Operation manual of

Geko®

Stromerzeuger-Systeme

4401 E -AA/HHBA	• 4401 E -AA/HEBA
5401 ED-AA/HHBA	• 5401 ED -AA/HEBA
6401 ED-AA/HHBA	• 6401 ED -AA/HEBA
7401 ED-AA/HHBA	• 7401 ED -AA/HEBA
7401 E -AA/HHBA	• 7401 E -AA/HEBA
4402 E -AA/HHBA	• 4402 E -AA/HEBA
5402 ED-AA/HHBA	• 5402 ED -AA/HEBA
6402 ED-AA/HHBA	• 6402 ED -AA/HEBA
7402 ED-AA/HHBA	• 7402 ED -AA/HEBA

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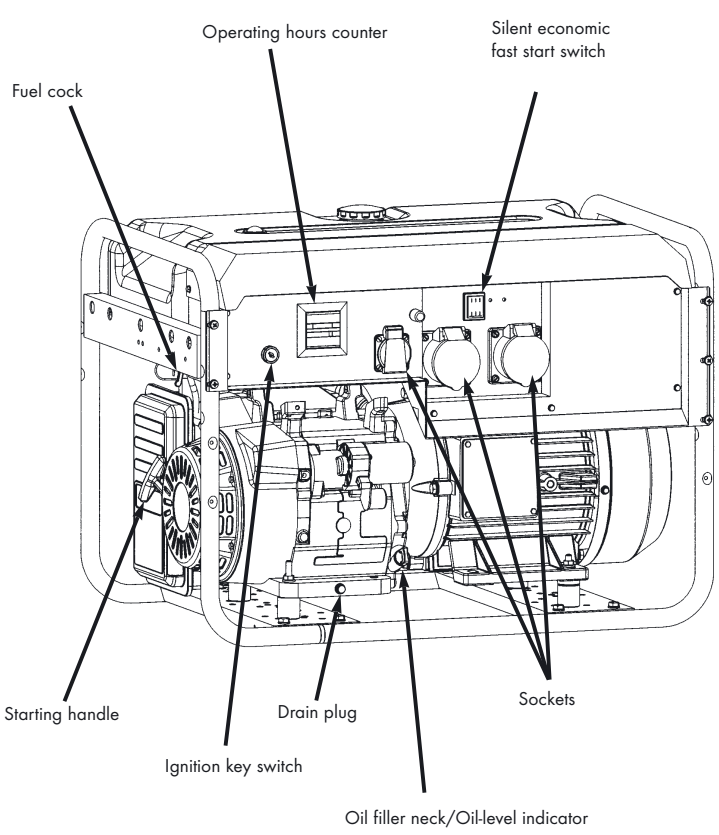
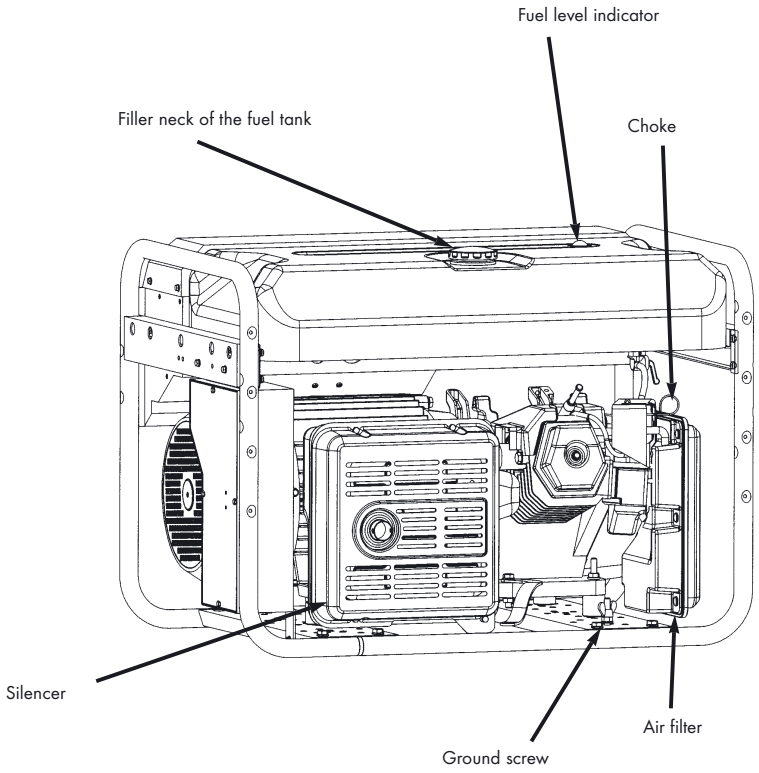




Safety rules

* An electric plant is delivered in a condition corresponding to safety requirements. Do not remove any protection devices. Do not remove any enclosure of electrical equipment. Do not apply unoriginal completing products.
* Waste gases are toxic! Do not use the electric plant in a closed unventilated building.
* Warning! Even if a withdrawing hose for the waste gases of the engine is used, they can get in the building. Therefore, when using in closed buildings, in addition to good ventilation, it is necessary to follow working normative documents. The withdrawing hose should not be produced from inflammable materials and directed to such materials. Fire danger!
* Be careful working with fuel. Fire and explosion dangers. Do not add fuel to the working plant. Do not pour out fuel on the ground. Use funnel in order to put fuel in.
* Never place the electric plant near inflammable materials. Fire danger!
* Do not touch hot details. Danger of burn!
* Necessarily follow the requirements presented in item 4 «Electric connections and safety measures». Wrong connection represents a danger to life.
* Use protective headphones when staying near the electric plant for a long time.

1. Design and action principle of the electric plant

1.1 Generator type

The generator corresponds to the requirements of the VDE 0530 standard. It represents an electric motor with a rotating magnetic system, is short-circuit protective, has self-excitation, is contactless and brushless, and has the block of excitation by alternating current, which consists of electrically strong breakdown-protective film capacitors. The generator has an F class insulation, IP54 protection degree, and dust- and spray-protection design. The copper windings of the stator have impregnation for moisture and tropic protection. The N VDE 0875 noise level and satisfaction to DIN VDE 0879-1 requirements are guaranteed.

1.2 Silent Economic

As a rule, the plant should not deliver power continuously. On the contrary, electric power is often necessary urgently by inquiry similarly to the circuits of power-supplying enterprises. By using the Geko-Silent Economic mode, the rotation frequency of the engine decreases, and it increases sharply after the receipt of an inquiry for the supply of electric power. Thus, the consumption of fuel, emission of waste gases, noise level, and wear of the engine are essentially reduced. A special electronic processor controls the operating mode of the plant by a measuring system and sensors and operates the engine. Thus, even when starting the cold engine, the control system is immediately turned on and does not require additional actions. When load is connected, the control system instantly brings the engine to the rated rotation frequency and total power, which allows the connection of a consumer with high start current.

