



**Advancing  
Battery Management**

**THE USE OF CARS CHANGES**

**VEHICLE TECHNOLOGY CHANGES**

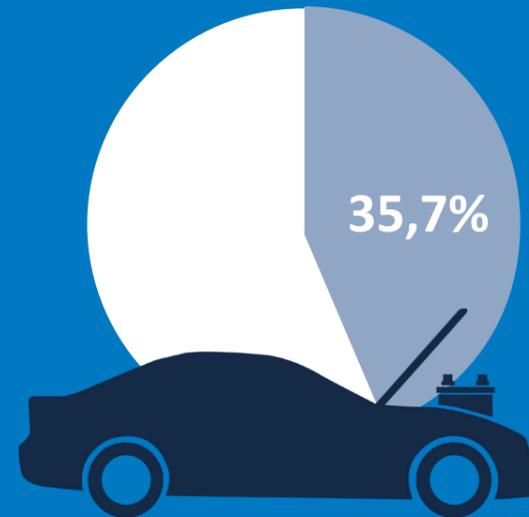
**BATTERY TECHNOLOGY CHANGES**

**BATTERY MANAGEMENT TECHNOLOGY CHANGES**

**BATTERY MANAGEMENT BOOK  
& PRODUCT CATALOG**

# WHY IS BATTERY MANAGEMENT IMPORTANT?

## STATISTICS



Battery related problems are by far the number one and growing breakdown statistic. ADAC breakdown statistics (2015) show that 35.7% are battery problems and another 11.9% are problems related to the electrical system. Looking at our European roadside assistance field data we see that from the average of 35% battery problems, 50% becomes an actual replace decision. Although this is in fact roadside assistance data, this does give us a great insight on the impact we can have performing preventive maintenance in our workshops.



## RETURN ON INVESTMENT

Field test results show that it pays off to test every vehicle coming into the workshop. Of every hundred vehicle batteries tested, 21 need replacing of which 16 customers choose to have the battery replaced. The element of trust plays an important role here. Customer trust is based on the provided service and transparency of that service.

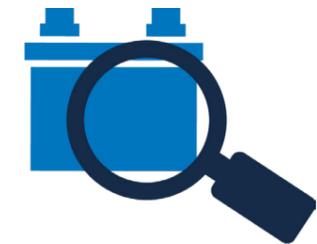
**The workshop has the opportunity to test every vehicle, follow up with the necessary charge, and inform the customer of the provided service.**

Selling about every seventh (16 out of 100) battery, makes 208 batteries on a yearly base. Let's pick a margin of 35.- Euro's per battery. An investment of 1000.- Euro's is earned back ...

**...IN LESS THAN TWO MONTHS.**

More importantly so, it helps to provide consistent service, build trust and increase sales until long after earning back the battery diagnostic system.

**100  
Tested**



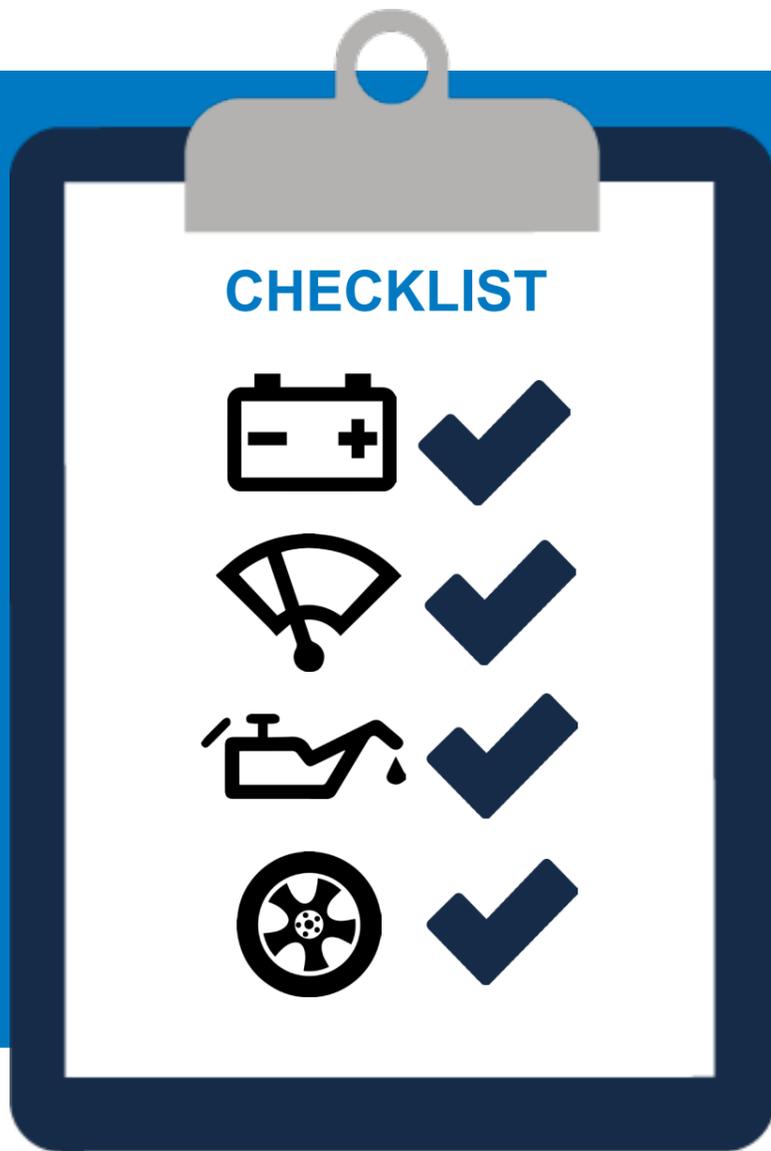
**21  
Need replace**



**16  
Sold**



# A NEW WORKSHOP ROUTINE



The point is, battery maintenance often isn't part of current maintenance routines like with oil, tires and windshield wipers. We need to make sure batteries are on this list and start testing every vehicle that comes into the workshop.

# TECHNOLOGY

As primed on the title page, people and their needs change. Consequently, the use of products and technology change. With vehicles demanding an awful lot from their batteries today, especially when the engine has stopped, new battery technologies have emerged.

The use of the ordinary SLI battery by car manufacturers has decreased by 50% from 2013 to 2016 and is prognosed to drop further to a total of 8% by 2019. At the same time the use of EFB batteries – not AGM – has grown to 35% and is expected to further grow to 51%.

