DEFA PowerSystems

Auto and Industry 2012

www.defa.com

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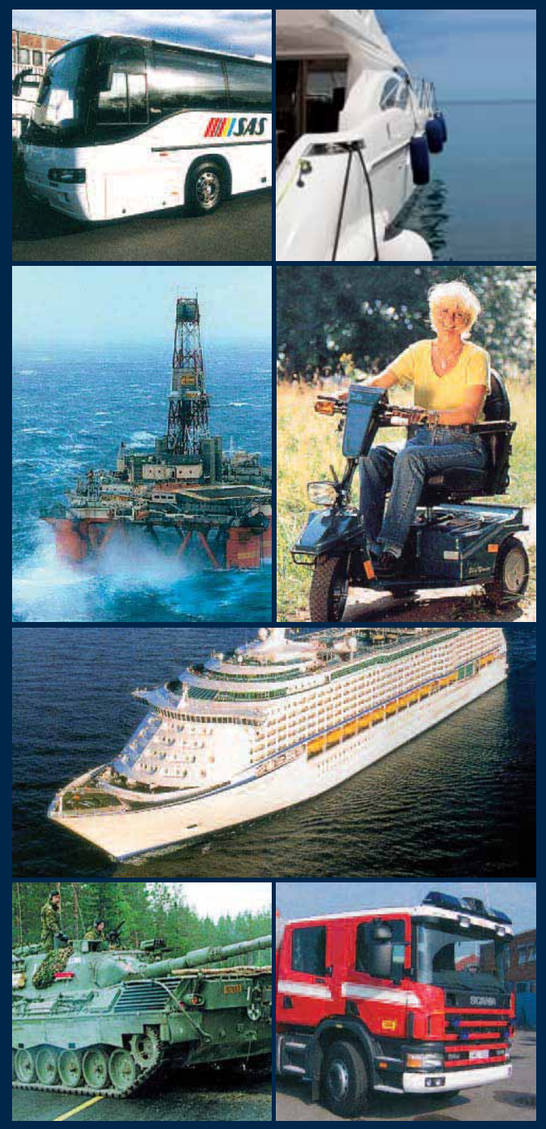
DEFA PowerSystems



DEFA aims to be present in the area of charging. Our concept is to give customers optimum use of products powered by lead/acid (AGM/GEL) batteries.

DEFA PowerSystems consist of a series of charging products which give the user maximal utilization of their batteries. Our battery chargers and charging systems have gone through a continuous development over decades and appear today as state-of-the-art for the customer who demands functionality, flexibility, safety and high quality.

Areas such as rescue vehicles and boats, ambulances, lifeboats, electric wheelchairs and other lifesaving equipment impose the strictest standards both on us and our products.

The DEFA PowerSystems have been developed to include our own splash proof and protected cables with PlugIn connectors.
The system has been developed to ease installation of complete 230VAC for boats, mobile units, defence and 42VAC charging systems for rescue and lifeboats.

The system eliminates need of tools for connection, which means the system can be installed without assistance from authorized personnel. The system is very simple, reliable and durable.

The 250VAC shore power system for boats features a power distribution box which contains fuses, ground leakage circuit breaker, galvanic isolators to reduce the risk of galvanic corrosion and earth leakage from shore power, main connections, outlets and PlugIn battery chargers. This is a module based system, facilitating the addition of other functions such as engine heaters and auxiliary equipment.

Our customers are professional and private users in such areas where strict demands are required to meet expectations on functionality and a high degree of readiness. Quality control, knowledge and customer demand is an important part of our development and product philosophy.

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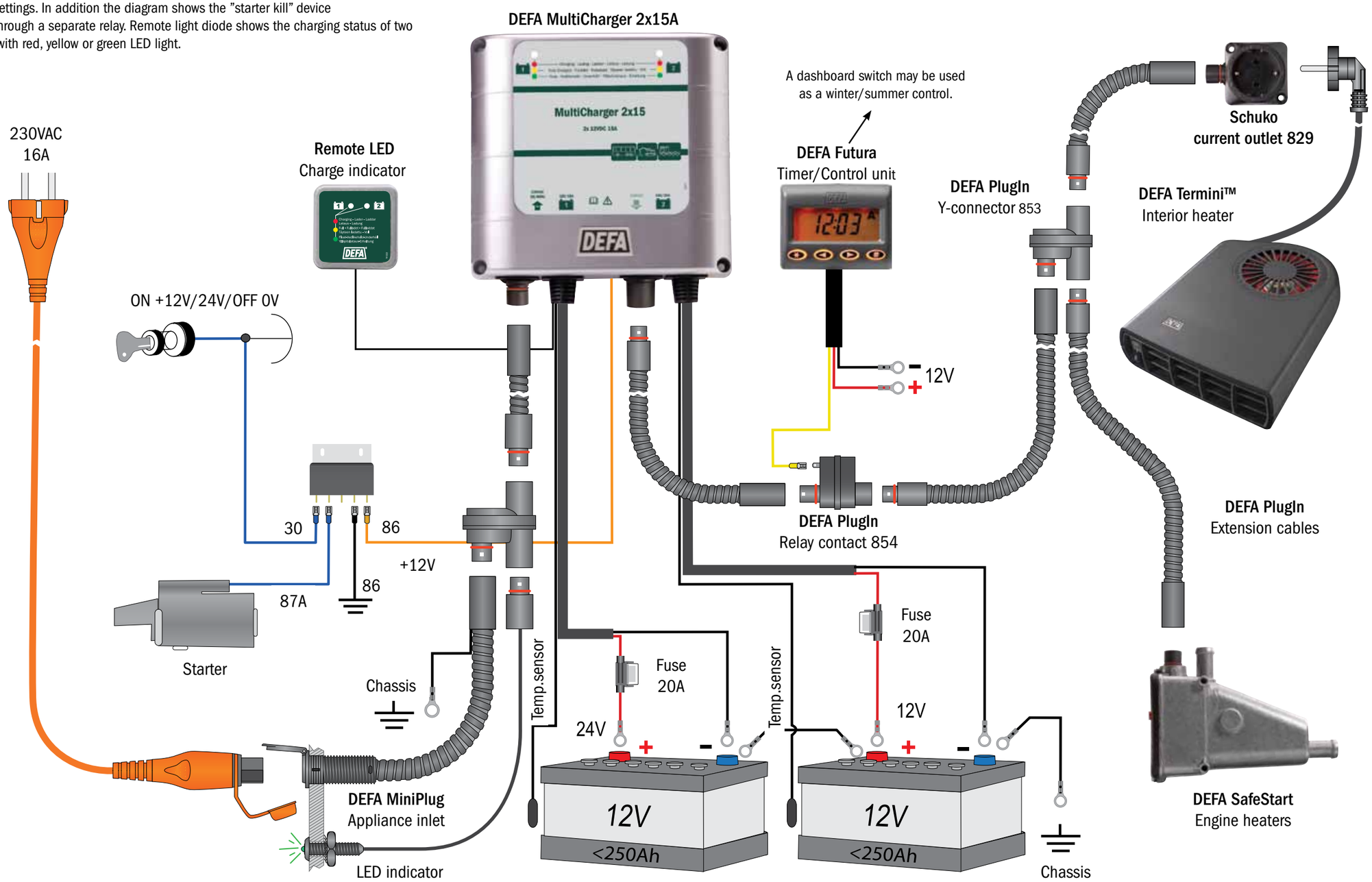
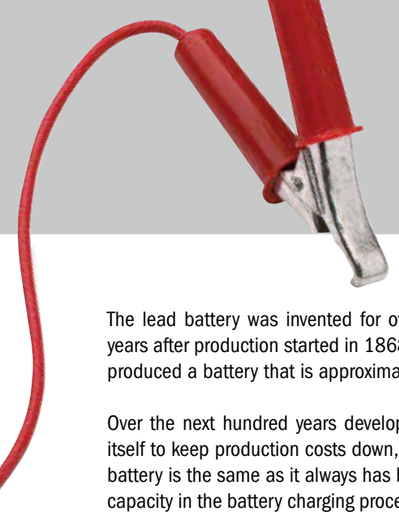
The circuit diagram shows temperature/time control of engine- and interior heaters by using DEFA Futura as winter/summer switch. The battery charger will charge independent of winter/summer settings. In addition the diagram shows the "starter kill" device function through a separate relay. Remote light diode shows the charging status of two batteries with red, yellow or green LED light.





The battery decides the charging

The lead battery was invented for over hundred years ago. Thirty years after production started in 1868, technical development had produced a battery that is approximate to those we use today.

Over the next hundred years development more or less confined itself to keep production costs down, the chemical make-up of the battery is the same as it always has been and the maximum capacity in the battery charging process has therefore not changed much. And here we provide some simple truths that we at DEFA must take into account in order to provide our customers with efficient charging and maximum economic life for their batteries.

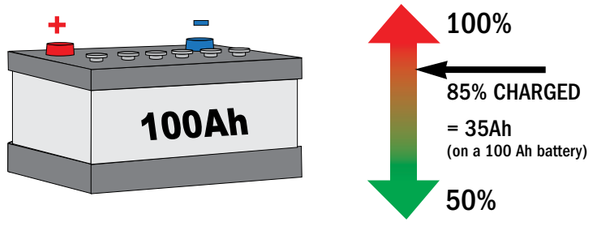
Value for your money
When you buy a lead battery marked with 100Ah it means the capacity of the battery is 100-Ampere hours. Ideally you should be able, for example, to use 5 Amperes for 20 hours (5A x 20H = 100Ah). However, this does not happen in reality. One of the properties of a lead battery is that when you discharge it by more than 50% every further discharge will reduce the capacity and economic life of the battery. This means that you only get a 50Ah capacity when you think you have bought 100Ah.