1.3 General configuration of the plant

The basic components of the electric plant are the engine, generator, distribution box, and bearing frame made of tubes. The generator is connected to the engine by a cone coupling and an additional threaded pin. The complete „engine-generator" set is mounted on shock absorbers. Power is taken through three and single-phase ac sockets.

1.4 Voltage regulation

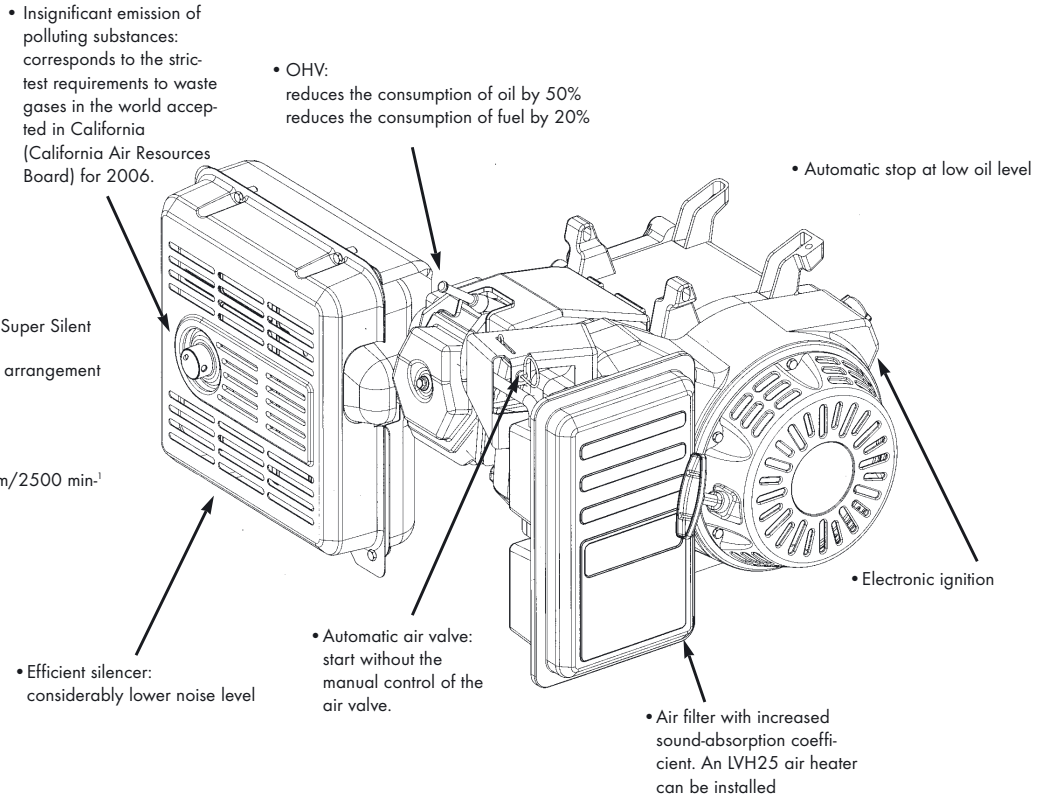
Regulation of the voltage of the electric plant is strictly set by its design. Voltage is varied within the admissible limits by changing the rotation frequency of the engine. The latter is supplied with an automatic device, which supports constant rotation frequency (within ±5% limits).
The idle run voltage of the generator is equal to 250 V as a maximum. At the maximum load, it should not fall below 207 V. Warning! Consumers sensitive to the increased and decreased voltage can be damaged when connecting to the electric plant.

1.5 Standard complete set

The electric plant of the standard modification is equipped with a manual starting device (or an electric starter under an order) and CEE sockets or sockets with protective contacts. The complete „engine-generator" set is mounted on rubber shock absorbers. All plants have distribution boxes, which contain electric components, sockets, etc.

2. Driving engine

It is a single-cylinder, four-cycle engine with air cooling and a horizontal crankshaft. Ignition is blocked when the level of oil is low. The automatic device stops the engine or prevents its start when the level of oil is low. This device is also triggered when the electric plant is placed on an inclined basis. „Super" gasoline or „Normal" ethyl-free gasoline is used as fuel. Start is carried out by the cord starter. The Honda gasoline engine is equipped with electronic ignition.



Specifications of the engine:

	GX 270 Super Silent	GX 390 Super Silent
Engine type	single-cylinder, four-cycle, with the top arrangement of valves	
Displacement	270 cm^3 bzw.	390 cm^3
Maximum torque	19,1Nm/2500 min^{-1}	26,5 Nm/2500 min^{-1}
Power	5,4 kW	7,5 kW
Cooling system	air	
Ignition system	transistor with magneto	

3. Electric part

Warning! Access to electric components is allowed only to skilled specialists. Non-authorized works in the distribution box are strictly forbidden. After each maintenance or repair of the device, it is necessary to inspect safety according to VDE0701. In particular, it is necessary to test the resistance of the potential-equalization wire (<0.3Ω), insulation resistance (> 2 MΩ), and appropriate operation of available protective devices.

4. Electric connection and safety measures

The plant in the delivery condition is intended for the supply of one consumer (IT circuit). The neutral wire is connected neither to the case nor to a protective wire. The only consumer is connected exclusively through the sockets on the electric plant. If extension cords are used, the total resistance should be no more than 1.5Ω. Accordingly, the maximum length of an extension cord with a section of 1.6, 2.5, and 4.0 mm2 is equal to 60, 100, and 165 m, respectively. If extension cords are connected to more than one socket, the corresponding length should be halved. Wires no worse than H07RN-F according to DIN VDE57282-810 must be used for portable extension cords. If the electric plant is planned to apply with another-type circuit, it is necessary to adapt protective measures. These works, as well as manipulations with the distribution box of the electric plant, can be executed only by skilled electricians. They are responsible for the efficiency of safety measures. In addition, it is necessary to follow local instructions. If necessary, the authorization of a local power-supplying enterprise should be received.

