Introduction

Dear customer,

Thank you for your confidence and purchase of our reliable and high-performance kit for recharging lead accumulators.

Charging kit GX30 is a product that has passed demanding testing and operation checks. It is a product that implements patent technologies and meets valid European and national directives.

The compliance with relevant standards has been documented in the product; the respective declarations and certificates are stored at the manufacturer.

With regard to optimal utilization, operational safety and reliability of the kit, please read this instruction manual carefully.

In order to keep the kit in good working condition and ensure its safety function it is necessary that you observe the instructions in the manual!

This instruction manual is part of the product. It includes important instructions concerning commissioning and operation. If you give or sell the product to other people, see to handing over this instruction manual as well.
Safety instructions:

Observe valid national standards and regulations valid at the site of kit use, both for installation and operation. Before you start using the kit, please read the following instructions:

Follow the instructions of combustion engine manufacturer with regard to installation, operation and maintenance, which are an integral part of this product.

Should there be damage of the kit caused by non-observance of this instruction manual, the warranty claim will be voided! The manufacturer of the kit is not responsible for any additional damage that would follow from it. The manufacturer is not liable for material damage and personal injuries caused by improper handling or non-observance of relevant safety regulations.

For safety reasons and because of registration (CE), it is forbidden to adjust the product in any way or make any alterations in its connection.

Do not use the kit in premises where there are combustible gases and fumes, dust, high relative air humidity (over 80 %), wetness and temperatures above 35 °C.

If you suppose that using the kit would be dangerous, turn it off and secure it against accidental use (turning on).

Take into consideration that the kit is no longer safe to use if it demonstrates visible damage, does not work, has been stored for a long time in improper conditions or has been exposed to heavy load during transportation.

Upon a failure (defect) of accumulator hypercharge protection, there may be leaks of dangerous explosive gas (hydrogen) near the charged accumulator battery (lead). Therefore, the battery has to be placed in a well-ventilated room.

In order to avoid short-circuits in the electric line between the kit and the accumulator battery, it is necessary to connect a proper breaker with equivalent current value into the branch with plus contact.

The breaker has to be mounted as close as possible to the accumulator terminal; the best would be directly on the terminal.

All electrical appliances connected to the accumulator have to be secured in the connection to the accumulator by suitable locks, as close as possible to the accumulator terminal as well.

Do not start the kit indoors (exhaust fumes are toxic).
Be careful when starting the kit in the presence of underage people.

Be careful about rotary parts when setting-up and maintaining the kit.

Do not cover the kit during operation and prevent the dirt, water and foreign particles from penetrating inside.

Before each starting of the kit, check its safety, fluid capacities, correct connection to electric circuit and safety with regards to the environment.

Charging up the accumulator should be carried out in a well-ventilated area that is not within the reach of sparking, radiant heat and open fire.

It is necessary to avoid charging up the accumulator in an environment with higher temperatures together with direct sunshine.

Do not store fuel or other chemicals near the working kit.

Install the electrical wiring of the kit in such a way that there is no possibility of damage during operation.

This kit, especially an exhaust silencer, gets very hot while working. (Danger of fire and burns.)

Do not use the kit as a heat source for heating. (Danger of exhaust fumes poisoning.)

Be careful about fuel leaks. (Danger of ignition.)

The fuel should be refilled into an idle kit and under generally valid safety precautions for handling substances of first combustibility class, and only after a disconnection of the electric circuit between the kit and the accumulator. Keep sufficient distance from sources of radiant heat, fire and sparking.

Be careful not to allow any dirt get into a fuel tank, which could then cause damage to the engine.

If the kit is to be started, it has to remain connected to the electric circuit with the accumulator.

If the kit is started, it has to be supervised by an informed person.

Let an expert sufficiently train you before using the kit.

The kit may cause serious injuries or damage if operated by unqualified people, especially by the children.
It is recommended for safety reasons to become insured for the use of special electrical appliances.

Installation (connection and disconnection) of the kit:

Important warning!

*You have to be absolutely sure about the right polarity of all connections!*

*Be careful upon connecting not to short-circuit (for example by some tools) the battery contacts!*

*Under certain circumstances, there may be leakage of hydrogen that is explosive when mixed with the air!*

Place the kit as close as possible to the charged up accumulator, but be careful not to expose the accumulator to climatic influences and influences of the kit. The length of a supplied cable approximately sets the distance. At the same time, check that both the accumulator battery as well as the kit are placed in an area with good air circulation.