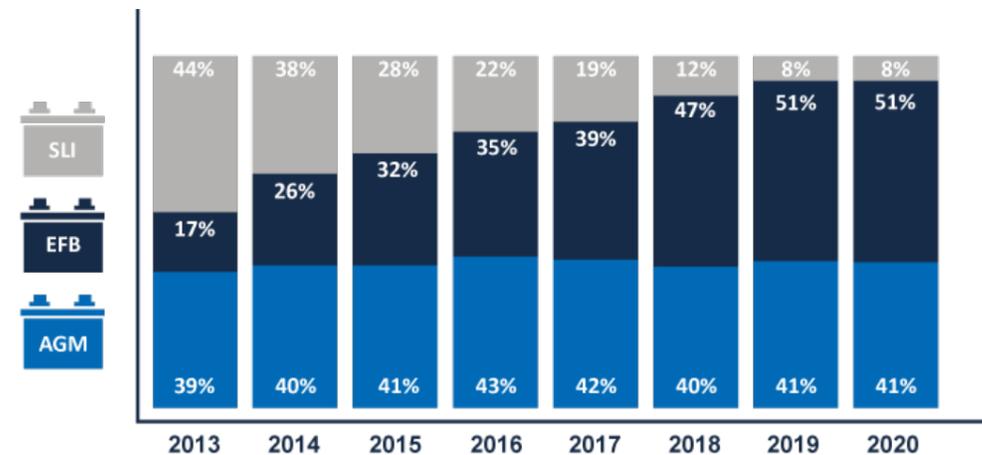
This new technology comes in many forms from Enhanced, Improved and Advanced Flooded to Extended Cycle Life. It comes in even more types with different battery standards and ratings. Each battery technology needs its characterizing so we can diagnose it with a fitting algorithm for providing a reliable result and a proper advise for the car owner.

*So, can you diagnose it with any of the available battery testing equipment of today, whether it is Midtronics or not?*

Yes you can, but the result is as good as the information you put in the tester. It works according the concept:

## GARBAGE IN, GARBAGE OUT.

To conclude, with products other than the Midtronics with Start-Stop support, you cannot be sure to rely on the test result. Therefore, the result is per definition unreliable and cannot be properly used to advise car owners. You risk both sending customers away with bad batteries as well as replacing batteries that are still ok.



# CUSTOMER TRUST, SERVICE AND TURNOVER

Whether car or battery manufacturer, tools and equipment manufacturer, workshop or customer, it is our common interest that the car keeps driving. By taking a minute to test every battery coming into your workshop you not only reduce the risk of your customer breaking down after you provided service. You take the opportunity to either save a customer from inconvenience by

**A.** selling a battery,

**B.** optimizing service and charging the battery for which you can decide to charge a little fee. Brag towards the customer about the wonderful service you provided checking and servicing the battery, and show the printout for transparency.

It is because we want to minimize the risk that your customer faces the inconvenience of breaking down, that we create an algorithm that is considerably designed with regards to a replace battery decision. Obviously, it is undesirable to find a battery still working long after a replace is advised. However, it is unacceptable that the battery fails after a good battery decision. The difficulty is that you never know exactly when it will break down until it does, when it already is too late. The breakdown statistics speak for themselves.

The sole reason for advising to replace when necessary, is to keep your customer from uncomfortable situations and offer a sense of certainty.

Of course, in the end it is the customer's decision. They decide to trust and follow your advice or not to. What we can offer is service, advice, and being transparent.

Perhaps the first time the result allows you to tell them you serviced the battery and they're good to go. The second time they take a pass on your advice. But the third time they either know you are great or they will find out they should have listened after they broke down. In the long run all this helps to build customer trust.

In the effort of reducing the risk and saving the customer from the inconvenience of breaking down it is still possible that the battery is either breaking down after being diagnosed as OK, or the battery still services long after it was advised to be replaced. In both cases we speak of a battery condition that is close to the threshold of being OK or NOT OK. It is a little yet uncomfortable risk which is part of the battery management game that we cannot overcome. The only way to know a battery's condition with a higher percentage of certainty than technologies we use today, is to open it up after which it not able to return it to service.

Last, when you find that we offer the piece of equipment that allows you to service every technology. And in this way build trust with every customer coming into your workshop. It is easier to invest in a tool that earns itself back in two or three months. These two or three months is based on performing battery management on 5 to 10 vehicles per day.

Need to know more?

[marketing-europe@midtronics.com](mailto:marketing-europe@midtronics.com)

# HOW TO PROPERLY PERFORM BATTERY MANAGEMENT?

-- DO IT WELL OR NOT AT ALL

Did we mention the concept of

## GARBAGE IN, GARBAGE OUT?

Every parameter to a battery test is hyper relevant. If you choose the wrong battery type, the battery is tested with the wrong algorithm. Consequently, the result is not reliable. The same applies for the battery

standard, rating, and every parameter you come across in a battery test. Even temperature can influence the test result.

When you do not accurately test the battery and the result is not reliable, you might provide the customer with the wrong advise. This can go both ways: you can advise a battery to be ok when it is not, or it is ok when you advise to replace.

## TIPS

It is not always easy to get to the parameters that you need. Batteries today can be located under the seat, in the back, or anywhere where it is hard for you to reach. We understand that they do this to make your jobs harder. Then there can be all sorts of filth or damages to the label that make it impossible for you to find the battery type, norm and rating. Well besides complaining about all this with you, we can offer a tiny tip.

The Eurobat code (ETN) offers a little trick. The code exists of three groups of three numbers per group, for example 563 107 061. The first group has a value of over 500 for 12 Volt batteries of which the last two digits indicate the Amp hours. 63 Ah in this example. The second group refers to dimensions, layout, and more. The last group multiplied by ten gives the CCA value: 610 CCA. This trick wont help you in every case, but it might come in handy now and then.

Of course you can check what original battery should be in there and if you can recognize whether it is this battery that is currently installed. The most comprehensive tools of today allow you to select the car brand, model and year after which you can confirm the original battery is still installed. There is no need to enter all the battery parameters manually and consequently less garbage comes out.



# DID YOU KNOW



Did you know a battery is chemically discharged at 11.72 Volts?

## PB

Did you know that the chemical abbreviation PB – Plumbum, which is latin for lead – does not mean that it is a lead-acid or regular flooded battery?



Did you know that with a charge state below 12.4 Volts the sulfation of your battery begins?



Did you know that maintenance free doesn't actually mean battery management isn't necessary? It refers to the times where we still filled up batteries. We don't do that anymore...



Did you know that Lead-Acid has been used since 1886 and is still the best alternative for vehicles? Although it contains lead, it is one of the best recycled products in the world.



Did you know batteries are influenced by how it is used, its state of charge, temperature, and other influences of its surroundings?

# WAYS TO LOOK AT A BATTERY

## STATE OF CHARGE

A battery can be charged or discharged. It is considered charged at a voltage value above 12.5, partially charged at values from 12 to 12.5, and discharged below 12. This state of charge says something about the charge only and nothing about the container of that can be charged. This means that if the battery has lost capacity. It can still be 100% charged. Temperature is an important factor that can be of influence in measuring state of charge.

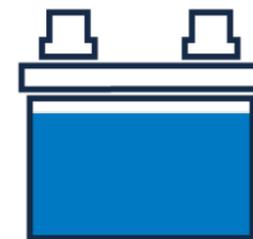
## RESERVE CAPACITY

Within state of health, besides CCA, we also take up reserve capacity. The traditional use of a battery, starting the car, requires a large amount of current at once. Today's vehicles consume a battery with car electronics, like start-stop systems, at a low amount of current for a long period of time.

As mentioned before, with all the change we have in technology of cars and batteries, we need to revise how we manage our batteries and base our advise to car owners on the way we consume our vehicles and batteries. So what are we saying? You may well advise a battery to be good based on what we know about the voltage or cranking amps, but the battery can still fail because of the other ways we need to look at batteries today.

## STATE OF HEALTH

We like to refer to it as the battery's capacity or its health condition. It speaks to the ability of the battery to perform compared to the battery's rating (CCA). When a battery is damaged and has lost capacity, the condition, the state of health has deteriorated.