Another characteristic of the lead battery, and this has to do with chemistry, is that it charges up to 80-85% of the capacity fairly quickly, but the remaining 15-20% takes a longer time (8-16 hours) irrespective of the size of your charger. The battery itself resists charging, and this means most batteries are never fully charged, usually they are about 85% charged.

Choose a sufficiently large battery
Batteries take time to charge. Because the battery takes a long time to fully charge, it is a good idea to remember only half the printed capacity is available. If you need 100Ah, in order to be sure of obtaining sufficient power you need to buy 200Ah.

Batteries are charged for less than eight hours
Because batteries are not charged for more than eight to ten hours between each discharge, the battery is not given enough time to absorb the last 15-20% of its maximum capacity. When batteries are used this way, you should use a battery set providing 300Ah to cover a requirement of 100Ah without fatiguing your battery.

Use correct charging voltage
A standard lead battery shall have a charging voltage of 14,4V at room temperature. In colder situations the voltage has to be increased. NAF (the Norwegian Automobile Association) has conducted a survey showing that average charging voltage from car generators in Norway is 13.8V. This can cause problems, especially for vehicles using lots of battery power and used for frequent short distances. A solution to this problem would be to install a maintenance-free battery charger from DEFA.



Offset charging - a big problem with 24V

When serial connecting two 12V batteries to a 24V-installation, the battery closest to minus will always receive the lowest charging. This reduces the total capacity in the plant and results in bad operating economy.

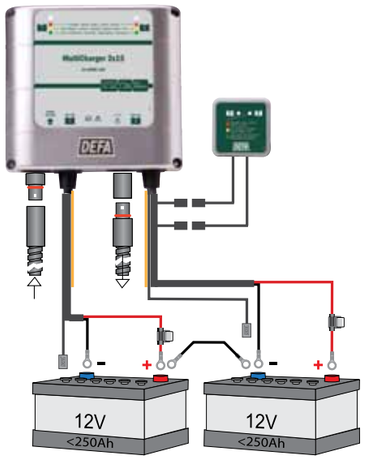
Negative charging
Negative charging is a quite unknown concept for most owners of trucks and buses, although such problems are quite normal. In order to explain this problem a little better, we have to get into simple battery technology. A battery is really a collection of cells which create energy. Normally we call a collection of six cells for a "12V battery". Due to physical laws it is most suitable for a cell to contain a voltage of 2V. Batteries are produced in 12V because this is absolutely the most used voltage in cars, boats etc.

Trucks, buses and heavy vehicles require more "pressure" in order to get started and to function. One has therefore discovered that 24V is a practical voltage. The voltage is still quite low, so there is no danger in getting "electrified" when working with the installation.

We choose two of the least expensive mass produced 12V batteries and connect these together in a serial. If one of the 2V cells should go to pieces, we do not have to change the one battery.

When we charge batteries we use 12V chargers/dynamoes for 12V batteries and 24V chargers for 24V batteries and assume this works out fine. Unfortunately it is not that easy. It turns out that after some time one of the batteries has a lower voltage than the other. The total capacity on this 24V battery is no longer as high as we thought it would be.

This phenomenom is well know from sectors that operate with greater voltages, such as forklifts, submarines etc.



Avoid negative charging in 24V-installations
Charge every battery separately with MultiCharger 2x15.

Problems
The old saying: " A chain is not stronger than the weakest joint in the chain" also applies here. One of the batteries will always have reduced charging conditions and this will reduce the total capacity. This will result in problems getting started, and with the running of different electrical appliances on trucks/buses such as the Thelma-break, lift etc. Because this one battery is very low, the start capacity will for instance already be reduced when the battery starts getting empty, even if the other battery is almost fully charged.

Operating economy
A battery that is not fully charged will have a shorter lifespan than a battery which is always charged enough. When the battery is not fully charged, the sulphating process, which starts already from the time the battery is new, will increase in speed and the battery will "die" before it should. We then have to go to the store and buy a new battery more and more often, and this results in a negative operating economy.

Longevity
One can generally say that low charging voltage gives the batteries a short lifespan. When charging it is necessary that the chargers voltage is high enough to fill the batteries completely. Correct charging voltage for a lead/acid car battery is 14,4V (for a "12V" battery) at 20°C. Most cars give too low charging voltage and in 24V installations negative charging will intensify the problem even more. It is therefore important to charge the batteries separately (see figure below) during the night. In that way both batteries achieve the correct voltage. When choosing a charger one should also make sure that the charger automatically changes to maintenance voltage when the batteries are full. This voltage should stay a little lower in order to make sure that the batteries are not "cooked", i.e. that the batteries consume too much fluid.

Better functionality
Buses, trucks, fire trucks, ambulances and other vehicles with massive power consumption will all function better with fully charged batteries.
The batteries will always, together with an intelligent charger, be able to perform to their fullest. If a vehicle is seldom used, such a charger will always maintain the batteries and therefore replace the full charge that the dynamo never has time to give.

Summarise
One achieves excellent operating economy in a 24V installation by:
- ✓ Giving the batteries correct charging voltage - 14,4V by 20°C.
- ✓ Compensating for negative charging by using a charger that is able to charge the batteries individually.
- ✓ Using a charger which switches to maintenance voltage when the batteries are full.
- ✓ Keeping batteries and wires clean, and make sure the level of fluid in the batteries is correct.

Trucks and GenSet

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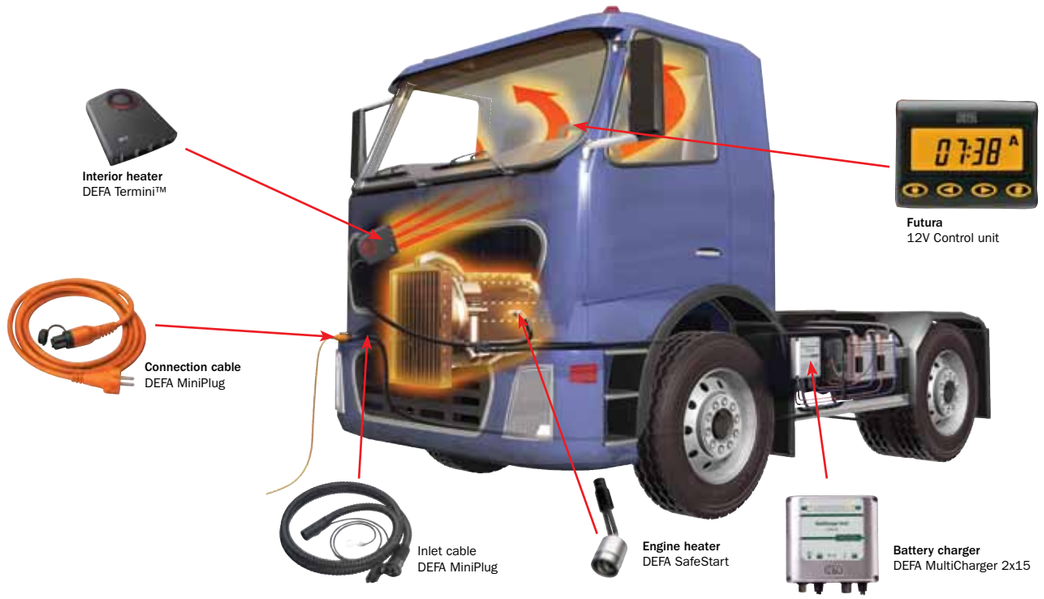
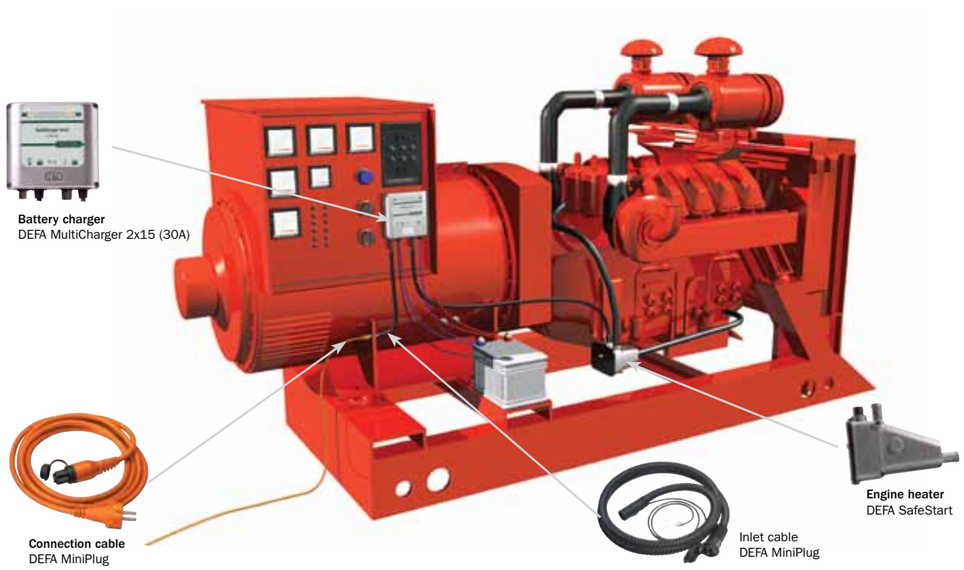
DEFA PowerSystems is developed in order to simplify installations and connections of battery chargers in cars, trucks, buses, tractors and construction machines. The system eases and enables connections with DEFA PlugIn cables. The system eliminates the need for tools for connection, which means that the system can be installed without assistance from authorized personnel.



Industry - Generator



Agriculture and Construction

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DEFA PowerSystems is very simple, reliable and durable. All cables and connectors are waterproof. DEFA PowerSystems is a modul based system which makes it possible to extend the system with for instance an engine- and interior heater.

Building and construction - Excavators etc.