4.2 Protection touch voltage (DIN VDE 0100, T551)

The safety measure called «Protective separation with equalization of potentials» is conveniently carried out. The phase and neutral wires should not be grounded and should not be connected to the protective wire and potential-equalization wire (PE). The potential-equalization wire should be laid continuously (generator-wiring-consumer). For the removal of static charges, grounding the case is allowed. If the electric plant should feed an existing circuit with a grounded neutral (TN circuit), protection measures for this circuit must operate or new effective protection measures should be developed. If the required short circuit current of the generator is insufficient for the circuit breaker of an available consumer or the wire resistance is more than 1.5 MΩ, it is necessary to provide protection measures (e.g., a protective circuit breaker) independent of the operation current and conductor length. If the electric plant with the protective circuit breaker is intended for application in TN circuits, it is necessary to keep the maximum allowable grounding resistance corresponding to the chosen protection measure. The executive should be an electrician. Each protective action should be checked by the electrician when commissioning.

4.3 Thermal protection means

The electric plant is equipped with a device for the control of winding temperature. When winding temperature exceeds a preset value, ignition is disconnected and the engine stops. The repeated start of the engine is possible only after cooling the winding. Before repeated start, it is necessary to remove causes of overheating (e.g., to clean the polluted cooling edges or ventilating casings, to be convinced of the absence of overload caused by too powerful consumers, to not apply the electric plant at too high ambient temperature).

5. Kinds of installations

5.1 Installation at an open place

Whenever possible, the electric plant should be applied outside buildings. In this case, the best supply and removal of air are provided. An area where obstacles are absent in a radius of 5 m is ideal for placing the electric plant. This area should be free of combustible or explosive materials such as fuel, etc. The plant should be placed horizontally on the ground; the maximum allowable inclination is equal to 35°. It is necessary to protect the electric plant from the action of direct solar beams by a shed if it does not affect the quality of air circulation.

5.2 Stationary installation in closed buildings

When the electric plant is applied in closed buildings, various supervising documents must be taken into account:

* Building norms and rules of German States
* Instructions of the Ministries of German States
* DIN 18600 «Instructions on construction and operation of public buildings»
* Regional TÜV instructions
* Instructions on the application of building norms and rules of German States
* Rules of manipulation with combustible liquids
* Instructions of power-supplying enterprises
* Instructions on operation of garages
* VDE 0100 and VDE 0108 instructions «Electrical installations in public buildings»

In closed buildings, it is necessary to provide the free supply (danger of the overheating damage of the plant) and removal (poisoning danger) of air. A building should be clean, dry, and protected from dust. It must not be used to store inflammable materials. Great attention should be paid to the removal of waste gases, because they include toxic carbon oxide. Flexible hoses for the removal of waste gases are not usually tight, and toxic carbon oxide can leak into the building. Therefore, it is necessary to charge a corresponding specialist with the design and realization of such devices.

6. Noise level

The device has a sound power threshold of 96 (740X: 98) dB (A). It corresponds to a sound pressure level of 70 (740X: 71) dB (A) at a distance of 10 m.

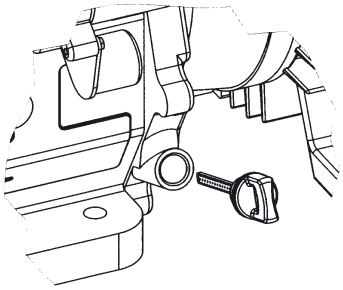
7. Supply of electric-power consumers

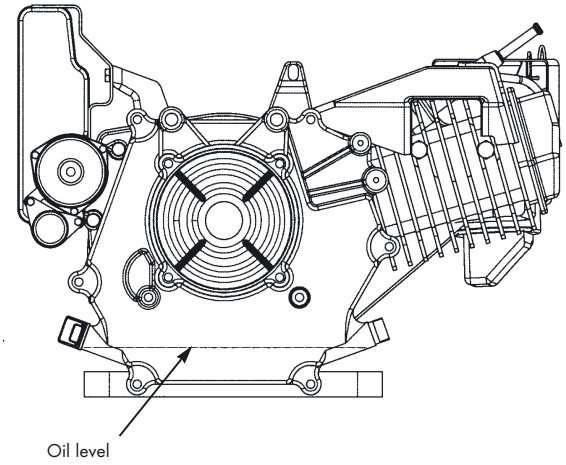
The power of the electric plant should be taken into account when choosing consumers. It is necessary to involve an expert in the choice of the standard size of the electric plant.

8. Check before start

8.1 Oil level in the engine

1. Remove the plug and cleanly wipe the oil level indicator.
2. Insert the oil level indicator into the filler neck, but do not screw.
3. If the oil level is low, it is recommended to add oil up to the edge of the filler neck.



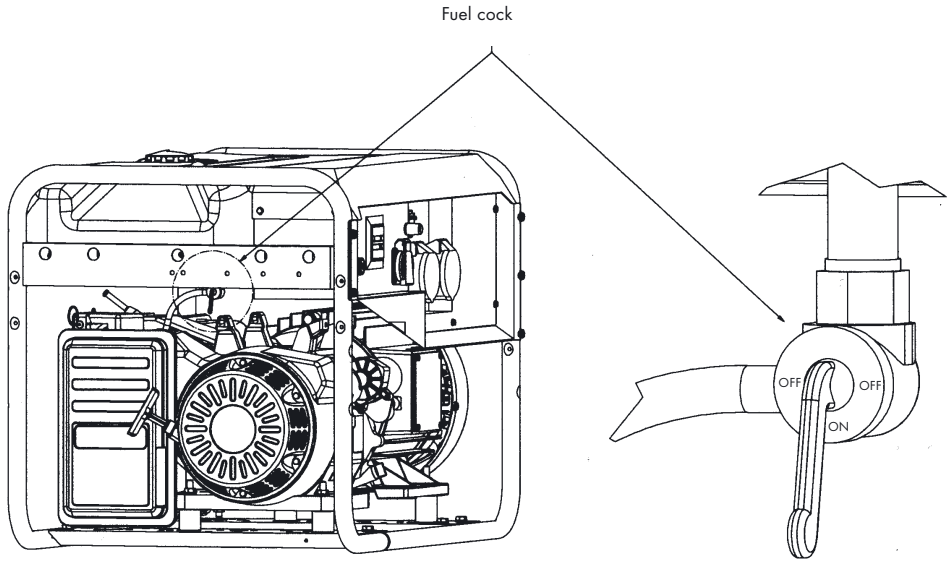


It is necessary to use oil for four-cycle engines that corresponds to classes SG and SF or higher. SAE 10W-30 oil is generally recommended for all temperatures.

8.2 Fuel

Ethyl-free car gasoline is used.
Never use a mixture of oil with gasoline or polluted gasoline.
Do not admit the hit of dirt, dust, or water into the gasoline tank.