STATE OF CHARGE

charged > 12.5  
discharged < 12V



STATE OF HEALTH

battery is fully  
charged, yet cannot  
use full capacity



RESERVE CAPACITY

battery needs to  
support long period of  
low current requirement

# WHAT CAN GO WRONG?

All battery problems whether corrosion / sulfation, stratification, or connector breaches – although the cause varies (e.g., inefficient charging) – have the same outcome:

## PREMATURE FAILURE AND A SHORTENED LIFE CYCLE.

What these problems also have in common is its prevention. It's very simple: preventive maintenance. Just measuring its voltage isn't enough though. Load testing only works under certain circumstances.

Test every vehicle that comes into your workshop and charge where necessary. When you install batteries, make sure to fit the right capacity for that model.



# OH, AND WE DON'T JUST TEST

WE CHARGE, WE CHARGE 'DIAGNOSTICALLY', WE DISCHARGE, EQUALIZE, BALANCE, AND MONITOR,

... BUT MOST OF ALL WE LISTEN!

We listen because we need to know your systems and procedures for customer trust and satisfaction, service, sales, and warranty. From there we touch upon our five business units:

1. DIAGNOSTIC SOLUTIONS
2. CHARGING SOLUTIONS
3. INTEGRATED SOLUTIONS
4. ELECTRIC VEHICLE SOLUTIONS
5. INFORMATION SYSTEMS





## BATTERY MANAGEMENT BOOK

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WHAT TESTER DO I USE FOR PROPERLY SERVICING AND ADVISING MY CUSTOMER?

VISIT OUR WEBSITE

	MDX-300 SERIES	MDX-500 SERIES	MDX-600 SERIES
BATTERY TYPES	Lead-Acid, Gel and AGM	Lead-Acid, Gel, AGM and EFB	Lead-Acid, Gel, AGM, AGM Spiral and EFB
START-STOP TESTING TECHNOLOGY	X	V	V
NEW BATTERY TEST	X	V	V
RATING	100 - 900	100 - 1200	100 - 2000
CABLE	45 cm	120 cm	300 cm

*Perform a quick, simple and accurate test in a minute and review the printout with your customer.*

WHY THE 300 SERIES?

The MDX-300 is the entry level tester that allows you to service Lead-Acid, Gel and AGM batteries that come into your workshop and give a reliable result allowing you to properly advise your customers

EASY TO USE

1. Hook up the tester to the battery
2. The voltage shows immediately
3. Press ENTER and select the test parameters like the battery location, technology, standard and rating
4. Test
5. Print

WHAT ELSE CAN YOU EXPECT?

- Customizable printout
- Bad cell detection
- Reverse polarity protection
- 19 languages software and quick manuals

WHY THE 500 SERIES?

The MDX-500 Series is the first tester at entry level that allows you to service every 12 volt vehicle battery that comes into your workshop and give a reliable result that allows you to advise your customers.

EASY TO USE

1. Hook up the tester to the battery
2. The voltage shows immediately at the startup of the tester
3. Press ENTER and select the test parameters like the test type, battery location, technology, standard and rating
4. Test
5. Print or press ENTER to measure the starting and charging system voltage

WHAT ELSE CAN YOU EXPECT?

- Instant voltage reader at startup
- Customizable printout for transparency with the customer
- Bad cell detection
- Reverse polarity protection
- Field replacable cables
- Backlit display
- Data card slot for software upgrades
- 26 languages software and quick manual

WHY THE 600 SERIES?

The MDX-600 is the most complete entry level tester allowing you to service every car, truck and motorcycle battery technology that comes into your workshop and give a reliable result that allows you to advise your customers.

EASY TO USE

1. Hook up the tester to the battery
2. The voltage shows immediately at the startup of the tester
3. Press ENTER and select the test parameters like the test type, battery location, technology, standard and rating
4. Test
5. Print or press ENTER to start the advanced starting and charging system voltage test

WHAT ELSE CAN YOU EXPECT?

- Motorcycle and truck test application
- 6 and 12 volt batteries test
- 12 and 24 volt charging systems test
- Customizable printout
- Bad cell detection
- Reverse polarity protection
- Field replacable cables
- Backlit display
- Data card slot for software upgrades
- 24 languages software and quick manuals



MDX-300



MDX-545



MDX-655P



# 16 EXP-1000 / EXP-1000HD



17

## WHAT TESTER DO I NEED FOR SERVICE AND PREVENTIVE MAINTENANCE?

VISIT OUR WEBSITE

	EXP-1000	EXP-1000HD	EST kit
BATTERY TYPES	Battery and electrical system test	Battery and electrical system test	
	6 and 12 volt Lead-Acid, Gel and AGM	6 and 12 volt Lead-Acid, Gel and AGM	
RATING	100-3000	100-3000	
CABLE	300 cm	425 cm	
NEW BATTERY TEST		Heavy duty/truck application	
		24 volt system balance testing	
	X	V	
			Multimeter leads (for diagnosing board-level component)
		Voltage drop leads	
		Board-level component diagnostic software	
		Voltage drop software	

*Find the cause of battery failure with this comprehensive piece of equipment.*

Test the battery, the complete electrical system, and perform advanced diagnostics to find the cause of the battery failure. For the technician who wants to find deeper lying problems.

### WHY THE 1000?

The EXP-1000 is a complete and expandable diagnostic tool for performing more comprehensive diagnostics that allow you to identify battery related problem causes. Test batteries, electrical systems, and batteries under charge.

Optionally expand for diagnosing the voltage lost through cables, and test board-level components to learn more about the cause of battery problems you run into.

### WHY THE 1000 HEAVY DUTY?

The EXP-1000HD is the most complete diagnostic tool for finding battery problem causes. Suitable for heavy duty application.

Test batteries, electrical systems, batteries under charge, and generate battery pairs or balance batteries in your 24 volt system.

### EASY TO USE

1. Hook up the tester to the battery
2. The voltage shows in the lower left corner of the tester display
3. Select the test you would like to perform: BATTERY TEST, SYSTEM TEST, etc.
4. Give in the test parameters such as test location, vehicle type, and battery type, standard and rating.
5. Perform test
6. View the results and graphs

### WHAT ELSE CAN YOU EXPECT?

- Data card slot for data storage and software upgrades
- Cranking voltage graph
- Battery temperature sensor
- Custom printout for transparency with the customer
- Bad cell detection
- Reverse polarity protection
- Field replaceable cables
- Backlit display
- 26 languages software and quick manual
- Optional: digital multimeter function, and cable drop test