Connect the current conductors in permanent manner, the best would be threaded sleeves and clamps to avoid self-release and secure a minimal contact resistance. All components of the installed circuit, it means conductors, battery, charging kit and appliances have to be rated together at the same nominal voltage and current load. Should you need some advice, ask an expert for the information required, for example your sales representative.

**When installing the electric circuit of the kit and the accumulator, please follow the following steps:**

1. Connect a red conductor of the kit with 25 A fuse directly to a positive accumulator terminal.
2. Connect a blue conductor to a **negative** accumulator terminal.
3. Carry out the specified **start of the kit**
4. Carry out the specified **shutdown of the kit**
5. Disconnect the kit conductor with the **negative** polarity
6. Disconnect the kit conductor with the **positive** polarity

When connecting, it is necessary to bear in mind the proper ratings of the conductors, paying attention to current values of individual fuses and lengths of wires!

Upon parallel wiring of the kit, it is necessary to have a fuse of max. 25 A for each kit extra and again, it should be placed as close as possible to a plus battery pole!

Mains layout for the appliances, or installation, should be carried out by a technician with relevant electrotechnical qualification! This technician should also consider the necessity of protection of individual
Commissioning of the kit:

Follow the instructions of combustion engine manufacturer, especially check the amount of fuel in the engine tank, the amount of motor oil in engine case and whether all the screws are tightened.

Set the switch on a control panel (K) to position 0.
Check nominal voltage of the charged-up accumulator.
Connect the kit into the circuit according to attached diagrams.
Check if there is a 25A fuse installed in the electric circuit.
Turn the screw of manual gas (C) left so that a drawbar becomes slightly released in the bearing of a knob of carburettor gate. By doing so, you will set the amount of fuel mixture to the minimal level.
Turn the switch on the control panel (K) to position I.
Start the combustion engine along with the manufacturer’s instructions. Above all – check the amount of oil and do not forget to flood the carburettor with fuel by means of manual fuel pump. Set the gas and choke levers into correct positions.

Let the engine run for 1 - 5 min at idling speed and after stabilization, carry out idling speed setting by means of manual gas screw (C) in engine's carburettor.

Until the first recommended motor oil change, it is necessary to set the idling speed more often. It is always suitable to let the engine run, according to the surrounding temperature, at idling speed for proper warming-through of oil and mechanical connections of combustion engine unit. The generator unit can slightly change revolutions, even after the end temperature is reached.

By smooth change of the mixture amount (turning the manual gas screw (C)), you can set the required revolutions of the kit based on required charging current.
It is recommended not to use the kit during the first operating hour to charge-up more than 10A, and during the first 10 operating hours to charge-up more than 20A. This will prolong the operating life of the kit and you will certainly find the saving of initial wear convenient in the future.

It is possible to use the full power of 25A right from the beginning and ever after, but with the above-mentioned consequences.

Manual shutdown of the kit:

Bring the kit to idling speed by means of the manual gas screw (C).
Turn the switch on panel (K) to position 0.
If needed, disconnect the kit from the circuit of the charged-up accumulator.

Automatic shutdown of the kit:
The automatic shutdown of the kit will occur in a few following cases:
- the kit will consume up the allocated amount of fuel
- the kit will reach gassing voltage on the accumulator
- the kit will reach critical voltage on the accumulator
- the kit will exceed max. permitted revolutions
- the kit is disconnected from the accumulator

After the automatic shutdown of the kit, turn the panel switch (K) to position 0 and set the amount of the mixture to the minimal level by means of the manual gas screw (C).
If needed, disconnect the kit from the circuit of the charged-up accumulator.

Emergency shutdown of the kit:

Proceed to emergency shutdown in the following cases:
- the kit exhibits an apparent defect, sudden rise in revolutions or vibrations
- the kit does not react to the panel switch (K)
- the kit has been started in an emergency mode

Put the choke lever into the cold start position (top position = enriched mixture) and set the gas amount to maximum by means of manual gas rose (C). Handling of gas is possible also directly by turning the gate controller on engine carburettor. The engine will stop in a few seconds.