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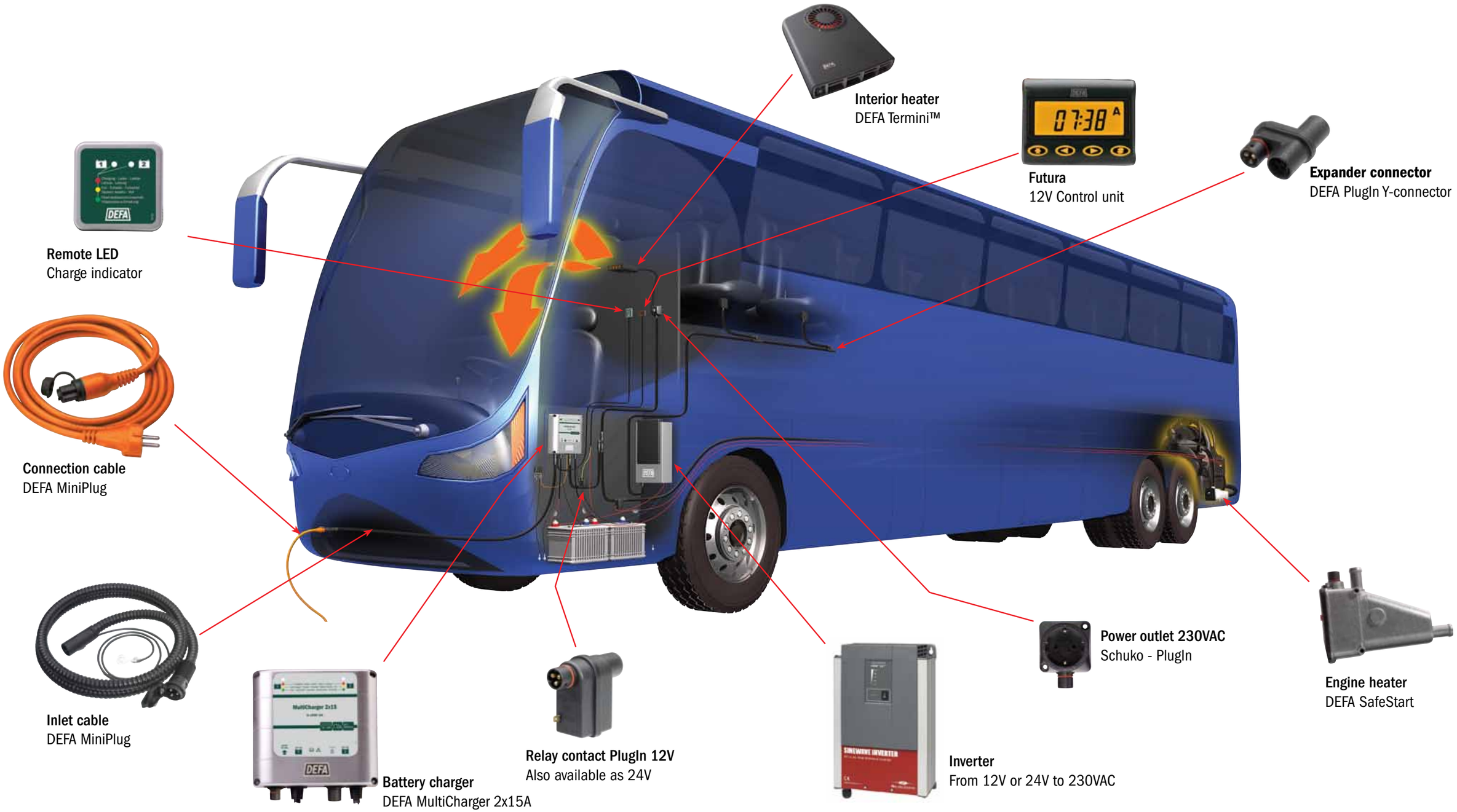
Transportation - Bus
In addition to charging and pre-heating of engine and compartment, it is necessary with an inverter which gives 230VAC while driving.
230VAC is used for PC, charging of telephone etc.



Fire engine

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Emergency response vehicles
DEFA RescueCharger has a special adapted charging profile for emergency repsonse vehicles.

Ambulance

www.defa.com

Emergency response vehicle
In addition to charging and pre-heating engine and compartment, it is essential with an inverter for medical equipment which gives 230VAC while driving.

Dual schuko contact
DEFA PlugIn

Futura
12V Control Unit

Interior heater
DEFA Termini™

Engine heater
DEFA SafeStart

Inverter
From 12V or 24V to 230VAC

Inlet cable
DEFA MiniPlug

Connection cable
DEFA MiniPlug

Remote LED
Charge indicator

Battery separator

Battery charger
DEFA RescueCharger 1x15A

Battery charger

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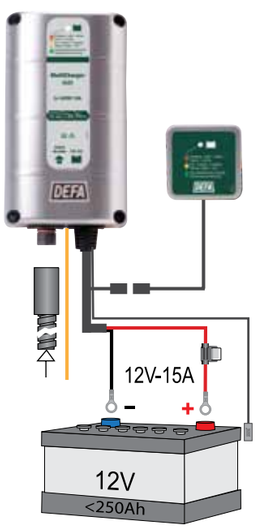
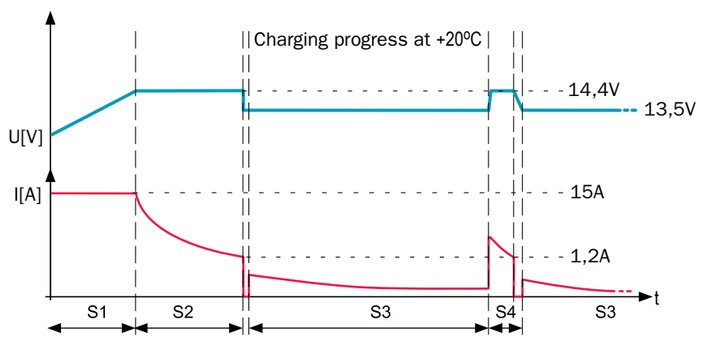
DEFA MultiCharger 1X15 is a 12V/15A battery charger.

The charger is suitable for fitting in vehicles with battery sizes up to 250Ah. It gives a galvanic isolation between net earth and the battery (dual isolation). DEFA MultiCharger 1x15 tolerates parallel loads up to 10A usage, charging the batteries at the same time.
The charging voltage is temperature compensated. DEFA MultiCharger 1x15A is filled with silicon compound and is therefore 100% waterproof.

DEFA MultiCharger 1x15	
Item No. with PlugIn	700132
Item No. with Schuko	700130
Mains voltage [VAC/Hz]	230/50-60
Charging voltage [VDC]	14,4
Float voltage [VDC]	13,5
Charging current [A]	15
Height/Width/Depth [mm]	200/115/45
Weight [kg]	1,9
IP rate (PlugIn/Schuko)	44/67

Remote LED panel with 10m cable	
Item No. (for 1 battery)	700129
Remote light diode shows the charging status of one battery with red, yellow or green LED light.	





The charging progress shows voltage (U) over time (t) and current (I) over time (t). The LED indicator, which is placed at the top of the front of the charger, indicates the status of the different charging steps (S1,S2...). The LED indicates:

Red	(S1) Main charging.
Yellow	(S2) End charging: more than 80% recharged / battery disruption.*
Green	(S3) Maintenance charging with lower voltage which starts after a minimum of four hours and after maximum sixteen hours of main charging.
Red pulse	(S4) Fully charged.

* The yellow lamp will light up (end charging mode) in cases of disruption of battery or change of fuse. This continues until the charger is reset (net on/off).

Battery charger

www.defa.com

DEFA MultiCharger 2X15 is a 12V/2X15A battery charger.

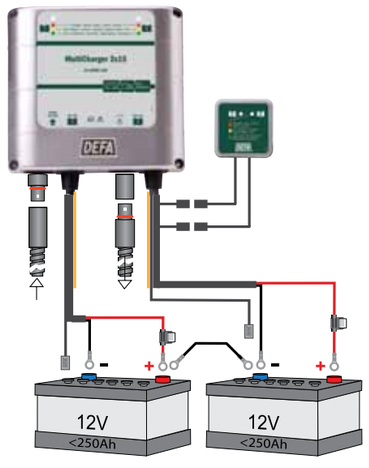
The charger is suitable for fitting in vehicles with battery sizes up to 500Ah. It gives a galvanic isolation between net earth and the battery (dual isolation). DEFA MultiCharger 2x15 tolerates parallel loads up to 20A usage charging batteries at the same time.
The charging voltage is temperature compensated. DEFA MultiCharger 2x15A is filled with silicon compound and is therefore 100% waterproof. The charger is suitable for 24V installations.

DEFA MultiCharger 2x15	
Item No. with PlugIn	700135
Item No. with Schuko	700133
Mains voltage [VAC/Hz]	230/50-60
Charging voltage [VDC]	14,4
Float voltage [VDC]	13,5
Charging current [A]	30/2x15
Height/Width/Depth [mm]	200/215/45
Vekt [kg]	3,5
IP rate (PlugIn/Schuko)	44/67

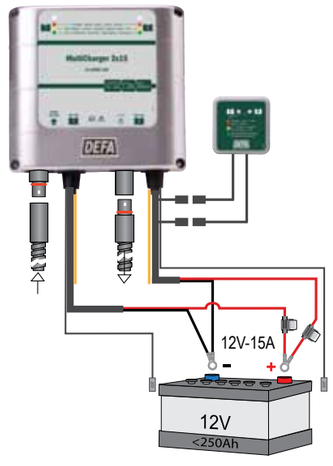
Remote LED panel with 10m cable	
Item No. (for 2 batteries)	700136
Remote light diode shows the charging status of two batteries with red, yellow or green LED light.	

The sketches show an optimal charging of 24V constructions where each battery is charged separately in order to avoid offset charging. The charger can together with interconnected outputs be used as a 12V/30A charger. The charge cycle for each channel equals the charge cycle for MultiCharger 1x15 shown on page 16.