EXP-1000





**WHAT TESTER DO I NEED FOR SERVICE AND PREVENTIVE MAINTENANCE?**

VISIT OUR WEBSITE

	MDX-300	EXP-1000	CPX-900	DSS-5000
CONDUCTANCE PROFILING™	NO	NO	YES	YES
WI-FI AND BLUETOOTH	NO	B or G Wi-Fi, No Bluetooth	B/G/N Wi-Fi, Bluetooth	B/G/N Wi-Fi, Bluetooth
DETACHABLE TABLET CONTROLLER	NO	NO	NO	YES
BATTERY REGISTRATION	NO	NO	NO	YES
BATTERY LOCATIONS AND RESET INSTRUCTIONS	NO	NO	NO	YES
CVG VIN CAPTURE SUPPORT	NO	NO	Optional	Optional
CAMERA (1D and 2D)	NO	NO	Optional barcode scanner	YES
OPERATING SYSTEM	Embedded	Embedded	Embedded	ANDROID
START-STOP BATTERY TEST	NO	NO	YES	YES
SYSTEM TEST	Voltage only	Optional	Loaded and unloaded voltage	Optional
HEAVY DUTY TESTING	NO	Optional	NO	Optional
CLAMPS	Standard	Standard	Power sports	Power sports
FIELD-REPLACEABLE TEST LEADS	YES	YES	YES	YES
TEMPERATURE SENSOR	NO	YES	YES	YES
BUILT IN PRINTER	YES	NO	Optional	Optional
AMP CLAMP SUPPORT	NO	YES	NO	Optional
DMM MODE	NO	Optional	NO	YES
RECHARGEABLE BATTERIES	NO	NO	NO	YES
DOCK	NO	NO	Optional, storage only	YES
CHARGE STATION	NO	NO	NO	YES
DISPLAY SIZE & TYPE	2.5"	3"	3.5" FULL COLOUR	5" TOUCH SCREEN, FULL COLOUR

Test the battery, the complete electrical system, and perform advanced diagnostics to find the cause of the battery failure. For the technician who wants to find deeper lying problems.

**WHY THE DSS-5000?**

As the complexity of battery and electrical systems continue to evolve, diagnostic technology must be able to keep pace.

The DSS-5000 Battery Diagnostic Service System answers the challenges posed by contemporary and future vehicles. Including capabilities for new battery and system types, new business procedures and a generation of service technicians familiar with app based technology.

The DSS-5000 enables you to broaden your service expertise by providing the technology to handle the complex challenges of servicing current and future electrified vehicles.

**EASY TO USE**

1. Connect the tester clamps to the battery posts
2. Select the test that you want to perform
3. The voltage shows in the top of the tester display
4. Scan the VIN and/or manually setup the battery test
5. Capture the battery temperature
6. The test is performed
7. View / send the test results

**WHAT ELSE CAN YOU EXPECT?**

- Software updates over the air (WiFi and Bluetooth wireless capability)
- Battery temperature sensor
- Lead acid, AGM, EFB and ready for Li-Ion
- Bad cell detection
- Reverse polarity detection
- Touchscreen
- 26 languages software and quick manuals
- Field replaceable charge cables: 2 meters (standard), 3 meters or 5 meters



DSS-5000

*Find the cause of battery failure with this easy-to-handle piece of equipment.*





FOR EVERY PROBLEM WITH YOUR BATTERY AND ELECTRICAL SYSTEM THAT SEEMS INSOLUBLE.

VISIT OUR WEBSITE

MEASUREMENT AND DATA RECORDING SPECS

<b>CURRENT CONSUMPTION</b>	<ul style="list-style-type: none"> <li>- Full power mode: 150 mA</li> <li>- Low power mode: 20 mA, recorded every 30 seconds (with auxiliary current disabled)</li> <li>- Deep sleep mode: less than 5 mA, recorded every 5 minutes</li> </ul>
<b>CURRENT MEASUREMENTS</b>	<ul style="list-style-type: none"> <li>- Main: -350 A to 350 A, 0 A to 7.5 A*, +/- 20 mA, 100 A to 350 A*, +/- 1 A</li> <li>* Charge and discharge current</li> <li>- Aux: -30 to 30 A max (fused), +/- 40 mA, connected in line with vehicle fuse</li> </ul>
<b>VOLTAGE MEASUREMENT</b>	<ul style="list-style-type: none"> <li>- Main: 9 to 16 Vdc, +/- 20 mV</li> <li>- Aux 1: On / off with settable threshold (triggerable)</li> <li>- Aux 2: On / off with settable threshold</li> <li>- Aux 3: On / off with settable threshold</li> <li>- Aux 4: On / off with settable threshold</li> </ul>
<b>TEMPERATURE SENSOR</b>	<ul style="list-style-type: none"> <li>- Located in IDR housing to approximate battery temperature</li> <li>- Measurement range: -4°F to 158°F (-20°C to 70°C)</li> </ul>
<b>OPERATING SENSOR</b>	<ul style="list-style-type: none"> <li>- 7 to 16 Vdc</li> </ul>

PHYSICAL SPECS

<b>DISPLAY</b>	<ul style="list-style-type: none"> <li>- 2-line, 16-character LCD display</li> <li>- Updates every 2 seconds with live data</li> </ul>
<b>LENGTH</b>	9" (22.86 cm)
<b>WIDTH</b>	3.875" (9.84 cm)
<b>HEIGHT</b>	1.5" (3.81 cm)
<b>WEIGHT</b>	1.6 lb (703 g)
<b>OPERATING TEMPERATURE</b>	<ul style="list-style-type: none"> <li>-4°F to 158°F</li> <li>-20°C to 70°C</li> </ul>

DATA RECORDING SPECS

<b>FULL POWER MODE</b>	Data is sampled at 50 ms, updates to data card a 30 second average of 50 ms samples every 30 seconds.
<b>LOW POWER MODE</b>	Data is recorded every 30 seconds. Check for current and voltage triggers every 1 second.
<b>DEEP POWER MODE</b>	Data is recorded every 5 minutes. Check for current and voltage triggers every minute.
<b>TRIGGERABLE</b>	<ul style="list-style-type: none"> <li>- In full power mode: store 60 seconds of data centered on the trigger event at 50 ms intervals.</li> <li>- In other modes: store 60 seconds of data after the trigger event.</li> </ul>
<b>TRIGGERABLE CHANNELS</b>	<ul style="list-style-type: none"> <li>- Main Current Measurement</li> <li>- Aux Voltage Channel 1</li> </ul>

Build the diagnostic data recorder into the customer's car and diagnose while the customer keeps driving. The customer can continue to use the car, while the data recorder gathers information over time for you to solve the problem. The trend in measurements can tell you more than any snapshot measurement.

## WHY THE DATA RECORDER?

The extent to which you can say something about a battery and its condition are not only determined by the number of parameters and the technology. It is in fact a timely matter. Most of the information that we can gather is gathered over time. If you can say something about a battery over time, about how it responds to use or charge, then you come to know valuable information that you are unable to retrieve with our testers and diagnostic charger. The IDR-10 allows you to find deeper lying problems based on trends in the data.

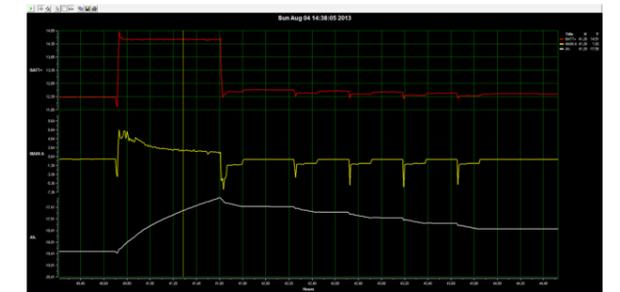
Diagnose the battery and electrical system over time to find the cause of every battery and/or electrical system failure.