* Gasoline is a combustible liquid and is explosive in certain cases.
* Fuel the engine only under good ventilation conditions, and the engine should be stopped during this process. Do not smoke and do not allow the occurrence of an open flame or sparks when fueling and at fuel storage sites.
* Do not let the overflow of fuel into the tank. After refueling, make sure that the neck cap is reliably closed.
* Watch that fuel does not spill when refueling. Gasoline vapors or spilled fuel can ignite. If gasoline spills, before the start of the engine, make sure that the area has completely dried up, and gasoline vapors have completely disappeared.
* Avoid the contact of gasoline to skin and inhalation of gasoline vapor. Hold fuel in places inaccessible to children.

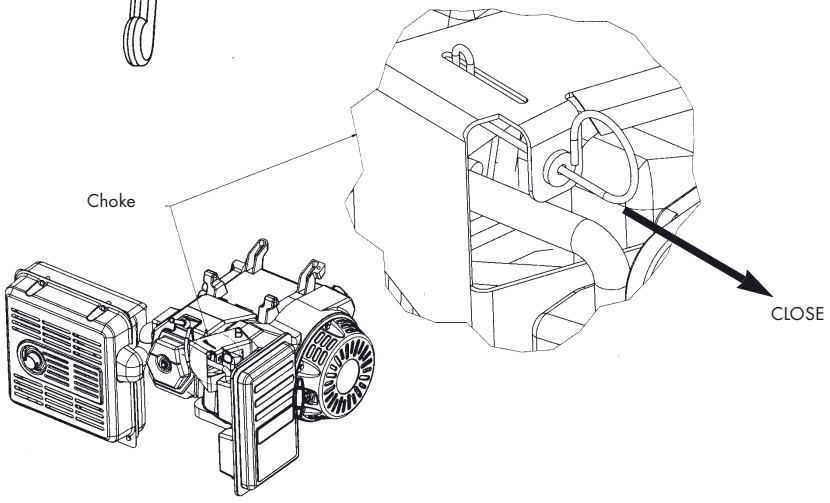


9. Start of the engine

1. Set the fuel cock to the „ON" position.

2. If necessary, close the air valve.
   At hot start, the valve opens automatically.

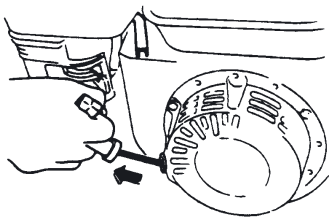
Warning! Do not use the valve if the engine is hot or the temperature of air is high.



3. Start of the engine

* Set the ignition key to the „ON" position
* Slightly pull the starter handle up to the sensation of resistance, and then sharply jerk.

Warning! When the cord retracts back, do not release the handle. It should be moved accurately in order to prevent the damage of the starting device.



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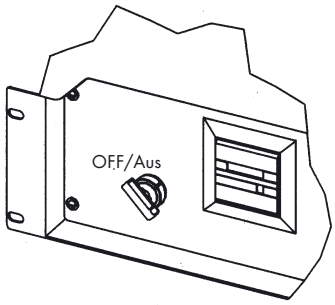
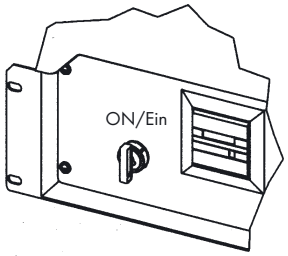
7401E-AA/HHBA
7401 ED-AA/HHBA
7402 ED-AA/HHBA:





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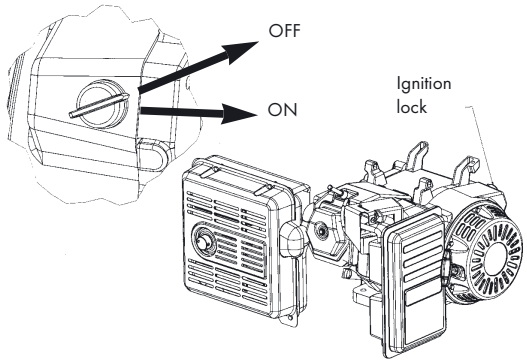
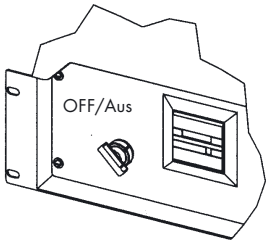
5402 ED-AA/HHBA:

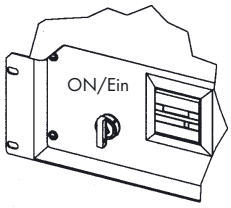


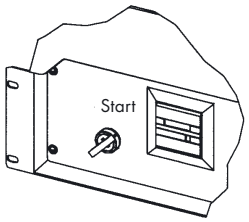
Electric start (all types)

* For the start by the electric starter, turn the ignition key to the „Start" position.
* When the engine starts, release the key.
* The key should move independently to the „ON/Ein" position and remain in this position during operation.

Warning! Never try to start the working engine by the electric starter - the damage of a tooth gearing is possible!







10. During engine operation

When the engine is warmed up, the valve opens automatically (do not push it).
The low oil level warning system prevents the damages of the engine when the level of oil in a crankcase is too low. When the oil level falls below the minimum admissible level, the warning system automatically turns off the engine [in this case, the ignition lock remains in the „ON" position].
Warning! If the engine has stopped and does not start, check the oil level before looking for a fault.

11. Turning-off the engine

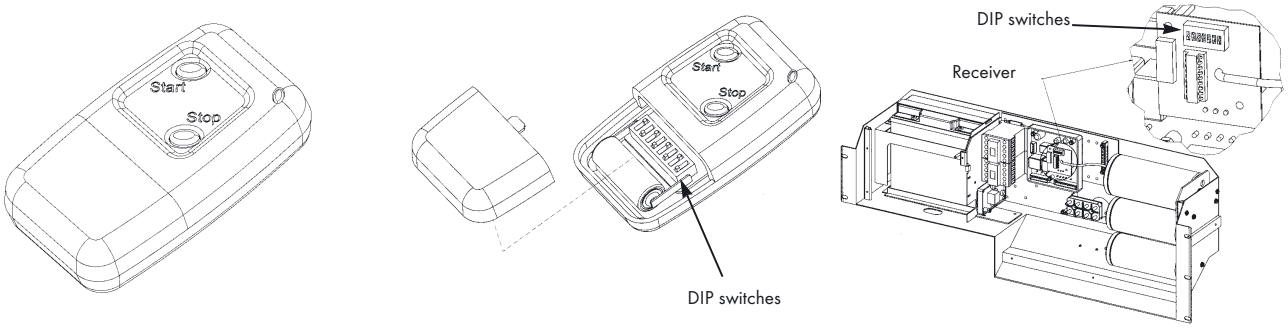
To turn off the engine:

1. Disconnect consumers of electric power, take plugs out.
2. Give the engine to work about 1 min without load.
3. Set the ignition key to the OFF/Aus position (Off).
4. Set the fuel cock to the OFF/Aus position (Off).