24V System



12V System



Battery charger

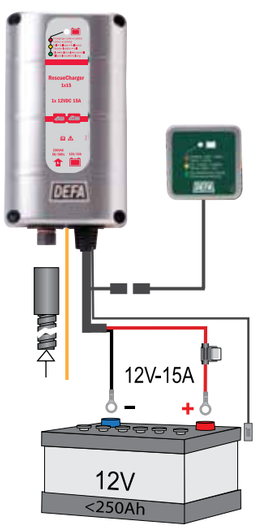
www.defa.com

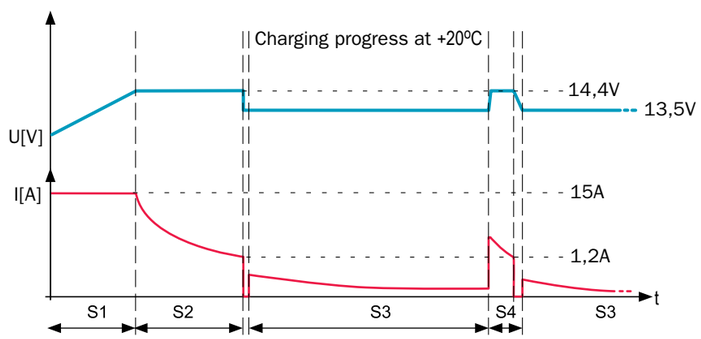
DEFA RescueCharger 1X15 is a 12V/15A battery charger.

DEFA RescueCharger is specially adjusted to emergency response vehicles which are connected on and off several times during a 24-hour period. The charger is suitable for fitting in vehicles with battery sizes up to 250Ah. It gives a galvanic isolation between net earth and the battery (dual isolation). DEFA RescueCharger 1x15 tolerates a parallel load up to 10A usage charging batteries at the same time. The charging voltage is temperature compensated. DEFA RescueCharger 1x15A is filled with silicon compound and is therefore 100% waterproof.

DEFA RescueCharger 1x15	
Item No. with PlugIn	701479
Item No. with Schuko	701480
Mains voltage [VAC/Hz]	230/50-60
Charging voltage [VDC]	14,4
Float voltage [VDC]	13,5
Charging current [A]	15
Height/Width/Depth [mm]	200/115/45
Weight [kg]	1,9
IP rate (PlugIn/Schuko)	44/67

Remote LED panel with 10m cable	
Item No. (for 1 battery)	700129
Remote light diode shows the charging status of one battery with red, yellow or green LED light.	





The charging progress shows Voltage (U) over time (t) and current (I) over time (t). The LED indicator, which is placed at the top of the front of the charger, indicates the status of the different charging steps (S1,S2...). The LED indicates:

Red	(S1) Main charging. Maksimum 1 hour.
Yellow	(S2) End charging: more than 80% recharged / battery disruption.*
Green	(S3) Maintenance charging with lower voltage starts after maximum four hours (S1+S2= maximum four hours).
Red pulse	(S4) Fully charged.

* The yellow lamp will light up (end charging mode) in cases of disruption of battery or change of fuse. This continues until the charger is reset (net on/off).

Battery charger

www.defa.com

DEFA RescueCharger 2X15 is a 12V/2X15A battery charger.

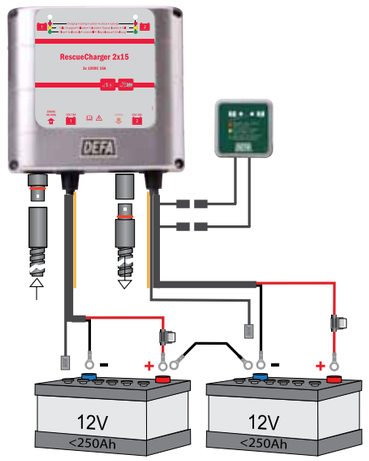
DEFA RescueCharger is specially adjusted to emergency response vehicles which are connected on and off several times during a 24-hour period. The charger is suitable for fitting in vehicles with battery sizes up to 500Ah. It gives a galvanic isolation between net earth and the battery (dual isolation). DEFA RescueCharger 2x15 tolerates a parallel load up to 20A usage charging batteries at the same time. The charging voltage is temperature compensated. DEFA RescueCharger 2x15A is filled with silicon compound and is therefore 100% waterproof.

DEFA RescueCharger 2x15	
Item No. with PlugIn	701481
Item No. with Schuko	701482
Mains voltage [VAC/Hz]	230/50-60
Charging voltage [VDC]	14,4
Float voltage [VDC]	13,5
Charging current [A]	30/2x15
Height/Width/Depth [mm]	200/215/45
Weight [kg]	3,5
IP rate (PlugIn/Schuko)	44/67

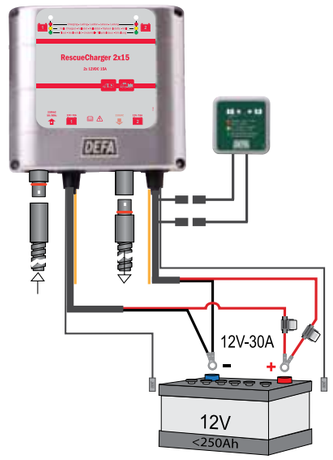
Remote LED panel with 10m cable	
Item No. (for 2 batteries)	700136
Remote light diode shows the charging status of two batteries with red, yellow or green LED light.	

The sketches show an optimal charging of 24V constructions where each battery is charged separately in order to avoid offset charging. The charger can together with interconnected outputs be used as a 12V/30A charger. The charge cycle for each channel equals the charge cycle for RescueCharger 1x15 shown on page 18.

24V System



12V System



Battery charger

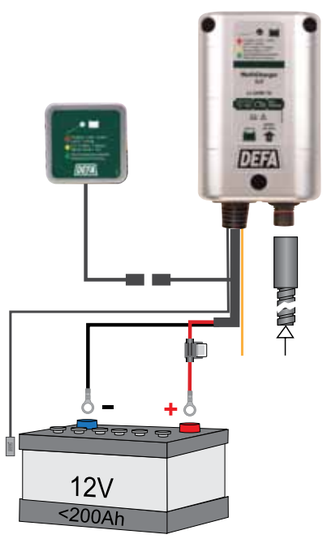
www.defa.com

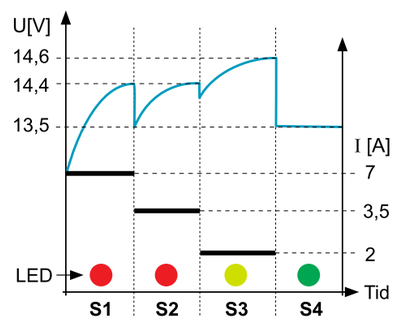
DEFA MultiCharger 1X7 is a 12V/7A battery charger.

The charger is suitable for fitting in vehicles with battery sizes up to 200Ah. It gives a galvanic isolation between net earth and the battery (dual isolation). DEFA MultiCharger 1x7 tolerates parallel loads up to 5A usage, charging the batteries at the same time. The charging voltage is temperature compensated. DEFA MultiCharger 1x7A is filled with silicon compound and is therefore 100% waterproof.

DEFA MultiCharger 1x7	
Item No. with PlugIn	701231
Item No. with Schuko	701232
Mains voltage [VAC/Hz]	230/50-60
Charging voltage [VDC]	14,4
Float voltage [VDC]	13,5
Charging current [A]	7
Height/Width/Depth [mm]	147/98/45
Weight [kg]	1,3
IP rate (PlugIn/Schuko)	44/67

Remote LED panel with 10m cable	
Item No. (for 1 battery)	700129
Remote light diode shows the charging status of one battery with red, yellow or green LED light.	





The charging progress shows Voltage (U) over time (t) and current (I) over time (t). The LED indicator, which is placed at the top of the front of the charger, indicates the status of the different charging steps (S1,S2...). The LED indicates:

Red - Main charging
Red - End charging: more than 80% recharged/disruption of battery
Yellow - Maintenance charging
Green - Fully charged

Battery charger

www.defa.com

DEFA MultiCharger 2X7 is a 12V/2X7A battery charger.

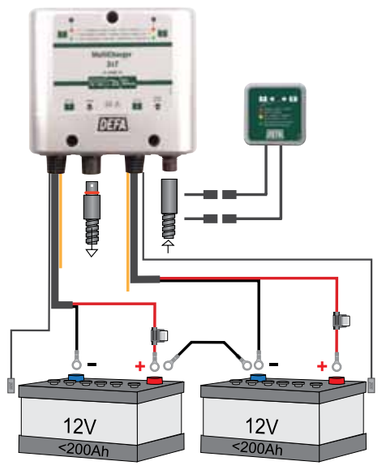
The charger is suitable for fitting in vehicles with battery sizes up to 400Ah. It gives a galvanic isolation between net earth and the battery (dual isolation). DEFA MultiCharger 2x7 tolerates a parallel load up to 10A usage charging batteries at the same time. The charging voltage is temperature compensated. DEFA MultiCharger 2x7A is filled with silicon compound and is therefore 100% waterproof. The charger is suitable for 24V installations.

DEFA MultiCharger 2x7	
Item No. with PlugIn	701233
Item No. with Schuko	701234
Mains voltage [VAC/Hz]	230/50-60
Charging voltage [VDC]	14,4
Float voltage [VDC]	13,5
Charging current [A]	14/2x7
Height/Width/Depth [mm]	155/183/42
Weight [kg]	2,6
IP rate (PlugIn/Schuko)	44/67

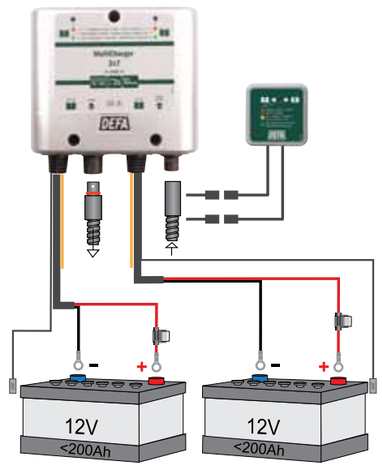
Remote LED panel with 10m cable	
Item No. (for 2 batteries)	700136
Remote light diode shows the charging status of two batteries with red, yellow or green LED light.	