## HOW DOES IT WORK?

- The IDR-10 is installed in the vehicle (between the chassis ground and negative battery post) for in-line testing and recording of voltage, amps, temperature, etc., for advanced troubleshooting of simple and complex electrical problems.
- The IDR uses a data card drive for storing data.
- The IDR has user defined events for identifying possible faults.
- The IDR records continuously in three automatic power modes to conserve battery power and enable long-term logging.
- The recorded data can be displayed graphically and in Excel.
- The IDR offers the capability of comparing vehicle data.



IDR-10



### WHAT DATA CAN LOOK LIKE

You are looking at data recordings clearly showing current leakage.

Find the deeperlying cause of battery and electrical system failure with this comprehensive piece of equipment.



## WHAT CHARGER DO I NEED FOR SERVICE AND PREVENTIVE MAINTENANCE?

VISIT OUR WEBSITE

	CHARGEEXPRESS PRO 25	CHARGEEXPRESS PRO 50-2
	Battery charger and power supply	Battery charger and power supply
CHARGE ACCEPTANCE	V	V
CABLE	500 cm	500 cm
BATTERY TYPE	12-volt Lead-Acid, Gel and AGM	2x 12-volt Lead-Acid, Gel and AGM; 24 volt system
	25 charging amps	50a single channel; 2x 25A dual channel
BALANCED CHARGING	X	V
	<b>SPECS</b>	<b>SPECS</b>
POWER REQUIREMENTS	230 volt AC – 50 Hz / 16A	230 volt AC – 50 Hz / 16A
POWER OUTPUT	300W	600W
DIMENSIONS	205 x 165 x 100 mm	300 x 165 x 100 mm
WEIGHT	2.5 k	4 k
PROTECTION INDEX	IP 23	IP 23
TEMPERATURE RANGE	-20 °C to 45 °C (-4 °F to 113 °F)	-20 °C to 45 °C (-4 °F to 113 °F)

Charge 12 volt Lead-Acid, Gel and AGM batteries with charge acceptance recognition, and support batteries with power during service with the power supply mode.

### EASY TO USE

1. Connect the charger to the battery and switch the charger on
2. Select the battery technology that you want to charge or the power supply mode with the multifunction-power button
3. When the LED turns orange, charging or power supply starts
4. When the LED is green, continuously, the battery is fully charged

### WHY THE 25?

The ChargeXpress PRO 25 is the low entry specialty charger and power supply. Charges all 12 volt batteries. It is smart as it recognizes charge acceptance, and allows you to support the battery of cars during service, maintenance routines and demonstrations.

It is portable, safe, and easy to use.

### WHAT CAN YOU EXPECT?

- Charger unit
- 500 cm replaceable charge cables (for 50 Amp 2 pair of leads)
- User manual

### WHY THE 50-2?

The ChargeXpress PRO 50-2 is the only charger in the market offering balanced charging. This means you can charge two batteries in a 24 volt system independently at the same time using the two channels. When battery pairs of a 24 volt system are out of balance you don't want to charge them the same. Under or overcharging a battery likely causes damage.



PRO 25



PRO 50-2

*Charge and maintain your batteries with this comprehensive piece of equipment.*





WHAT NEXT GENERATION CHARGER DO I NEED FOR SERVICE AND PREVENTIVE MAINTENANCE?

VISIT OUR WEBSITE

	ChargeXpress PRO 25 / 50	MCC-070	MSP-070
PRODUCT	25A CHARGER & POWER SUPPLY - 50A CHARGER & POWER SUPPLY, OPTION TO SERVICE 2 CARS	70A CHARGER	70A POWER SUPPLY
WI-FI AND BLUETOOTH	N/A	B/G/N WI-FI, BLUETOOTH	WITH OPTIONAL ACCESSORY
OVER-THE-AIR SOFTWARE UPDATES	N/A	OPTIONAL WITH BMIS	N/A
CLOSED LOOP BATTERY MANAGEMENT	N/A	YES	WITH OPTIONAL ACCESSORY
ASSET MANAGEMENT	N/A	OPTIONAL WITH BMIS	WITH OPTIONAL ACCESSORY
ACTIONABLE DATA REPORTING	N/A	OPTIONAL WITH BMIS	WITH OPTIONAL ACCESSORY
REMOTE DIAGNOSTICS	N/A	OPTIONAL WITH BMIS	N/A
CAN INTERFACE	N/A	YES	YES
MANUAL AND AUTOMATIC CHARGE MODE SELECTION	N/A	YES	N/A
TOP OFF MODE	YES	YES	N/A
FLOAT CHARGE CAPABILITY	YES	YES	N/A
BATTERY CHEMISTRIES	LEAD-ACID, GEL, AGM	LEAD-ACID, GEL, AGM, EFB	LEAD-ACID, GEL, AGM, EFB
CVG - VIN CAPTURE SUPPORT	N/A	OPTIONAL	OPTIONAL
FUSED CLAMPS	POWER SPORTS	INSULATED CHARGE CLAMPS WITH NARROW END-TIPS	INSULATED CHARGE CLAMPS WITH NARROW END-TIPS
CHARGING AMPS	25A CHARGER AND POWER SUPPLY - 50A SINGLE CHANNEL / 2X 25A DUAL CHANNEL CHARGER AND POWER SUPPLY	70A CHARGING AND POWER SUPPLY	70A POWER SUPPLY
FIELD-REPLACEABLE TEST LEADS	YES	YES	YES
ENHANCED USER INTERFACE	N/A	YES	N/A
SELECTABLE VOLTAGE OUTPUT	STATIC VOLTAGE 13.1 VDC	ON-SCREEN: 12 - 14.4 VDC IN 0.1 V INCREMENTS	3-POSITION SWITCH: 14.2, 13.7, 13.1 VDC
REVERSE POLARITY	YES	YES	YES
CLAMP CONNECTION DETECTION	YES	YES	YES
CLAMP HIGH TEMPERATURE DETECTION	N/A	YES	YES
CIRCUIT BREAKER FOR DC OUTPUT PROTECTION	N/A	YES	YES
INPUT SURGE PROTECTION	YES	YES	YES
POWER FACTOR CORRECTION	YES	YES	YES
DYNAMIC INTERNAL FAN CONTROL	N/A	YES	YES
BATTERY DEFECT RECOGNITION	N/A	YES	N/A
CHARGE PROGRESSION ISSUE DETECTION	N/A	YES	N/A
CABLE LENGTH IN METERS	25: 5M, 50: 2X 5M	2, 3 OR 5M	2, 3 OR 5M

WHY THE MCC-070?

- The MCC offers benefits that address the unique needs of any service application.
- Different accessory options such as a handle, base and wall-mount
  - Charges batteries - including new AGM & EFB models quickly and easily
  - Automatic and efficient charge recovery for deeply discharged batteries
  - Provides on demand current and constant clean voltage to the vehicle battery for the extended period of time required to update the vehicle computer software. Selectable voltage levels from 13.5 - 14.5 VDC (.1 VDC)
  - Clearly indicates charger status: charging, charge complete, charging error/fault
  - Quick charging at 14.5VDC / 40A
  - Controlled charging: EFB 15.5 VDC / 70A and AGM 14.5 VDC / 40A



EASY TO USE

- Connect the charger clamps to the battery posts
- The voltage shows in the upper left corner of the charger display
- Select the charge app that you want to use
- Setup the battery charge
- Charging is performed
- View the test results

WHAT CAN YOU EXPECT?