**Ordinary start of the kit:**

Set the switch on the control panel (K) of the kit to position 0.
Check nominal voltage of the charged-up accumulator.
Connect the kit into the circuit according to attached diagrams.
Check if there is a 25A fuse installed in the electric circuit.
Turn the switch to position I.
Check the amount of allocated fuel.
Start the combustion engine along with the manufacturer’s instructions.
Let the combustion engine run for 1 - 5 min at idling speed for proper warming-through of oil and mechanical connections of combustion engine.
Set the required revolutions of the kit, based on required charging current indicated on the panel (K), by a smooth change of the mixture amount by means of manual gas screw (C).

**Emergency mode:**

Emergency start of the kit will enable the engine to transfer the energy through an integrated generator directly to the battery and without any interventions of control electronics and without the kit’s speed governor = performance regulator. However, the kit will not be able to interrupt charging-up automatically, after gaining the critical values. It will not be possible to shutdown the kit manually in a standard way. Further, the kit can be damaged. The kit can damage the battery. The kit can cause short-circuit and other damage to the electric circuit. This way of charging up is dangerous, but we list it here for emergency cases as a way to eliminate electronic defect, accumulator defect, or changes of other boundary conditions.

*Use the emergency start only in the case of electronic circuits defect of the kit and if human health or possession are in danger at the same time. Use it responsibly and cautiously; as a necessary backup for emergencies.*

Read the chapter on emergency shutdown of the kit.
Disconnect or otherwise interrupt the interconnector (I) between the electronics of the display unit and the engine.
The display units (K) will no longer display the engine revolutions, potentially not even the battery voltage, and electronic circuits will not be able to shutdown the kit automatically.
Check nominal voltage of the charged-up accumulator.
Connect the kit into the circuit.
Check if there is a max. 40A fuse or its substitute installed in the electric circuit.
Check the amount of allocated fuel.
Start the combustion engine along with the manufacturer’s instructions.
By means of manual gas (C) set the amount of mixture for the required revolutions, i.e. the kit performance, and set it into a position corresponding to your specific need.
If using the highest performance, allow enough time for the kit to reach its operating temperature. For permanent operation of the kit in the high-performance mode, please pay extra attention to sufficient access of cold air for engine and generator cooling.
Kit characteristics and functions:
Charging up of lead acid battery - a small traction battery or common starting one – can be carried out in several ways. One of them is charging up with constant current until gassing of the electrolyte that occurs when 2.45 – 2.65V is reached per one cell, which stands for the accumulator charged up from 50 - 80%. It is possible to use 0.1 – 0.4 of accumulator rated capacity (based on accumulator design), without an impact on accumulator operating life.

Charging characteristics of lead acid battery (hereafter the accumulator) enables to charge up with markedly higher constant current, under specific boundary conditions. Charging of the accumulator requires hypercharge protection. Once the charged up accumulator reaches end charging voltage, it does not mean that it is already fully charged. Nevertheless, charging of the accumulator with high current has to stop at this point so that the end charging voltage of the accumulator is not exceeded. The accumulator charged up in this way will have sufficient capacity that will ensure a trouble-free operation of your equipment (connected appliances).

Be careful since lead accumulator batteries require also protection against their full discharge, as it causes damage to the battery cells (sulphonation inside the cells - deposits of lead sulphide on lead accumulator plates).

Warning! The kit does not include protective elements against excessive discharge of the accumulator through connected appliances.

The design of the charging kit GX30 is arranged as follows:

As a drive serves a miniature four-stroke petrol engine (D) of 25ccm capacity with OHC distribution with a manual starter (F). The engine itself is adjusted for permanent operation in random working position. It is connected to the generator (A) by a centrifugal clutch that facilitates start and warming-up of the unit. The generator is placed coaxially inside a case that is compact with the engine. The generator does not have a commutator, excitation circuits, or excitation coils. Winding is situated only on the stationary part of the generator; thus increasing its reliability significantly. The generator output voltage is further rectified by diodes arranged into a bridge. The output of the kit is realized by conductors with an offcut of 2.5 mm², provided with a fusible fuse of 25A.

In the generator block (A), there is built-in electronics with a display unit (K) which checks the voltage on alternator output and revolutions of the combustion engine.