The sketches show an optimal charging of 24V constructions where each battery is charged separately in order to avoid offset charging. The charger can together with interconnected outputs be used as a 12V/14A charger. The charge cycle for each channel equals the charge cycle for MultiCharger 1x7 shown on page 20.

24V System



12V System

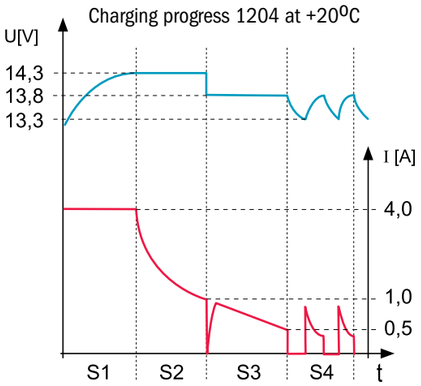


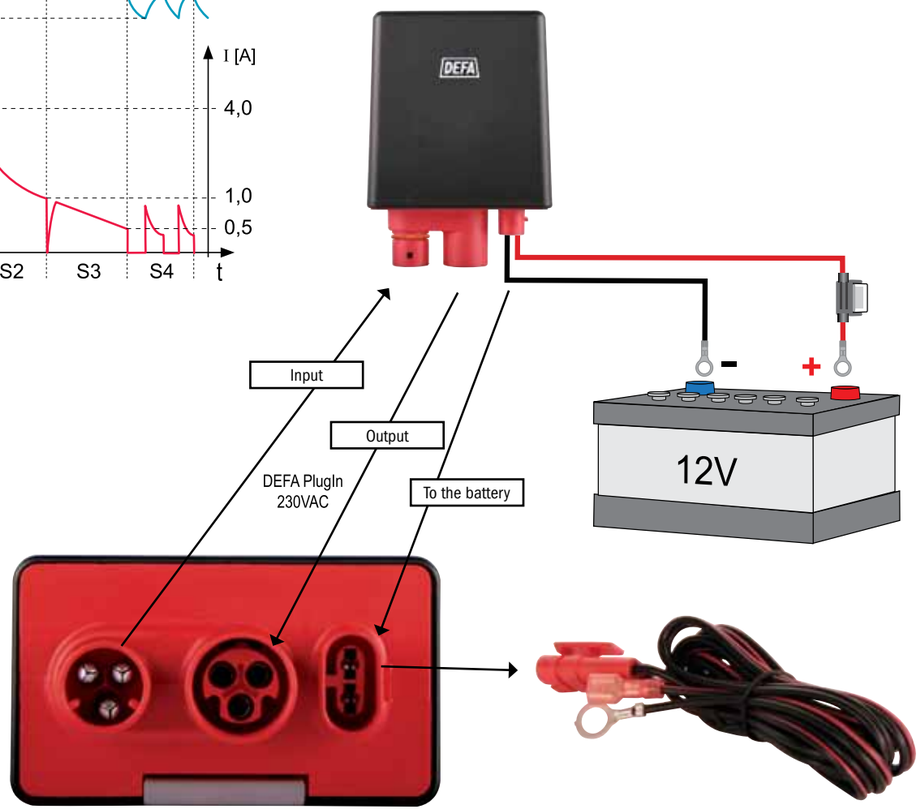
Battery charger

www.defa.com

DEFA MultiCharger 1204 is a maintenance charger which is adjusted to modern battery technology, and it extends the lifespan of the battery. If you are looking for a reliable start of your car and a fully charged battery during the winter season, or maintenance charging of your battery over a longer period of time, then DEFA MultiCharger 1204 is the solution for you.

DEFA MultiCharger 1204	
Item No.	450020
Mains voltage [VAC/Hz]	230/50-60
Charging voltage [VDC]	14,3
Float voltage [VDC]	13,3 - 13,8
Charging current [A]	4
Height/Width/Depth [mm]	84/103/42
Weight [kg]	0,26
IP rate	65



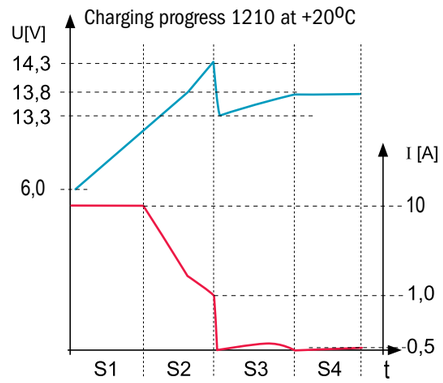


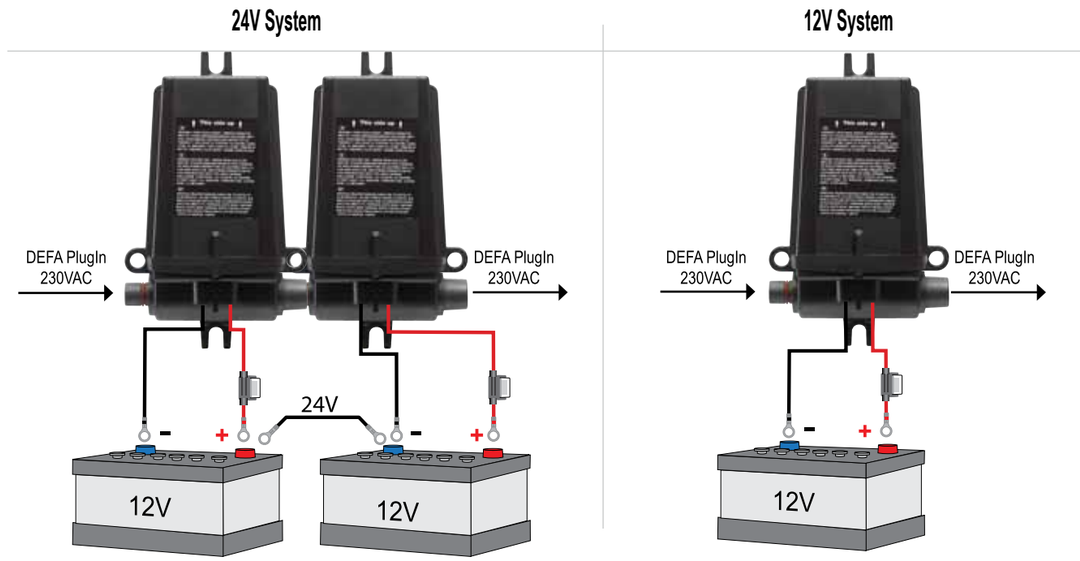
Battery charger

www.defa.com

MultiCharger 1210 is a 12V/10A battery charger which can be used for transportation vehicles, caravans, tractors, construction machines and generators.

DEFA MultiCharger 1210	
Item No.	450011
Rated output [W]	125
Charging current [A]	10A
Charging voltage boost mode [V]	>14,7
Maintenance charging [V]	13,7
Height/Width/Depth [mm]	205/120/65
Fuse [A]	15
Weight [kg]	0,505
IP rate	44





DEFA PowerSupply

www.defa.com

DEFA PowerSupply 15A is used as a pure current provider without being connected to batteries. DEFA PowerSupply 15A does not produce any noise at output (DC) and therefore does not interfere with any other electronics. DEFA PowerSupply 15A is 100% waterproof (IP67) and is therefore very suitable for rough environments such as oil drilling platforms, fish farms, back-up stations in the mountains, etc.

DEFA PowerSupply 15A	
Item No.	700493
Mains voltage [VAC/Hz]	230/50-60
Charging voltage [VDC]	14,4
Maintenance charging [VDC]	13,5
Charging current [A]	15
Height/Width/Depth [mm]	200/115/45
Weight [kg]	1,9
IP rate	67

El-central and panels

www.defa.com

El-central	
Item No. Main inlet cabinet 230VAC/16A 1 DEFA PlugIn inlet, 1 DEFA PlugIn outlet - Schuko outlet - grey	700433

Front panel for 700433	
Item No. Front panel for El-central 700433, recessed - white	701101
Item No. Front panel for El-central 700433, recessed - mahogany	701104

El-central	
Item No. Main inlet cabinet 230VAC/16A 1 DEFA PlugIn inlet, 3 DEFA PlugIn outlet - grey	700437
Item No. Main inlet cabinet 230VAC/16A, 2 DEFA PlugIn inlet 3 DEFA PlugIn outlet, with general switch - grey	700441

Front panel for 700437/700441	
Item No. Front panel for recessed, black	701121
Item No. Front panel for recessed, mahogany	701102
Item No. Front panel for recessed, white	701103
Item No. Front panel for recessed, anthrasite	701122

Control unit

www.defa.com

The control units Futura and SmartStart™ ensure on and off connection of engine and compartment independent of battery charging. We achieve the most cost effective use by letting the temperature control the connection of engine and compartment (automatic). The system will then only be connected no longer than necessary. The higher the temperature, the shorter the connection time.

DEFA Futura and SmartStart™ can in addition also be used as summer/winter switches.

DEFA Futura 12V	
Item No. without relay box	440010
Item No. with relay box	440011

A control unit which can be used as both summer and winter switch. The winter function can connect engine and/or interior heater controlled by time or temperature. We can supply outdoor temperature sensor as extra equipment. (Item No. 418071).