- 5 meter charge cables
- 2 meter power cords
- Safety features such as reverse polarity, clamp connection, non-12V connection, battery voltage too low (<5,5V)
- Lead Acid, AGM, EFB supported



MCC-070 on base, with handle





WHAT NEXT GENERATION CHARGER DO I NEED FOR SERVICE AND PREVENTIVE MAINTENANCE?

VISIT OUR WEBSITE

	ChargeXpress PRO 25 / 50	MCC-070	MSP-070
PRODUCT	25A CHARGER & POWER SUPPLY - 50A CHARGER & POWER SUPPLY, OPTION TO SERVICE 2 CARS	70A CHARGER	70A POWER SUPPLY
WI-FI AND BLUETOOTH	N/A	B/G/N WI-FI, BLUETOOTH	WITH OPTIONAL ACCESSORY
OVER-THE-AIR SOFTWARE UPDATES	N/A	OPTIONAL WITH BMIS	N/A
CLOSED LOOP BATTERY MANAGEMENT	N/A	YES	WITH OPTIONAL ACCESSORY
ASSET MANAGEMENT	N/A	OPTIONAL WITH BMIS	WITH OPTIONAL ACCESSORY
ACTIONABLE DATA REPORTING	N/A	OPTIONAL WITH BMIS	WITH OPTIONAL ACCESSORY
REMOTE DIAGNOSTICS	N/A	OPTIONAL WITH BMIS	N/A
CAN INTERFACE	N/A	YES	YES
MANUAL AND AUTOMATIC CHARGE MODE SELECTION	N/A	YES	N/A
TOP OFF MODE	YES	YES	N/A
FLOAT CHARGE CAPABILITY	YES	YES	N/A
BATTERY CHEMISTRIES	LEAD-ACID, GEL, AGM	LEAD-ACID, GEL, AGM, EFB	LEAD-ACID, GEL, AGM, EFB
CVG - VIN CAPTURE SUPPORT	N/A	OPTIONAL	OPTIONAL
FUSED CLAMPS	POWER SPORTS	INSULATED CHARGE CLAMPS WITH NARROW END-TIPS	INSULATED CHARGE CLAMPS WITH NARROW END-TIPS
CHARGING AMPS	25A CHARGER AND POWER SUPPLY - 50A SINGLE CHANNEL / 2X 25A DUAL CHANNEL CHARGER AND POWER SUPPLY	70A CHARGING AND POWER SUPPLY	70A POWER SUPPLY
FIELD-REPLACEABLE TEST LEADS	YES	YES	YES
ENHANCED USER INTERFACE	N/A	YES	N/A
SELECTABLE VOLTAGE OUTPUT	STATIC VOLTAGE 13.1 VDC	ON-SCREEN: 12 - 14.4 VDC IN 0.1 V INCREMENTS	3-POSITION SWITCH: 14.2, 13.7, 13.1 VDC
REVERSE POLARITY	YES	YES	YES
CLAMP CONNECTION DETECTION	YES	YES	YES
CLAMP HIGH TEMPERATURE DETECTION	N/A	YES	YES
CIRCUIT BREAKER FOR DC OUTPUT PROTECTION	N/A	YES	YES
INPUT SURGE PROTECTION	YES	YES	YES
POWER FACTOR CORRECTION	YES	YES	YES
DYNAMIC INTERNAL FAN CONTROL	N/A	YES	YES
BATTERY DEFECT RECOGNITION	N/A	YES	N/A
CHARGE PROGRESSION ISSUE DETECTION	N/A	YES	N/A
CABLE LENGTH IN METERS	25: 5M, 50: 2X 5M	2, 3 OR 5M	2, 3 OR 5M

WHY THE MSP-070?

The Midtronics MSP-070 Power Supply Charger provides clean, reliable power for charging and maintaining battery state-of-charge during service reflash, complex maintenance and in the showroom.

- Integrated carry handle
- Avoid potential battery damage from drain during vehicle service
- Maintain vehicle electronic and accessory settings
- Return battery in optimum condition to prevent potential no-starts and ensure customer satisfaction
- Selectable voltages of 13.2, 13.8, and 14.4 VDC via 3-position switch for showroom battery maintenance, reflash, and extended maintenance events.



MSP-070

EASY TO USE

- Select the charging voltage: 13.2V, 13.6V or 14.4 V
- Connect the charger clamps to the battery posts
- Switch the circuit breaker to ON
- Switch on the unit
- Charging starts immediately

WHAT CAN YOU EXPECT?

- 3 or 5 meter charge cables
- 2 meter power cords
- Safety features such as reverse polarity, clamp connection, non-12V connection, battery voltage too low (<5,5V)
- Lead Acid, AGM, EFB supported





## BATTERY DIAGNOSTIC STATION FOR DIAGNOSTIC CHARGING AND POWER SUPPLY

VISIT OUR WEBSITE

SPECS	
<b>DIMENSIONS</b>	- Charger: 60 x 53 x 31 cm; 24 x 21 x 12 in - Cart: 63 x 94 x 40 cm; 25 x 15 x 16 in
<b>WEIGHT</b>	- Charger: 18 k; - Cart: 19 k
<b>TEMPERATURE RANGE</b>	-20 °C to 45 °C (-4 °F to 113 °F)
<b>RATING</b>	CCA 100-1700, IEC 100-1000, DIN 100-1000, EN 100-1700, SAE 100-1700, JIS BY PART NUMBER
<b>POWER SUPPLY</b>	70A/600W
<b>POWER REQUIREMENTS</b>	220 - 240 volt AC – 50 Hz / 16A
<b>EXPORT PORTS</b>	SD and USB
<b>LANGUAGE</b>	24 software and quick manual
<b>OPTIONAL</b>	Printer and communication modules

*Find the cause of battery failure with this comprehensive piece of equipment.*

The only diagnostic charger in the world. This battery diagnostic station charges the battery based on its condition. The GRX continuously monitors the charging progress and how the battery responds. In this way it recognizes if the battery can be brought back to service and follows up on the diagnosis in the least possible time.

condition, and provide updates on charging parameters and remaining charge time as you go. During the charge cycle conductance and load tests are performed to monitor the battery response.

### WHY THE GRX-3000?

### WHAT CAN YOU EXPECT?

One unit for battery management: testing and charging. With this one unit you can diagnose and charge based upon the measured battery condition. In most cases, this unit advises whether the battery can be recovered or not in no more than five minutes.

- Charger and power supply unit
- Cart
- 190 cm replaceable charge cables
- User manual

Defective batteries are identified rapidly and recoverable batteries are quickly and safely charged. The added value over an EXP-1000 SERIES tester lies with this station's capability to charge and with that repeatedly monitor the battery response. It is one of little ways to know about a battery's condition more accurately next to the IDR-10's ability to measure over time.

The ultimate tool for preventive maintenance in the workshop helps increase efficiency as time is not wasted on charging faulty batteries and increase service, customer satisfaction and turnover as you identify defective batteries.