Charging by means of GX30 kit is realized in such a way that the accumulator is connected as the kit’s load. The kit is started and you set its output parameters by means of gas controller. The kit can be set according to recommended values so that quick accumulator recharging to required capacity occurs. Charging parameters are to be set by the gas controller and through the amount of allocated fuel in the fuel tank. From here on, the kit works independently without necessary operator interventions.

The charging process is finished after consuming up all the allocated fuel, since the power supply from the drive to the generator is stopped, or after an evaluation of reached end voltage of the accumulator.

The kit is designed in such a way that it need not be disconnected from load immediately after the end of a charging cycle.

Power characteristics of the generator is adjusted to the behaviour of combustion engine torque so that the kit covers the majority of working capacity when charging the accumulator battery. The generator input copies the
power characteristics of the combustion engine, with a backup for engine performance degradation due to wear.

The kit is designed so that the working capacity of the drive engine cannot be exceeded. This is secured by intersection of a performance profile of generator input in obtuse angle with a performance profile of the drive, in the area before reaching the max. permitted revolutions of the kit. The kit’s generator cannot take higher input than the drive is able to supply at minimal-idling speed, which is ensured by the adjusted power characteristics of the generator.

Operating control of the kit during charging is ensured by mere connection of the accumulator to the kit, during the whole charging process. During charging, there are changes in electric quantities of current and voltage on the accumulator, which are given by the kit characteristics. In this version, the kit does not include any element for automatic control of gasoline throttle of the carburettor. Such design ensures high reliability and resistance to the environment.

Therefore, there is no need for other accessories to control the load mode, or track operating limits of mechanical and electrical quantities of the kit.

The absence of control circuits ensures high reliability.

Further, the generator is designed so that the voltage at the kit’s output does not exceed the value that could damage the generator, not even in emergency conditions, e.g. when load is disconnected.

Even in case of short-circuiting the line to the load, non-exceeding of operating parameter is guaranteed.

This ensures great safety and reliability.

Further, the kit is provided with electronics for greater comfort, safety and reliability, without causing the kit to fail charging in case of electronics defect.

The electronics is integrated into the generator case with a control and display panel (K) on the generator’s housing. It has the function of voltage and charging current display at the kit’s output. It includes an actuator for manual shutdown of the kit. The electronics will shutdown the kit after exceeding voltage or revolutions.

The state of voltage on battery terminals can be read from the display unit (K) of the kit.

The kit is further equipped with a handle (B) in the gravity centre of the machine for easy transport and installation, and a variable rack (L) with an option to attach a strap for easy transport.

This device can be upgraded by other equipments, connected in parallel to the accumulator – see the diagram.

The GX30 kit can be ordered in specialized modifications: L – long operating life, S – enhanced resistance to marine environment, M – lower weight and adjustments for high altitudes.
Adjustment and maintenance of the kit:

Adjusting the kit’s drive should be yielded to an authorized service centre of the drive engine manufacturer. The nearest representative can be looked up in the instruction manual attached to the engine. As far as necessary maintenance tasks are concerned, please refer to the instruction manual of the engine.

Adjustment or maintenance of the electronics of integrated power generator is not needed in the operating life of the product.

Check for the tightness of screw connections and visible mechanical defects.
Visually inspect the clearness of cooling input and output. In case of visible dirt, remove it immediately.
Check for the consistency of output conductors, the fuse and cleanliness of electric connections.

Upon common maintenance, refer to the instruction manual of the engine, observing the periods of service, service tasks and predominantly the performance period of motor oil.

Several pieces of advice to keep high performance of the kit:

Proper alignment of the kit’s drive has direct influence on the environment, performance, noise and fuel consumption of the kit.

With regard to the technology used and the absence of operating hours counter, you should keep an operating diary of the machine, so that you can correctly determine the periods of service.
Under demanding conditions, exchange the motor oil already after 1/2 or 1/4 of prescribed number of operating hours.
The operating life of the kit is above all influenced by fuel purity and good-quality motor oil. If you are not sure about the number of operating hours actually worked, exchange the motor oil rather sooner.
Exchange the oil, spark plugs, adjust the valve and clean fuel filters before each demanding application.
Carefully practice the manipulation with the kit before each important application.
Consult each demanding application with an expert.

