Add-on license additionally.

*appropriate software module necessary
**appropriate accessories necessary

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