### EASY TO USE

1. Connect the charger to the battery and switch it on
2. Select the diagnostic charging mode
3. Select the test parameters such as test location, battery type, standard and rating
4. The initial analysis is started existing of: conductance test, deep scan test, load test and conductance test. When the GRX determines the battery to be healthy and it's safe to charge, it proceeds with the charging session.
5. Several charge modes are performed to indicate charge acceptance, charge the battery according battery condition, monitor progress and battery



**GRX-3000 with cart**





THIS BATTERY SERVICE TOOL OFFERS THE POSSIBILITY TO DEPOWER, BALANCE, AND CHARGE HYBRID AND ELECTRIC VEHICLE BATTERY PACKS.

VISIT OUR WEBSITE

SPECS	
<b>INPUTS</b>	<b>AC Main Power</b> - 100-240 VAC 50/60 Hz - 12A maximum - Continuously monitored for maximum charge rate - > 0.95 PFC - 89% efficiency <b>Control: RS-232 power, USB-A &amp; B, Wi-Fi</b>
<b>INPUT/OUTPUT</b>	- Independent CAN BUS (2) - LIN (1) - Digital I/O (8)
<b>COMMUNICATIONS</b>	- Wi-Fi - USB-A - RS-232
<b>CERTIFICATIONS</b>	- CE - UL 1012 - CAN/CSA C22.2#107.1
<b>USER INTERFACE</b>	Graphical screen, alphanumeric keypad with two hot keys
<b>HOUSING</b>	High-strength anodized aluminum
<b>DIMENSIONS</b>	33H x 74W x 43D cm
<b>WEIGHT</b>	Charger: 24 k Shipping weight including accessories/cables: 34 k
<b>DISCHARGER</b>	<b>CHARGER</b>
0 – 7.5 amperes DC	0 – 5.0 amperes DC
Continuously variable	Continuously variable - Develops maximum current based on AC input power available (100 – 240 VDC)
0 – 384 VDC compliant	
Reverse polarity protected	
Hard safety disconnect	
Monitors battery section temperature	
- Throttles back current for excessive temperature rise - Terminates session for temperature limit	
Monitors high-voltage leakage to chassis	
- Terminates session for excessive leakage	
Redundant systems	
- Throttles back current for excessive temperature rise or restricted air flow - Terminates session for temperature limit	

This battery service tool offers the possibility to depower, balance, and charge hybrid and electric vehicle battery packs.

### WHY THE GRX-5100?

With this unit we offer the industry's first high voltage hybrid and electric vehicle battery service tool. Perform battery pack service with simple controlled and automated processes, including:

1. Safely discharge the battery pack or sections in or out of vehicle to ready them for transportation.
2. Balance sections, charging and discharging them individually, for ensuring optimal battery pack operation.
3. Capture the VIN and generate detailed status reports of the vehicle's battery pack including information on cell level.

This xEV battery service stations offers you the possibility to reduce time and expense for your customers. Furthermore, it helps you to reduce warranty costs.

Working with hybrid and electric vehicles requires safety measures. Please contact us to discuss possibilities for the GRX-5100 xEV Battery Service Tool.



GRX-5100

**Service and depower hybrid and electric vehicles coming into your workshop.**





VISIT OUR WEBSITE

## Cables & Replacement Cables

Part Number	Description
A018	Inductive Amp Clamp
A028	10-ft DMM Cable Assembly with Clamps
130-078J	10-ft Replaceable Cable
130-072Q	4-ft Replaceable Cable
A126	DMM Adapter & Probe Kit
130-000195	10-ft Replaceable Cable with Heavy-Duty Clamps
130-569	4-ft Replaceable Cable
130-568	10-ft Replaceable Cable
130-000289	4-ft Replaceable Cable with Heavy-Duty Clamps (Piranha)
130-000320	Replaceable Charge Cable / Clamp Set



A018

Product(s)
EXP-1000, EXP-1000 HD
EXP-1000, EXP-1000 HD
EXP-1000, EXP-1000 HD
EXP-1000, EXP-1000 HD
EXP-1000, EXP-1000 HD
EXP-1000, EXP-1000 HD
MDX Series
MDX Series
EXP-800
GRX-3000

## Carrying Cases & Bags

Part Number	Description
A106	Hard Carrying Case
115-911	EU Carrying Case

Product(s)
EXP-1000, EXP-1000 HD
MDX-600, EXP-1000

## Miscellaneous Accessories

Part Number	Description
A033	Lead Stud Adapter Set (2 Female; 2 Male)
A125	Protective Rubber Boot

Product(s)
All
EXP-800

## Printers & Print Accessories

Part Number	Description
A025	In-Vehicle Charge Cable for A088 Infrared Printer (for cigarette lighter / accessory outlet)
HYB-1000	
A088	Infrared Printer
HYB-1000,	
157-002	Charger Adapter for A088 Infrared Printer
HYB-1000	
MJ10	Rechargeable Batteries for A088 Infrared Printer
HYB-1000	
856607-10	10-Pack Thermal Printer Paper (2.25-in w x 1.875-in d) (Also available at most office supply stores)
A224	Plastic Printer Roller Replacement
A256	Printer Module

Product(s)
EXP-1000, EXP-1000 HD,
EXP-1000, EXP-1000 HD,
MDX Series
EXP-1000, EXP-1000 HD,
EXP-1000, EXP-1000 HD,
EXP-800, EXP-1000, EXP-1000 HD, GR1-120, HYB-1000, MDX Series
MDX Series
GRX-3000



A088

## AMP-100 Portable Multimeter

- Low-level DC Amp range for easy detection of excessive parasitic drain
- 200 DC Amp range to measure system output level for advanced starter diagnosis
- Small jaw size (fits into tight places, easier to get the right cable for accurate measurement)
- One-touch zero button sets the reading to zero as a reference value or to eliminate the offset value caused by residual magnetism
- 3-3/4-inch digital LCD display
- Probes make it a useful tool for pinpoint diagnostics like finding shorts and voltage drop tests
- Can also be used to troubleshoot AC-powered equipment and shop circuits

### Specifications:

AMP-100, includes carrying case, cables and manual

Measurement Ranges:

Using the Jaw:  
Measures AC and DC current from 0-40A, 0-200 A

Using the Probes:  
Measures AC and DC Voltage: 400 V (Resolution: 0.1 V)  
Measures Resistance: 40# Ohm-400# Ohm (Continuity upon voltage: 0.4 V)