DEFA SmartStart™	
Item No. 12V	440020
Item No. 24V	440021

SmartStart™ is a wireless control unit which has, in addition to the characteristics of Futura, many useful functions such as two separate users, databased starting time of engine and interior heater and connection of interior heater based on the temperature inside the compartment. Smartstart™ can also be used as control unit for fuel heaters provided access to analog start and stop signal from this system.

Manual summer and winter switch	
Item No.	701123
Height/Width/Depth [mm]	67/135/76
Weight [kg]	0,200

The summer/winter switch is a manual switch which makes it possbble for an engine heater/interior heater to be disconnected during the summer without the battery charger being disconnected.

Contacts and frames

www.defa.com

All 230VAC Schuko connections have DEFA PlugIn connections for single installations.
The connections are supplied both for flush mounted and on-wall mounted.

Wall outlet - flush mounted single stainless steel	
Item No.	700399
Mains voltage [VAC]	230
Weight [kg]	0,200
IP rate	44

Wall outlet - on-wall mounted single	
Item No.	700401
Mains voltage [VAC]	230
Weight [kg]	0,100
IP rate	44

Wall outlet - on-wall mounted double	
Item No.	700403
Mains voltage [VAC]	230
Weight [kg]	0,200
IP rate	44

Wall outlet - on-wall mounted single	
Item No.	460829
Mains voltage [VAC]	230
Weight [kg]	0,058
IP rate	44

Wall outlet - flush mounted single/double	
Item No. (White)	701317
Item No. (Brown)	701316
Item No. (Grey)	701315

Frames for wall outlets	
Item No. Single frame for wall outlet - white	701307
Item No. Single frame for wall outlet - brown	701306
Item No. Single frame for wall outlet - grey	701305
Item No. Double frame for wall outlet – white	701310
Item No. Double frame for wall outlet - brown	701309
Item No. Double frame for wall outlet - grey	701308

Relay contact and Y-connector

www.defa.com

DEFA PlugIn Y-connector	
Item No.	460853
Mains voltage [VAC]	230
Weight [kg]	0,023
IP rate	44
DEFA Y-connector is an all-welded connector for connecting engine and interior heater or MultiCharger battery charger.	

DEFA PlugIn T-connector 90°	
Item No.	460831
Mains voltage [VAC]	230
Weight [IP]	0,022
IP rate	44
DEFA T-connector is an all-welded connector for connecting engine and interior heater or MultiCharger battery charger.	

DEFA PlugIn relay connector	
Item No. (12V)	460854
Item No. (24V)	460856
Mains voltage [VAC]	230
Weight [kg]	0,059
IP rate	44

DEFA PlugIn relay box	
Item No. (12V)	460838
Item No. (24V)	460863
Mains voltage [VAC]	230
Weight [kg]	0,101
IP rate	44

DEFA LED Indicator Kit	
Item No.	460881
Mains voltage [VAC]	110-240
Current [A], Max.	16
IP rate PlugIn/LED	44/67

Connection cables

www.defa.com

DEFA Connection cable is adjusted to DEFA MiniPlug and gives a reliable and good connection from electricity outlets to the car.

DEFA MiniPlug Connection Cable 1,5mm^2	
Item No. (2,5m rett kontakt)	460920
Item No. (2,5m vinklet kontakt)	460933
Item No. (5,0m)	460921
Item No. (10,0m)	460924
Item No. (15,0m)	460936
Voltage [VAC]	230
Current [A]	16
Weight (Length/Weight) [m/kg]:	2,5/0,420 – 5,0/0,695 10,0/1,180 – 15,0/1,700

DEFA MiniPlug Connection Cable 2,5mm^2	
Item No. (2,5m)	460960
Item No. (5,0m)	460961
Item No. (10,0m)	460962
Voltage [VAC]	230
Current [A]	16
Weight (2,5/5,0/10,0 m) [kg]	0,530/0,915/0,1520
DEFA Connection Cable 2,5 mm^2. Applicable to vehicles with special requirements to power cable, for instance ambulances and fire trucks with special equipment. Maximum power consumption is 16A, even if the cable is supplied with 2,5mm^2 cross-section.	

DEFA Connection set 460785	
Item No. MiniPlug inlet cable 1,5 m	460915
Item No. MiniPlug connection cable 2,5 m	460920
Item No. MiniPlug inlet cable - Bracket	418801

DEFA Connection set 460787	
Item No. MiniPlug inlet cable 1,5 m	460915
Item No. MiniPlug connection cable 5,0 m	460921
Item No. MiniPlug inlet cable - Bracket	418801

Inlet plug - PlugIn

DEFA MiniPlug Inlet Cable is adjusted to all new cars. It is as functional and easy to install flush mounted as with bracket. During the development of DEFA MiniPlug we have emphasized on correct design, safety, optimal installation- and user friendliness.

DEFA MiniPlug Inlet Cable	
Item No. (0,6m)	460902
Item No. (1,9m)	460901
Item No. (1,5m)	460915
Item No. (2,0m)	460939
Voltage [VAC]	230
Current [A]	16
Weight (Length/Weight) [kg]:	1,5/0,410 – 2,0/0,570
The Inlet Plug has MiniPlug "She-contact" with lid in one end and DEFA PlugIn contact in the other end. In addition it has an ground conductor with cable clip for grounding the system.	

Extension cables

www.defa.com

DEFA CEE Connection Cable	
Item No. (2,5m)	460820
Item No. (5,0m)	460821
Voltage [VAC]	230
Current [A]	16
Weight (2,5m/5,0m) [kg]	0,465/0,805

DEFA CEE Inlet Cable with DEFA PlugIn	
Item No. (1,5m)	460815
Item No. (2,0m)	460839
Voltage [VAC]	230
Current [A]	16
Weight (1,5m/2,0m) [kg]	0,510/0,630

DEFA CEE Contact with DEFA PlugIn	
Item No.	701150
Voltage [VAC]	230
Current [A]	16
Weight [kg]	0,158

Extension cables - PlugIn

The components in DEFA PowerSystems are easily connected together with DEFA's armoured PlugIn extension cables. The system is garanteed a reliable and tight connection and eliminates incorrectly connections.

DEFA PlugIn Extension cable	
Voltage [VAC]	230
Current [A]	16
IP rate	44

DEFA PlugIn Extension cable	
Item No.	Length [m]
460802	0,5
460803	1,0
460843	1,5
460804	2,0
460844	3,0
460846	4,0
460809	5,0
460847	8,0
460851	10
460850	12,0

Interior heaters

www.defa.com

DEFA Termini™ interior heaters use a PTC (PTC = Positive Temperature Coefficient) heating element which adjusts the effect depending of the temperature on the inlet air. 20°C increase in temperature gives 10% reduced effect. Gradually as the compartment is heated up, the effect will be reduced and power consumption will also be reduced. The interior heater is equipped with an automatic excessive temperature protection.

DEFA Termini™ is tested and approved by; Safety EN 60335-1 og EN 50408.

Termini™ 1350	
Item No. with Schuko	430051
Output -25°C [W]	0/1350
Height/Width/Depth [mm]	35/138/181
Weigth interior heater [kg]	0,595
Weight bracket [kg]	0,020
IP rate	20

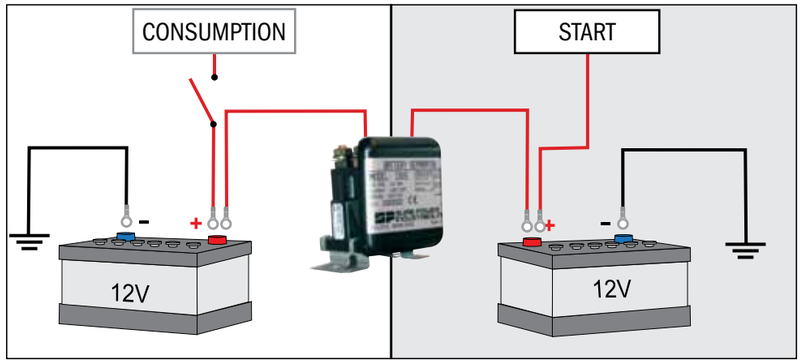
Termini™ 1850	
Item No. with Schuko	430063
Output -25°C [W]	0/850/1850
Height/Width/Depth [mm]	47/141/183
Weight interior heater [kg]	0,745
Weight bracket [kg]	0,020
IP rate	20

Termini™ 2100	
Item No. with Schuko	430061
Output -25°C [W]	0/1350/2100
Height/Width/Depth [mm]	47/141/183
Weight interior heater [kg]	0,745
Weight bracket [kg]	0,020
IP rate	20

Battery separators

www.defa.com

The battery separator connects two separate battery groups, for instance start and consumption battery during charging. When charging is interrupted the batteries are separated again. The battery separators measure voltage on both battery groups and is activated automatically. It is very easy to install, including in the existing installation. An optimal and easy solution for a 2-circuit system without having to work on the original installation.



Battery separator 12V 100A	
Item No.	700595
Function	Separator
Continuous current [A]	100
Max output [A]	400
On function (typical) [V]	13,2
Off function (typical) [V]	12,8
Height/Width/Depth [mm]	76/83/64
Special characteristics: Both batteries will activate the separator.	