Most frequent defects and their troubleshooting:

1. The kit cannot be triggered (started)
   a) Check engine-starting conditions (according to the instruction manual of engine manufacturer) and repeat the start
   b) If the switch is in position 0, turn it to position 1 and repeat the start
   c) If the switch is in position 1, turn it to position 0 and after 10 sec. back to position 1 and repeat the start
   d) If the voltage display unit shows small or no voltage (faulty accumulator, incorrect connection of the circuit) = remove the complication
   e) If the voltage display on the panel (K) shows high voltage (charged up accumulator, faulty accumulator, incorrect connection of the circuit) = remove the complication
   If the preceding steps did not help, try to start the kit in emergency mode.
   f) the kit cannot be started in the emergency mode
   = follow the instructions of the engine manufacturer
   g) the kit can be started in the emergency mode (most likely the control electronics is damaged)
   = the intervention of a service technician is necessary

2. Revolutions (current) display unit is not working
   a) visually inspect the interconnection between the connector and cable (I)
b) make a considerable change of kit revolutions

3. Voltage display unit is not working
   a) check the connection of the circuit
   b) check the fuses
   c) check the battery voltage
   d) make a considerable change of kit revolutions

3. The kit stops after a short-time operation
   a) check the correct connection of the circuit
   b) check the battery if it is already charged-up
   c) check whether an automatic shutdown of the kit does not occur after reaching certain voltage or max. revolutions
   d) check the amount of fuel in the tank
   e) follow the instructions in the engine manual

4. The kit begins to falter after warming up to operating temperature (performance is decreased)
   a) ensure sufficient air supply for cooling and fresh air for the preparation of fuel mixture
   b) check the fuel, fuel filter, air filter and clearness of the exhaust pipe

5. The kit exhibits high fuel consumption

High fuel consumption might be caused by the integrated generator unit only exceptionally, through gross mechanical defect together with simultaneous considerable warming. If the kit does not run extraordinarily hot near the display unit - i.e. above 80°C, then the cause of the increased consumption is in the area of combustion engine.

The fuel consumption depends on the wear and alignment of the engine, fuel quality, clearness of the fuel system and the wear of the kit. These are the factors that you can directly influence by your careful maintenance and prescribed kit operating.

The kit will reach the least consumption only after a few hours of ordinary operation.

Nevertheless, the most common cause of deviation from exemplary consumption is the impact of the environment. The fuel consumption is markedly influenced by the altitude, moisture and air temperature, applied fuel, and installation of external conduit for exhaust fumes.
In extreme conditions, ask your service technician to set or adjust the kit.

a) ensure sufficient air access for kit cooling, and fresh air for the preparation of fuel mixture
b) see about the check of supply conductors
c) add approved additives into the fuel
d) follow the instructions of the engine manufacturer
Frequent questions concerning the kit usage:

1. Which battery (accumulator) types can be charged with this kit?
   All kinds of lead accumulators with 12V nominal voltage (starting batteries, gel lead accumulators and powerful accumulator for domestic use.)

2. Which rated capacities of batteries can be used when charging with this kit?
   Minimal capacity of a charged-up battery is restricted by the option to set the minimal charging current of the kit to 5A. The size of charging currents 5A can be used for rated capacity from 20Ah on. When the kit’s revolutions drop under the level of 5A, excessive wear of friction clutch and warming of the kit occurs. Under boundary conditions given by the manufacturer of the accumulator, it is possible to charge also accumulators of smaller capacity, or use the option to arrange them in line and connect them to a battery of greater capacity. The maximum capacity of a charged battery is not limited. With regard to the amount of fuel prepared in the kit’s tank it is then necessary to interrupt charging for the purpose of safe fuel refill into the kit. Optimal – economy mode of the kit is from 15 to 22.5A. From this range of values follows that the ideal capacity of a charged accumulator is from 40 to 90Ah.

3. How long does it take the kit to charge up a completely discharged car battery?
   This kit is able to recharge a fully discharged battery. You should charge with small currents, i.e. less than 0.1 of battery’s rated capacity if charging a fully discharged battery. After reaching 12V voltage, it is possible to gradually increase the charging power of the kit, however it should not exceed 14V. The time necessary for charging 80% of battery capacity depends on the course of this process and can range around 3 hours, depending on the rated capacity of the car battery used. Nevertheless, it is possible to start the car successfully already after a few minutes of charging up. You should still bear in mind that a car battery is not adjusted for discharging under 50% of its rated capacity, so it is quite likely that a complete discharge will irreversibly decrease its capacity and operating life.