12. Custom-order equipment

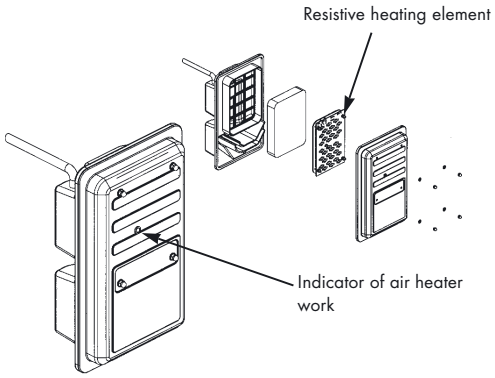
12.1 Radio device FFS 100 for remote start and stop of the electric plant (option)

The device is made in the form of a compact module Geko-SMD. Due to the small sizes of the transmitter, a user can constantly carry it with him.
The device is intended only for electronic start and not applied in combination with UBC 400.
By using FFS 100, the electric plant can be started or stopped [key should be in the „ON/Ein" position (On)] from a distance up to 100 m (depending on the conditions of radio wave propagation). The Geko remote control radio device works in the 433-MHz noiseless band.
Frequency codes FFS 100 are set by DIP switches on the transmitter and receiver. In the delivery condition, switches are in the following positions: 1 = ON; 2 = OFF; 3 = ON; 4 = OFF; 5 = ON; 6 = OFF; 7 = ON. For work, the switches of both devices should be set identically. The positions of switches 8-10 on the receiver must never be changed (factory installation: 8 = ON; 9 = OFF; 10 = ON).
See also electrical connection scheme 100126.



12.2 Air heater LVH 25 (option)

It can be applied to all engines Honda-Super Silent GX 270 and GX 390. It prevents the icing of the carburetor at low temperatures, which allows the reliable exploitation of the electric plant under extreme conditions.
Inlet air is heated by an automatic electric resistive heater controlled by a gauge. The mode is initiated by a light-emitting diode on the casing of the air filter.
The heater is turned on at +10°C, because the icing of the carburetor often begins already at temperature from 0°C to + 5°C.
See also electrical connection scheme 100127.

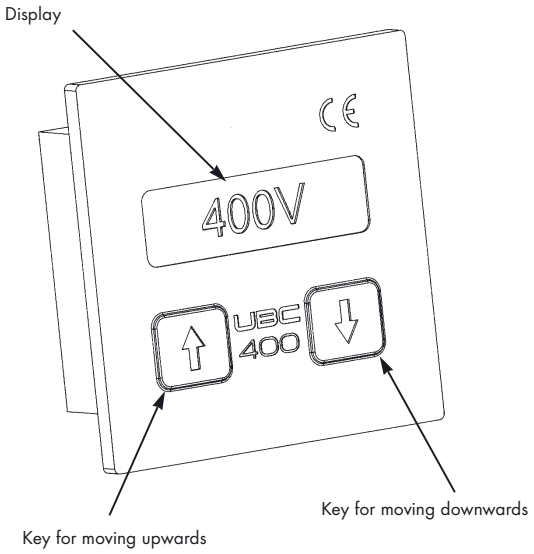


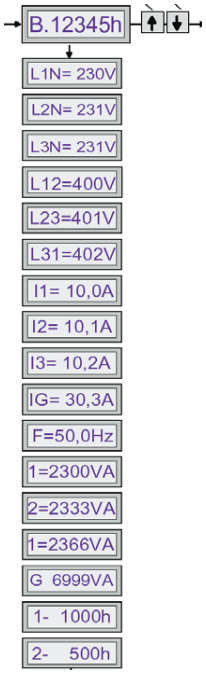
12.3 Universal built-in controller UBC 400 (option)

It provides the display of 20 current parameters of the electric plant, which were not displayed earlier.
Due to the application of the microprocessor measuring system, UBC is made in the form of a Geko compact module, and the controller UBC 400 can be mounted in most Geko electric plants.
It is applied for both one- and three-phase electric plants.

- Voltage N - L1, N - L2, N - L3
- Voltage L1 - L2, L2 - L3, L3 - L1
- Current L1, L2, L3
- Total current
- Frequency
- Power per Phase in kVA L1, L2, L3
- Total power in kVA
- Running time
- Maintenance periodicity 100 + 300 Std.
- Real time and date

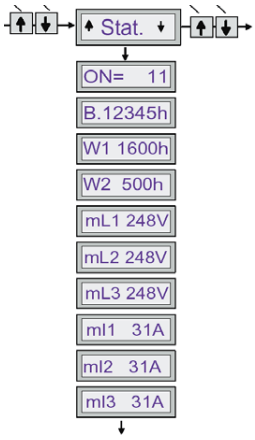
All data are transformed by a high-efficiency measuring amplifier to digital signals. The latter signals are processed by a microprocessor. The parameter is chosen by arrow keys.
Change of the parameters of maintenance periodicity, the calibrations of voltage and current, and the reset of the operating hours counter can be made only by our authorized representative.
See also electrical connection schemes 100122 and 100123.





B.12345h	Generator operating time in hours (from 0 to 99999 h)
L1N= 230V	Voltage of phase L1 with respect to neutral N (0 - 300V AC)
L2N= 231V	Voltage of phase L2 with respect to neutral N (0 - 300V AC)
L3N= 232V	Voltage of phase L2 with respect to neutral N (0 - 300V AC)
L12=400V	Linear voltage L1-L2 (0 - 500V AC)
L23=401V	Linear voltage L2-L3 (0 - 500V AC)
L31=402V	Linear voltage L3-L1 (0 - 500V AC)
I1= 10,0A	Current of phase L1 (0- 32,0 A)
I2= 10,1A	Current of phase L2 (0- 32,0 A)
I3= 10,2A	Current of phase L3 (0- 32,0 A)
IG= 30,3A	Total current of all phases L1, L2, L3 (0- 99.9 A)
F=50,0Hz	Frequency in Hz (0 - 99,9Hz)
1=2300VA	Calculation with voltage L1 and current I1 gives the total power of phase L1 in VA (0 - 9999 VA)
2=2333VA	LCalculation with voltage L2 and current I2 gives the total power of phase L2 in VA (0 - 9999 VA
3=2366VA	Calculation with voltage L3 and current I3 gives the total power of phase L3 in VA (0 - 9999 VA)
G 6999VA	Total power of the generator in all phases (G) in VA (0 -9 999 VA)
1- 1000h	Operating time remaining to the first maintenance; i.e., after this time, the first maintenance must be carried out
2- 500h	Operating time remaining to the second maintenance; i.e., after this time, the second maintenance must be carried out