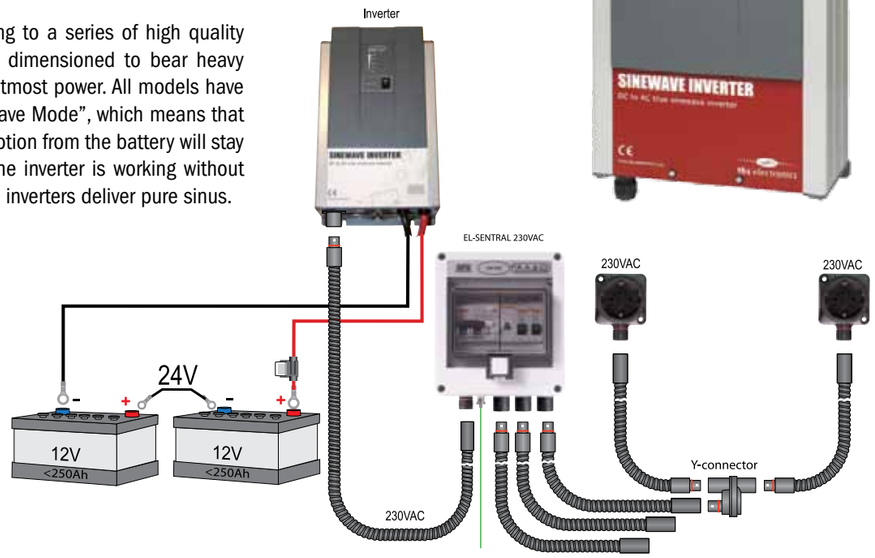
Battery separator 12V 200A	
Item No.	700596
Function	Separator
Continuous strøm [A]	200
Max output [A]	1000
On function (typical) [V]	13,2
Off function (typical) [V]	12,8
Height/Width/Depth [mm]	76/83/64
Special characteristics: Both batteries will activate the separator.	

Battery separator 24V 100A	
Item No.	700598
Function	Separator
Continuous current [A]	100
Max output [A]	400
On function (typical) [V]	26,8
Off Function (typical) [V]	25,7
Height/Width/Depth [mm]	76/83/64
Special characteristics: Both batteries will activate the separator.	

Inverter

INVERTER

Our inverters belong to a series of high quality inverters. They are dimensioned to bear heavy use and give the utmost power. All models have a built-in “Power Save Mode”, which means that the power consumption from the battery will stay at a minimum if the inverter is working without being strained. The inverters deliver pure sinus.



Item No.	Connection	Input [VDC]	Output [VAC]	Continously [W]	Peak [W]	< 10 min. [W]	Weight [kg]	Dimensions [mm]
700503	PG Nipple	12	230	1300	2500	1600	10,5	351/210/114
701208	DEFA PlugIn			1300	2500	1600		
700504	PG Nipple	24		1400	3000	1800		
701211	DEFA PlugIn			1400	3000	1800		
701205	PG Nipple	12		850	2000	1050		105/206/355
701206	DEFA PlugIn			850	1800	1000		
701326	PG Nipple			250	700	300	3,5	98/130/185
700505	PG Nipple			500	1000	600	6,2	113/163/228

FUNCTION

An inverter will give you access to 230VAC from 12/24V battery groups. DEFA inverters deliver pure sinus. DEFA inverters are excellent for for instance TV, video, DVD, parabol, PC, stereo, etc. It is necessary with enough battery capacity, as the power consumption from the battery will be quite high. See examples underneath:

Product	Effect [W]	Consumtion [A] 12V	Elaps time in hours [t]				
			50Ah	75Ah	100Ah	200Ah	400Ah
19” TV	100	1	4,5	7,0	10,0	20	40,0
Data system	300	30	1,0	2,0	2,7	6,3	13,0
Drilling machine	400	40	0,8	1,3	1,9	4,5	10,0
Microwave	800	80	-	0,6	0,8	1,9	4,5
Hair dryer	1000	100	-	-	0,6	1,4	3,4

DEFA Security/Tracking

www.defa.com

DEFA Tracking

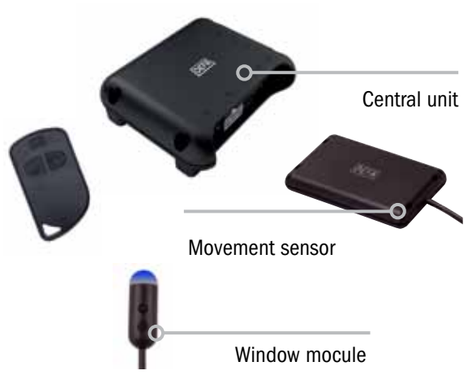
DT20 is a GSM/GPS based tracking product where all electronic elements are gathered together in a small unit. The unit comes with a preinstalled SIM-card. The system is also suitable for installation in cars, outboard engines, motor cycles, ATV etc.

- Fence-alarm (initiate tracking)
- Supply voltage 8-30 VDC
- Built in angle sensor (Accelerometer)
- Built in antennas
- Preinnstalled SIM-card
- 2 types of subscription (DEFA Basic – DEFA Basic Light)
- Easy registration on WEB
- GSM-bånd 900/1800mHz (dual band)
- Integrated back up battery (48 hours operation)
- Super sensitive 16 channels GPS receiver
- 1 SMS controllable output (max. 500 mA)
- 1 input (e.g. alarm)
- SMS alarms: battery alarm, power alarm, fence alarm, speed alarm
- Update of new software through GPRS

DT20

DEFA Security Alarm

DVS90 is a state-of-the-art alarm system designed on a flexible electronic platform that contributes to a very easy set up and installation in most vehicles, regardless of type of electric- and electronic systems. The alarm has digital interfaces for all types of CAN–busses found in modern cars and also provides interfaces for analog as well as semi-digital inputs with corresponding functio nality for support of older vehicles or boats. The alarm can be installed in all vehicles utilizing 12V or 24V battery systems. As sisted by car specific installation drawings and excellent support from www.defa.com the DVS90 will always be number one when it comes to installation- time and reliability. To raise the security level further, additional plug and play sensors are available.



DEFA Handy 70 - Powerful battery charger, handy size

www.defa.com

Choose correct battery charger

A good charger has to give enough output, the right voltage and current. One will find a wide range of models of various quality on the market. Handy 70 from DEFA gives a safe, fast and efficient charging and is protected against misconnection. With Handy 70 you meet all requirements for both cars, motorbikes, snow scooters, tractors, camping, boat and other equipment with all types of lead/acid batteries AGM/GEL from 4,0 - 240 Ah.

Flat battery?
It is important to keep the battery fully charged. Using the battery charger frequently will increase the batteries life span and give safe and secure start of your car. In case you have forgotten to turn the lights or other features off and are left with a dead battery and have to jumpstart your car, a charge is still needed to bring the battery back to life. If you have to recharge your battery over night, a minimum of 7 Ampere battery charger is needed. Handy 70 is adjusted to the sensitive electronics in modern cars.

Maintenance charging is a smart investment. Motor cycles, snow scooters and other seasonal based equipment have periods during the year where they are not in use. By charging regularly you will have a guaranteed start and at the same time the lifespan of the battery will be extended.

Handy 70 with built-in light
It can be diffictult to orientate oneself. When Handy 70 is connected to 230V you will have a flashlight function in front of the charger. Handy 70 can also be used as power supply when changing batteries.

6-pack Item.No. 700122

Model	HANDY 70
Item No.	700121
Item No. 6-pack	700122
Mains voltage [VAC, Hz]	207-253, 50/60
Current [A rms]	0,9
Return current [mA]	< 2
Charging voltage [VDC]	13,7/14,4/14,7
Charging voltage maintenance [VDC]	13,3/13,7
Charging current [A]	7
Ripple [mV rms]	< 70
Surrounding temperature [C^{o}]	-40 to +50
Cooling	air
Type of charging	three step IUoU Pulse
Type of batteries	all types of lead/acid inclusive AGM and GEL, open and shut
Battery capacity [Ah]	4,0 to 240
Height/Width/Length [mm]	50/50/230
Weight [kg]	0,5
IP rate	54

DEFA SmartCharge

www.defa.com

Take SmartCharge now! Simply plug your DEFA SmartCharge to the mains, attach the easy-to-use clips to the battery and push the on-button. When you are done, wind it up, click the parts in place and keep it handy. DEFA SmartCharge is the safe, effective and smart solution for your battery charging needs.

EASY TO USE CHARGER

- One-button solution.
- Backlit user friendly interface and display.
- Adapts automatically to the size of your battery.
- A meter to easily read the actual power level of your battery.
- Integrated cable management.
- It will never over-charge your battery. Ever.
- Temperature compensated charging cycle.

DEFA SmartCharge	
Item No.	701515
Length/Width/Height [mm]	110/90/54
Weight [gr]	260
IP rate	65

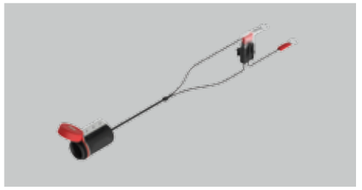
DEFA SmartCharge accessories

www.defa.com

Accessories: There excists a wide range of accessories for DEFA SmartCharge. These products reflect your everyday need for charging - that be for your car, boat or other battery-operated elements. The selection consists of cables, connectors, status displays and outlets which can be adapted to any need. For more information about the different accessories on defa.com.

Charge connector and power outlet - both combined at the same connector point

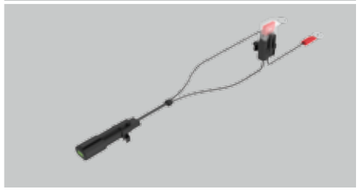
With an extra DEFA power outlet installed in your vehicle, you can easily charge your mobile phone, connect your cooling box or other equipment which requires power. When the battery needs to be charged you connect SmartCharge directly through the same power outlet and charge the battery when docking and you have access to 230V - it could not be easier!