4. Is it necessary to connect any charging regulator between a battery and the kit?
   NO. There are other means of protection against possible battery hypercharge, predominantly the amount of fuel prepared for the charging mode and integrated electronics that will shutdown the kit after reaching gassing voltage on the accumulator.

5. Can this kit cause a battery discharge?
   If the switch is in position 0, then it is not possible. Else, the battery is discharged by a current given by its self-consumption, i.e. 0.03A, which stands for more than a month in an ordinary, charged accumulator.

6. Is it possible to use this kit indoors?
   No. Installation conditions of a combustion engine require outdoor room.

7. Is it possible to charge up a car battery through the outlet of cigarette lighter?
   No. This connection does not meet the basic precondition of fixed connection of charging electric circuit with little contact resistance. Another obstacle here is usually a small value of a fuse for the outlet and in some types of cars, the cigarette lighter outlet is connected to the battery only after starting the ignition. You can find the relevant information in the operating instructions of your car.

8. Can the kit used for permanent power supply of other appliances?
   Yes. However, it is necessary to implement at least a small accumulator into the circuit. This connection utilizes a small accumulator as regulating load for the kit and the majority of current is directed towards the connected appliance. If an automatic shutdown of the kit occurs because of reaching the accumulator end voltage, then your appliance will be fed from the accumulator, until the time of a manual restart of the kit. It means that the only condition is the capacity of the inserted accumulator; it should be able to supply the respective amount of current during the necessary shutdown of the kit. If you know the average consumption, this cycle can be balanced out so that the system works even for several hours without an automatic shutdown of the kit, until all the propellants from the kit tank are used up. We recommend to insert a protection against battery overcharge.
discharge before the appliance and complete the circuit with an ampere-meter for balance control of the system.

Optional accessories for the kit:

- KIT of additional silencer and exhaust system guiding combustion gases away from EPR working area, in L, S or M modifications.

- exhaust pipe in L, S or M modifications

- tailpipe with closable die for mounting on fixed separator, in L, S or M modifications

(GX30 kit can be ordered in specialized modifications: L – long operating life, S – enhanced resistance to marine environment, M – lower weight and adjustments for high altitudes.)

Technical data:

**DRIVE**
- Dimension LxWxH: 282x192x230
- Operating temperature: -5 to 35 °C
- Cylinder capacity of combustion engine: 25ccm
- Cooling: by the air
- Starter: manual
- Fuel consumption: 0.1(5A) – 0.3 (25A) l/h
- Ignition: electronic
- Fuel: unleaded petrol
- Fuel tank capacity: 0,55 l

**GENERATOR**
- Generator rated voltage: 12V
- Min. charging current: 5A
- Max. charging current: 25A
- Peak current: 30A
- Self consumption: 0.03A
- End charging voltage: 14V
- Fuse: fusible 25A
- Voltmeter: YES
- Ampere-meter: YES
- Operating hours counter: NO

Accumulator Charging Kit GX30
Basic electrical wiring diagram of the kit, the accumulator and an appliance.

A - kit  
F1 - 25A fuse  
B - accumulator  
F2 - appliance fuse  
C - appliance

Example of extended connection of two kits, three accumulators and an appliance.

Description of the kit:
In conclusion

Development of this device has been preceded by lots of research work, technical discussions and user comments.

Introduction of the kit with these parameters to the market has been consulted with the requirements of its future users, often pioneers in many spheres of human activity.

Shall this product serve as a means of advancement, research or for crossing the realm of possibility, then it will fulfil the basic requirement it has been designed for.

We believe that this product will become a useful tool and helper in your activities.

We wish you that our product fulfils not only your wills but expectations too.

- Author of the construction -
Warranty certificate

Manufacture

Model

Manufacture date

Serial number of the drive

Serial number of the machine

Output control

Vendor

Before-sales service

YES

NO

Date of sale

Date of commissioning

Stamp and signature of the vendor

Customer

Name and Surname

Address