The following menu item is selected by pressing key „up“ with pressed key „down“

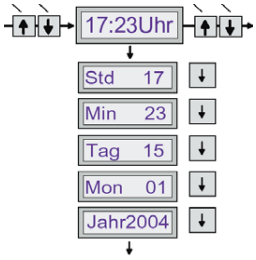


STATISTIK (Statistics) menu; here, the major parameters of the system are stored and displayed

ON= 11	Number of starts of the plant
B.12345h	Operating hours of the plant
W1 1600h	Periodicity of the first maintenance (preset time is displayed here)
W2 500h	Periodicity of the second maintenance (preset time is displayed here)
mL1 248V	Maximum measured voltage of phase L1 of the generator
mL2 248V	Maximum measured voltage of phase L2 of the generator
mL3 248V	Maximum measured voltage of phase L3 of the generator
mI1 31A	Maximum measured current of phase L1 of the generator
mI2 31A	Maximum measured current of phase L2 of the generator
mI3 31A	Maximum measured current of phase L3 of the generator

Uhrzeit (Date, time) menu
Current time 17 h 23 min
Indications automatically vary at the transition to winter/summer time. If it is necessary to change indications, it is possible to select the necessary time counters by key „_“

The following menu item is selected by pressing key „up“ with pressed key „down“



Hours
To change the displayed value, it is necessary, having pressed and keeping the key hidden by the UBC 400 sign, to quickly press key «_» (for increase) or key „_“ (for decrease). These keys should be pressed until the necessary value

Minutes
To change the displayed value, it is necessary, having pressed and keeping the key hidden by the UBC 400 sign, to quickly press key «_» (for increase) or key „_“ (for decrease). These keys should be pressed until the necessary value

Date - day
To change the displayed value, it is necessary, having pressed and keeping the key hidden by the UBC 400 sign, to quickly press key «_» (for increase) or key „_“ (for decrease). These keys should be pressed until the necessary value

Date - month
To change the displayed value, it is necessary, having pressed and keeping the key hidden by the UBC 400 sign, to quickly press key «_» (for increase) or key „_“ (for decrease). These keys should be pressed until the necessary value

Date - year
To change the displayed value, it is necessary, having pressed and keeping the key hidden by the UBC 400 sign, to quickly press key «_» (for increase) or key „_“ (for decrease). These keys should be pressed until the necessary value

Uhrzeit Datums- Jahr: Jah 2004
Bei Änderung des angezeigten Wertes muss die mittlere unsichtbare Taste gedrückt gehalten und für + (höherer Wert) die Pfeil nach oben Taste, oder für - (niedriger Wert) die Pfeil nach unten Taste zusätzlich kurz gedrückt werden. Die Tasten solange betätigen bis der angezeigte Wert stimmt.

12.4 Automatic emergency device BLC 100 (option)

12.4.1 Safety rules

Installation must be charged only to skilled electricians. Do not begin to work with the given equipment without carefully studying all documentation applied to it. The given safety rules and other instructions of the manufacturer should be executed every time when working with this device. If you have no instructions on work with the equipment, appeal to a representative of the manufacturer. Ask immediate dispatch of the necessary documentation to address of the responsible for the safety use of industrial electronics. These safety instructions must be also attached when selling, hiring, and/or transferring components.
Warning! Products of industrial electronics must be commissioned only by specialists with sufficient knowledge in electrical engineering, generators, and motor equipment.
Necessarily study warnings of the dangerous factors included in the documentation.
Metallwarenfabrik is not responsible for damage arisen due to failure to comply with warnings contained in this Operation Manual.
If changes that are not indicated in this Manual are introduced into the device, guarantees are automatically cancelled. The below safety instructions should be necessarily studied and fulfilled before commissioning the electric plant in order to prevent injuries and/or material damage. These safety instructions should be carried out constantly.

12.4.1.1 Purpose application

An industrial electronic device BLC 100 Geko is intended only for application in electric plants. All electric plants should be certificated by their manufacturers for application in certain areas and checked on both resistance to overloads and operational reliability. The manufacturer of a device has to provide the corresponding safety measures. Before commissioning, the device should pass comprehensive tests for conformity to the technical and local requirements for it, as well as to the safety rules concerning the area of its application.

12.4.1.2 CE marking

The industrial electronic device BLC 100 is intended for application in the structure of equipment. For this reason, it is offered to manufacturers of equipment only as a completing product. Thus, the device is not subject to CE marking.

12.4.1.3 Possible dangers at unforeseen application and inadequate manipulation

High voltage and current!

Danger of death or heavy injury! When working with the device, it is necessary to exclude touches to current carrying parts. All sockets (of any kind) should be joined only when the device is turned off.

Surfaces may be hot. Danger of burn!

* A touch to the hot details of the case, radiator, etc. can lead to burns.
* Sufficient cooling of built-in components must be ensured. Inadequate manipulation can lead to injuries including burn, squeezing, cut, and shock! Inadequate operation and installation of the certain components of the drive can lead to injuries under unfavorable conditions.
* Follow general building rules and safety requirements when installing and operating.
* Apply appropriate assembly and transport appliances.
* Take appropriate measures preventing pinching and squeezing!
* If necessary, apply corresponding protective appliances (e.g., goggles, footwear, gloves).
* Do not stand under a suspended load.
* Immediately remove liquids spilled on a floor (danger of slipping).

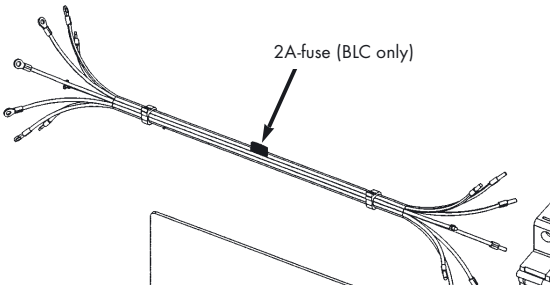
Protection against an electrostatic discharge / Installation instructions

Take into account when installing electronic modules.Apply corresponding protection against electrostatic discharges.

Warning! Inadequate manipulation with these devices and failure to comply with warnings can lead to material damage, physical injuries, damage by current, or even death.

Dangerous displacements! Unforeseen displacements of the elements of engines lead to danger to life, the possibility of heavy physical injuries, or material damage!