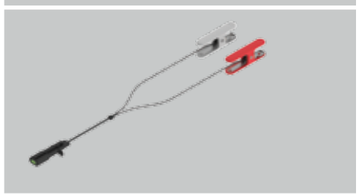
DEFA 12V Charger connector	
Item No.	701759
Cable length [m]	2,0
Cross section [mm^2]	2,5
IP rate Flush-/Bracket mounted	65/20

DEFA 12V Charger cable	
Item No.	701760
Cable length [mm]	0.75
Cross section [mm^2]	1,3
IP rate	65

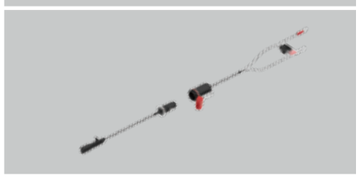
DEFA 12V Battery status indicator	
Item No.	701758
Length [mm]	48
Cross section [mm^2]	28
IP rate	65



DEFA 12V Charger cable, compact	
Item No.	701762
Cable length [m]	1,3
Cross section [mm^2]	1,3
IP rate	65



DEFA 12V Charger cable, compact, with clips	
Item No.	701764
Cable length [m]	1,3
Cross section [mm^2]	1,3
IP rate	65



DEFA 12V Charger cable Kit	
Item No.	701761

Electric Outlets

www.defa.com

Electric outlets for parking lots are especially adapted for vehicles with electrical engine and interior heaters, and as charging station for heavy vehicles.

The possibility for connecting at home, at work, at the shopping mall, at the airport, at skiing resorts etc. is good for the environment, good for the car and good for you.

Pillar or wall outlet with 2 or 4 outlets can be used. These should be placed between two parking spaces to reduce the possibility of getting run over by cars. It also ensures easy access. Control by using a timer can give considerable energy savings at larger parking lots. Heavy vehicles normally demand a separate fuse circuit at 16A.

Electric outlets
- a flexible and secure choice

DEFA WarmUp

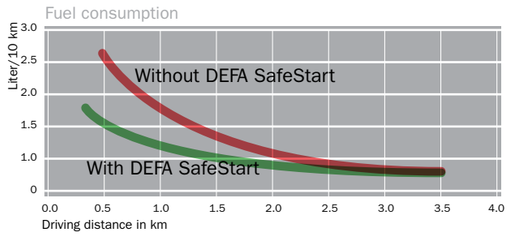
When starting a cold engine, pollution and consumption is at its very worst.

It doesn't matter if the temperature outside is -15 or +4°C. The engine is cold anyway, and cold engines consume a lot more fuel to get started. Additionally, the emissions are much higher during this cycle. The catalyst, which cleans the emissions from the engine, does not work properly before the temperature exceeds 600°C. Electrical car heating is the most environmentally friendly way to preheat your car. If you start driving with a warm engine, both emissions and fuel consumption will be reduced the first 4-5 kilometers.
If all cars had engine heaters, the environment would benefit in several ways.

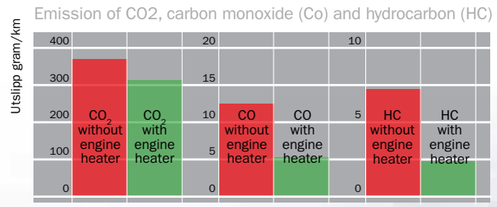
Today the authorities throughout Europe are taking dramatic measures to restrict the use of cars. Introduction of car free zones and times, increased car taxes and environmental taxes during rush-hour are a result of the environmental threat. At the same time the society depends on efficient solutions for collective transportation.

Every car owner is able to give the environment a helping hand by starting their car every day with a warm engine. One single car owner will not be able to make such a big difference one winter morning – but the entire European car fleet will absolutely make a big difference during a year.

Electrical car heating has only environmental advantages. In contrast to solutions based on fuel, DEFA car heating ensures less emissions and fuel consumption. A preheated engine during the cold winter season will also ensure less engine wear and tear.



Starting of a preheated engine reduces the fuel consumption with 50% the first 4 km



Starting of a preheated engine gives 15-30% less pollution the first 4 km

DEFA SafeStart - Engine pre-heaters

The purpose with an engine heater is to create and transfer heat to the engine in an effective and best possible way. This can be done directly through heating the antifreeze fluid or oil, or indirectly through heating the engine block or oil pan utilizing a contact heater.

DEFA offers optimal engine heater solutions for most air-and water-cooled petrol- and diesel engines on the market. We also have smart solutions for tractors, trucks and other engine vehicles and stationary engines. More than 600 different engine heaters are on the market supporting more than 3400 different engines. We have basically 9 series in our product range where the differences are to be found in the manner of operation and the principal of installation.

DEFA SafeStart 000-series

Characteristic	Flat conic flange
DEFA No.	001-099

The 000-series can only be used on engines with cast iron block. The heaters flange consists of a conic slice, and the heater is kept in place in the engines frost hole by a press fit solution.

DEFA SafeStart 100-series

Characteristic	Conic cup flange
DEFA No.	101-199

100-series heaters are only used on vehicles with cast iron block. The heaters flange is formed as a cup in order to keep a small profile on the active heating area. The heater is used on engines with little space inside the water jacket.
Press fit heater.

DEFA SafeStart 200-series

Characteristic	Threaded flange
DEFA No.	201-299, 2201-2299

The flange of the 200-series is threaded and is used on cars which have a threaded plug into the water jacket.

DEFA SafeStart 300-series

Characteristic	T- or spread rail
DEFA No.	301-399

The heater is fastened to the engine block with a fixed spreader rail or a T- rail.
The 300-series is also used in areas where there is too little space around the element for press fit on cast iron block or in aluminum blocks.

DEFA SafeStart 400-series

Characteristic	Hose heater without thermostat
DEFA No.	401-499, 2401-2499

Heaters with DEFA number series from 401 to 499. Number series from 420 to 423 are heaters with thermostat. The flange on this type of engine heater consists of a metal pipe. This pipe can encompass the whole or parts of the active element. The heater is attached to a specific point in one of the engines coolant hoses.

DEFA SafeStart 500-series

Characteristic	Special fastening point of the bracket
DEFA No.	501-599, 2501-2599

Some engine types have hatches in different shapes which open to the water jacket of the engine block. This heater has a flange which is identical to the original hatch.

DEFA SafeStart 600-series

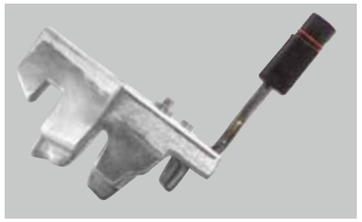
Characteristic	Oil heater
DEFA No.	601-699

The oil heater is used on air cooled engines or in combination with engine heater for coolant.

DEFA SafeStart 700-series

Characteristic	Hose heater
DEFA No.	700-799, 2700-2799

Heaters which have DEFA serial numbers from 701 to 799. Engine heaters in this series are supplied with our without thermostat.



DEFA SafeStart 800-series

Characteristic	Contact heater
DEFA No.	800-899, 2800–2899, 3800-3899, 4800-4899

The contact heater can be divided into two categories:
Heaters for engine block and heaters for sump. The contact heaters consist of an element cast in aluminum, adapted to the place of installation.

Installation and use

Read the instruction manual for your vehicle closely. The engine heater should ONLY be installed in vehicles which are described in the fitting instructions. Installation of engine heater is to be carried out at an authorized workshop.

DEFA engine heaters are dimensioned for ”normal use”. Normal use is defined as: 3 connections x 3 hours per 24 hours, based on 150 usage days per year (approx. 5 months per year). If an engine heater is used in emergency response vehicles, emergency power aggregates, and so on, where the engine heater is continously connected when vehicles no longer are in use, it will be necessary with a yearly service/controll.

DEFA Special tools

www.defa.com

DEFA Installation tools	
Item No.	460840
Hull saw Ø24mm	For MiniPlug inlet plug
Hull saw Ø20mm	For Interior heater cable
File	For MiniPlug feed track
Hull saw retainer	With pilot hole drill

DEFA tools for feed through bulkhead	
Item No.	460862
Lead-in plug	For PlugIn male
Lead-in plug	For PlugIn female

DEFA tools for feed through bulkhead	
Item No.	460866
No. of pcs.	3
Lead-in wire	For PlugIn Female-connector (**B1**), PlugIn Male-connector (**B2**) and Termini™ Interior heater cable (**B3**).

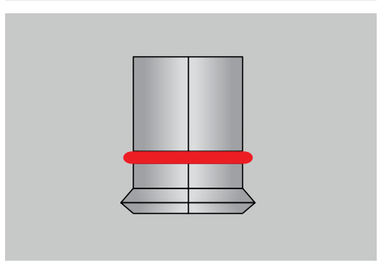
DEFA Extractor tools

www.defa.com

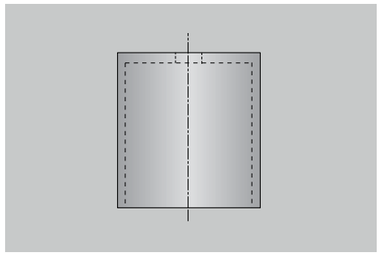
These tools come separately or in a complete set. In order to use the tools one needs the main tools, extractor and taper clamping sleeve. Extractor and taper clamping sleeve can be baught seperately in 5 different sizes depending on the inside diameter of the frost plug being dismounted (see the diameter list). The tool is suitable for deep frost plugs.

Complete extractor tools consists of main tools, 5 extractors and 5 taper clamping sleeves with different diameters.
Item No. 490887.

DEFA Main tool	
Item No.	490888



DEFA Extractor	
Item No. Complete extractor set	490871
Item No. Ø20mm	490843
Item No. Ø27mm	490845
Item No. Ø31mm	490846
Item No. Ø35mm	490847
Item No. Ø41mm	490848



DEFA Taper clamping sleeve	
Item No. Complete taper clamping sleeve	490886
Item No. Ø27mm	490881
Item No. Ø31mm	490882
Item No. Ø35mm	490883
Item No. Ø41mm	490884
Item No. Ø46	490885

DEFA Extractor hook	
Item No. 30,5mm	460835
Item No. 37,5mm	460836
Item No. 44,5mm	460837

For more information about our products please see www.defa.com,
Technical Handbook (Order No. 490270) or List of Vehicles (Order No. 490100).

www.defa.com

Producer: DEFA AS, Norway

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