AMP-100

# COMPARISON MIDTRONICS - BATTERY AND SYSTEM ANALYZERS



FEATURE	MDX-300P	MDX-545P	MDX-655P	EXP-1000 (HD)	CPX-900	DSS-5000	DSS-7000S	GRX-3000	DCA-8000
<b>CONDUCTANCE PROFILING™</b> Diagnose reserve capacity issues and achieve ±50% reduction in CHARGE&RETEST decisions	NO	NO	NO	NO	YES	YES	YES	NO	YES
<b>WI-FI AND BLUETOOTH</b> Supports connectivity to Midtronics Battery Management Information System (BMIS) and our Next-Gen tools. It supports over-the-air updates and data transfer.	NO	NO	NO	NO	B/G/N Wi-Fi, Bluetooth	B/G/N Wi-Fi, Bluetooth	Bluetooth	Optional Wi-Fi, Bluetooth	B/G/N Wi-Fi, Bluetooth
<b>CVG - VIN CAPTURE SUPPORT</b>	NO	NO	NO	NO	NO	Optional	Optional	Optional	Optional
<b>CAMERA</b> Used for barcode VIN capture. Camera can capture 1D and 2D.	NO	NO	NO	NO	Optional barcode	YES	YES	NO	NO
<b>OPERATING SYSTEM</b>	EMBEDDED	EMBEDDED	EMBEDDED	EMBEDDED	EMBEDDED	ANDROID	WINDOWS	EMBEDDED	ANDROID
<b>STOP-START BATTERY TEST</b>	NO	YES	YES	NO	YES	YES	YES	Optional	YES
<b>SYSTEM TEST</b>	Voltage only	Voltage only	Voltage only	YES	YES	YES	YES	Optional	YES
<b>HEAVY DUTY TESTING</b>	NO	NO	NO	Optional	NO	Optional	Optional	NO	NO
<b>CLAMPS</b>	Mueller	Mueller	Mueller	Mueller	Power sports	Power sports	Metal Piranha clamps	Charge clamps	Charge clamps
<b>FIELD-REPLACEABLE TEST LEADS</b>	NO	YES	YES	YES	YES	YES	YES	YES	YES
<b>TEMPERATURE SENSOR</b>	NO	NO	NO	YES	YES	YES	YES	YES	YES
<b>INTEGRATED PRINTER</b>	YES	YES	Optional	NO	Optional	Optional	NO	Optional	Optional
<b>AMP CLAMP SUPPORT</b>	NO	NO	NO	YES	NO	Optional	Optional	Optional	NO
<b>DMM MODE</b>	NO	NO	NO	YES	NO	YES	Optional	Optional	NO
<b>RECHARGEABLE BATTERIES</b>	NO	NO	NO	NO	NO	YES	YES	Not applicable	Not applicable
<b>STANDALONE</b> The tool is also useable as a standalone tool (no requirement for WiFi in workshop).	YES	YES	YES	YES	YES	YES	NO	YES	YES
<b>BATTERY TYPES</b> What battery types can be tested with the standard tool.	Regular (flooded), AGM, GEL	Regular (flooded), EFB, AGM (flatplate and spiral), GEL	Regular (flooded), EFB, AGM (flatplate and spiral), GEL	Regular, AGM, Spiral, GEL,	Regular (flooded), EFB, AGM (flatplate and spiral), GEL	Regular (flooded), EFB, AGM (flatplate and spiral), GEL	Regular (flooded), EFB, AGM (flatplate and spiral), GEL	Regular (flooded), EFB, AGM (flatplate and spiral), GEL and optional LITHIUM-IRON-PHOSPHATE	Regular (flooded), EFB, AGM (flatplate and spiral), GEL and LITHIUM-IRON-PHOSPHATE
<b>CABLE LENGTH IN METERS</b>	0,5m	1,2m	3m	4,5m	1,2m	0,9m	0,9m	3m	5m

# COMPARISON MIDTRONICS - CONTROLLED CHARGERS



FEATURE	ChargeXpress PRO 25	ChargeXpress PRO 50	MCC-070	MSP-070
<b>PRODUCT</b>	25A CHARGER & POWER SUPPLY	50A CHARGER & POWER SUPPLY, OPTION TO SERVICE 2 CARS	70A CHARGER	70A POWER SUPPLY
<b>WI-FI AND BLUETOOTH</b> Supports connectivity to battery management information system (BMIS) and next generation tools.	N/A	N/A	B/G/N WI-FI, BLUETOOTH	WITH OPTIONAL ACCESSORY
<b>FUTURE READINESS</b> Remote over-the-air software updates	N/A	N/A	OPTIONAL WITH BMIS	N/A
<b>CLOSED LOOP BATTERY MANAGEMENT</b> Communication with next generation platforms and tools (see visual on the second page)	N/A	N/A	YES	WITH OPTIONAL ACCESSORY
<b>ASSET MANAGEMENT</b> Centrally control assets of the entire enterprise	N/A	N/A	OPTIONAL WITH BMIS	WITH OPTIONAL ACCESSORY
<b>ACTIONABLE DATA</b> Reporting and analytics tool	N/A	N/A	OPTIONAL WITH BMIS	WITH OPTIONAL ACCESSORY
<b>REMOTE DIAGNOSTICS</b> Remotely diagnose equipment in the field	N/A	N/A	OPTIONAL WITH BMIS	N/A
<b>CAN INTERFACE</b>	N/A	N/A	YES	YES
<b>MANUAL AND AUTOMATIC CHARGE MODE SELECTION</b>	N/A	N/A	YES	N/A
<b>TOP OFF MODE</b>	YES	YES	YES	N/A
<b>FLOAT CHARGE CAPABILITY</b>	YES	YES	YES	N/A
<b>BATTERY CHEMISTRIES</b>	LEAD-ACID, GEL, AGM	LEAD-ACID, GEL, AGM	LEAD-ACID, GEL, AGM, EFB	LEAD-ACID, GEL, AGM, EFB
<b>CVG - VIN CAPTURE SUPPORT</b>	N/A	N/A	OPTIONAL	OPTIONAL
<b>FUSED CLAMPS</b> No sparks on (dis)connect	POWER SPORTS	POWER SPORTS	INSULATED CHARGE CLAMPS WITH NARROW END-TIPS	INSULATED CHARGE CLAMPS WITH NARROW END-TIPS
<b>CHARGING AMPS</b>	25A CHARGER AND POWER SUPPLY	50A SINGLE CHANNEL / 2X 25A DUAL CHANNEL CHARGER AND POWER SUPPLY	70A CHARGING AND POWER SUPPLY	70A POWER SUPPLY
<b>FIELD-REPLACEABLE TEST LEADS</b>	YES	YES	YES	YES
<b>ENHANCED USER INTERFACE / EASE-OF-USE</b> Application interface, color screen	N/A	N/A	YES	N/A
<b>SELECTABLE VOLTAGE OUTPUT</b>	STATIC VOLTAGE 13.1 VDC	STATIC VOLTAGE 13.1 VDC	ON-SCREEN: 12 - 14.4 VDC IN 0.1 V INCREMENTS	3-POSITION SWITCH: 14.2, 13.7, 13.1 VDC
<b>REVERSE POLARITY</b>	YES	YES	YES	YES
<b>CLAMP CONNECTION DETECTION</b>	YES	YES	YES	YES
<b>CLAMP HIGH TEMPERATURE DETECTION</b>	N/A	N/A	YES	YES
<b>CIRCUIT BREAKER FOR DC OUTPUT PROTECTION</b>	N/A	N/A	YES	YES
<b>INPUT SURGE PROTECTION</b>	YES	YES	YES	YES
<b>POWER FACTOR CORRECTION</b>	YES	YES	YES	YES
<b>DYNAMIC INTERNAL FAN CONTROL</b>	N/A	N/A	YES	YES
<b>BATTERY DEFECT RECOGNITION</b>	N/A	N/A	YES	N/A
<b>CHARGE PROGRESSION ISSUE DETECTION</b>	N/A	N/A	YES	N/A
<b>CABLE LENGTH IN METERS</b>	5M	2X 5M	2, 3 OR 5M	2, 3 OR 5M

## Contact details

### ONLINE

Customer portal  
Corporate website  
EMEA website

[midtronicseurope.com/customer-portal.html](http://midtronicseurope.com/customer-portal.html)  
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