Attention! If a BLC-equipped genset will be started with disconnected battery or reverse connected battery, a 2A-fuse inside the controlbox will blow. This has to be replaced by authorized personnel.



Dangerous displacements can arise due to the erroneous adjustments of engines. Causes may be different:

* polluted or defective electrical wiring;
* erroneous adjustment of components;
* faulty gauges;
* faulty components;
* errors in the software;
* going beyond the operational restrictions.

These defects can be revealed both immediately after installation and a while after the beginning of operation. In order to prevent accidents, injuries, and material damage due to unforeseen displacements of the details of the engine, corresponding protective measures must be realized in devices or plants.

Possible additional measures for the prevention of the specified cases:

* do not present in the zone of movement of the elements of a device or a plant;
* apply sufficiently durable protective barriers and casings;
* before opening the device or access in a dangerous zone, make sure that the device is stopped, and exclude a non-authorized repeated start.

The presence of persons with heart stimulants, metal implants, and acoustic devices near electrical equipment is dangerous to health!

Persons with heart stimulants and metal implants must not be admitted to zones where:

* electric devices and components are mounted, working, or commissioned;
* the components of engines with constant magnets are stored, repaired, or mounted.

If access to the specified zones is necessary, these persons should preliminary consult with a physician.

12.4.2 Functions of BLC 100

The modern automatic device of emergency electrical supply BLC provides unique advantages and previously absent conveniences for a user:

* the entire device, including protection, is completely built in the electric plant;
* one- and three-phase construction;
* the generator is connected after warming the engine either by the signal of the sensor of the temperature of the cylinder head or with a delay of 30 s. Thus, load is connected already at the rated speed of the engine;
* repeated switching on the common circuit is carried out with preservation of circuit voltage in the specified limits (> 190 V and < 250 V) within three seconds;
* up to three attempts of the automatic start;
* a built-in device of recharging an accumulator (500 mA/12 V).

The automatic emergency device BLC switches load to the Geko electric plant if circuit voltage disappears or strongly fluctuates. After the recovery of circuit voltage, load is again automatically switched to the circuit and the electric plant stops.

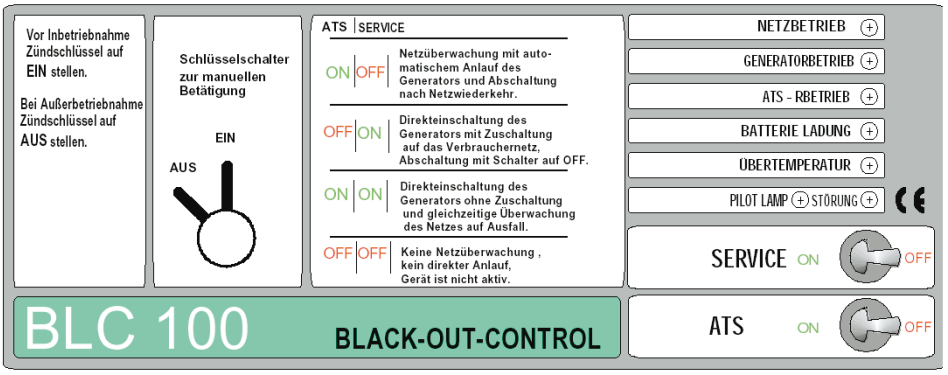
* Connection of the electric plant at circuit voltage <175 V or > 260 V.
* Disconnection of the electric plant at circuit voltage > 190 V and < 250 V.

12.4.3 Connection of the electric plant with BLC 100

See electric schemes 100107, 100108, and 100132. The circuit is connected to a head on the face panel of the distribution box. Output voltage is taken through a CEE socket.
Warning! It is necessary to avoid the overload of the circuit contactor. The maximum current load (both one- and three-phase) is equal to 20 A.
Only a skilled electrician can carry out these works. It is necessary to take into account requirements of item 4 «Electric connection and safety measures».

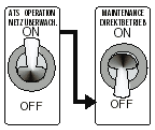
12.4.4 Indication of BLC 100

Light-emitting diode „Netzbetrieb" (Work from the circuit):
is on when a consumer is fed from the circuit (circuit contactor is closed). However, it is necessary to keep the key and ATS switch in the EIN (ON) position.
Light-emitting diode „Generatorbetrieb" (Work from the generator):
is on when a consumer is fed from the generator (generator contactor is closed).
Light-emitting diode „TS-Betrieb" (ATS mode):
blinks while the ATS switch is closed.
Light-emitting diode «Batterie Ladung» (Accumulator charging):
is on when circuit voltage is supplied and the accumulator is recharged or charged.
Light-emitting diode „Übertemperatur" (Overheating):
is on when the engine is overheated.
Light-emitting diode «Pilot Lamp» (Control lamp):
is on when the generator works; i.e., voltage is generated.
Light-emitting diode „Störung" (Malfunction):
is on when a general fault arises

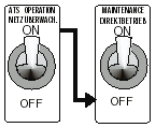


12.4.5 Operating modes of BLC 100

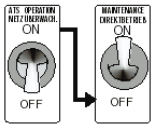
Warning! Turn on the unit, keeping both on-off switches in the „OFF“ position. After turning on, wait the end of built-in control BLC (about 10 s). After the light-emitting diode „Netzbetrieb“ (Work from the circuit) has lighted up, a desired operating mode can be chosen by the on-off switches.



Start of the electric plant in the presence of load
In this operating mode, the electric plant starts immediately with closed contacts X1.6 and X1.7. After the electric plant is warmed up, load is connected.

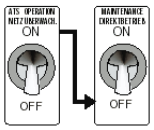


When the switch is turned to the AUS position, the generator is immediately disconnected.
After 30 s, the engine stops. If contacts X1.6 and X1.7 are not closed, the electric plant does not start. After the closure of contacts X1.6 and X1.7, the electric plant starts immediately. After warming up, it accept load. After the direct-mode switch is opened, the electric plant is immediately disconnected. If contacts X1.6 and X1.7 are opened again, the generator is disconnected after 5 s.
After 30 s, the engine is turned off



The control of the voltage of a circuit with automatic start
The ATS/Control mode of the circuit is turned on. Light-emitting diode „ATS-Betrieb“ (ATS mode) blinks. The electric plant is turned on with a delay of 4 s after the disappearance of circuit voltage.

Start of the electric plant in the absence of load and with the control of circuit voltage
In this mode, the electric plant starts immediately, in the absence of load (hot-reserve mode). Circuit voltage is monitored, and when it disappears, the generator contactor connects a consumer to the electric plant after 2 s. After the direct-mode switch is opened, the electric plant is immediately turned off.



OFF.
Circuit voltage is not monitored, the electric plant does not start. Warning! If both switches are in the „OFF“ position, all messages on faults are erased

12.5 Protective circuit breaker (option)

The protective circuit breaker is a switch with an electromagnetic breaker, which is automatically opened when leakage current exceeding rated breaker-triggering current flows on the ground or through the case. The application of the protective circuit breaker is an additional safety measure against a direct touch. This device is intended to prevent the appearance of both dangerous voltage on open current-carrying parts of electrical devices and fires. Warning! Before the connection of the electric plant, it is necessary to check its serviceability by the test button of the protective circuit breaker. If the circuit breaker is not triggered, it is forbidden to use the electric plant. See electrical connection schemes 100118 and 100119.

12.6 Control of insulation resistance in agreement with GW 308 (option)

The control of insulation resistance in combination with the standard protective measure «protective separation» is an additional protective measure in an IT circuit. Since the first short circuit on the case or defect of insulation is not destructive and consequently remains unnoticed, the insulation control device, which reveals such defects and disconnects consumers, is useful and recommended by GW 308. The neutral wire (N) and potential-equalization wire (PE) should not be connected with each other. The potential-equalization wire should be connected without breaks between the electric plant and all consumers. The plant can be used without grounding. Before each connection, it is necessary to check the serviceability of the insulation control device by pressing the test button. In this case, a red control lamp must light up, and the main switch must be opened. The red control lamp „ISO-Fehler“ (Insulation fault) is constantly on before opening the main switch when the insulation of the generator, as well as the insulation of the consumer, is defective. See electric connection schemes 100110 and 100111.

12.7. Measuring instrument for insulation resistance (A-Isometer) (option)

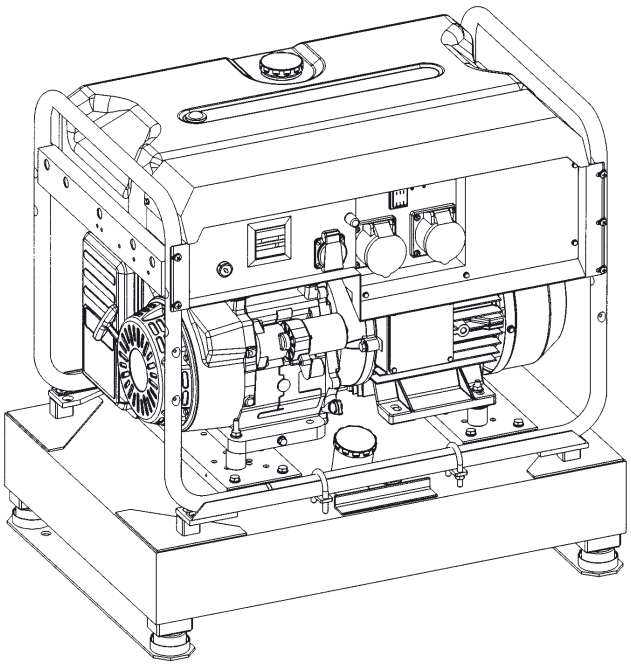
The insulation resistance control in combination with the standard protective measure «protective separation» is an additional protection measure in an IT circuit. Since the first short circuit on the case or defect of insulation is not destructive and consequently remain unnoticed, the insulation control device, which reveals such defects and disconnects the circuit, is a useful device with a light indicator according to VDE 0100-410. The neutral wire (N) and potential-equalization wire (PE) should not be connected with each other. The potential-equalization wire should be connected without breaks between the electric plant and all consumers. The plant can be used without grounding. Before each connection, it is necessary to check the serviceability of the insulation control device by pressing the test button. In this case, a red control lamp must light up. The red control lamp „ISO-Fehler“ (Insulation fault) is constantly on before breaking the supply circuit when the insulation of the generator, as well as the insulation of the consumer or wiring, is defective. See electric connection schemes 100114 and 100116.

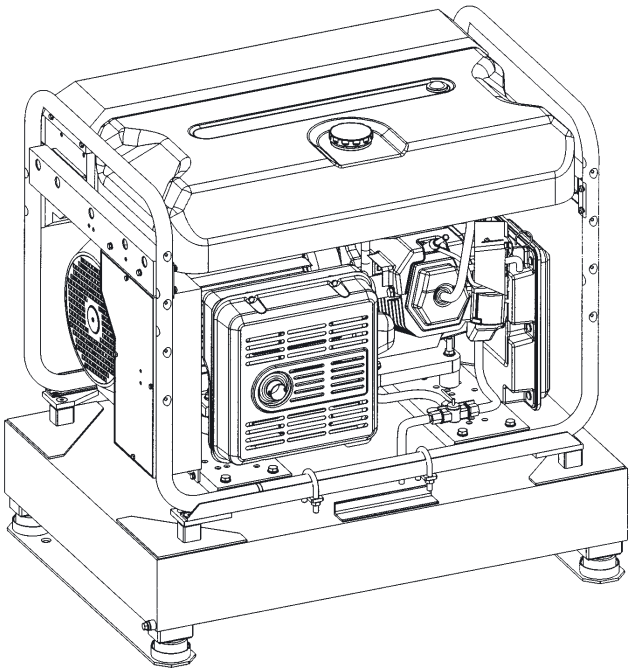
12.8 Additional fuel tank 50l or 100l (optional)

The additional fuel tank enable extra long running times of the genset.

A mechanical engine driven pump deliver the fuel from the lower tank to the careburator

The standard 20l-tank remain usable thanks to a manual operable three-way-tap.





13. Possible faults and ways of their elimination

No.	Faults	Origin	Elimination
1	The engine can not be started	Not enough oil is filled or the gas-electric generating set is situated on an inclined ground	Check the oil level, if necessary refill the engine oil or provide an even surface
2	The gas-electric generating set can not be started tilting or falling of the aggregate)	Engine oil in the combustion chamber (because of intensive	Remove the spark plug and pull through the engine with a reversing starter 3-4 times. Clean the carburettor and the air filter.
	Mechanical damages in the range of the reversing starter or blower hood	Maintenance or replacement through a new spare part	
3	The gas-electric generating set does not deliver enough voltage	Capacitor is defect interturn short circuit in stator	Replace the capacitor replace the stator by a new one
		Overcurrent circuit breaker is actuated or defect	Actuate or replace the circuit breaker
		Insufficient rotation speed of the engine	run up to rated speed, idle running 3180 1/min, max. 250 V
		The air filter and/or the carburettor is contaminated	Clean the component or insert a new filter set
4	No or not enough voltage after loading is not serviceable	Insufficient rotation speed of the engine or the speed controller max. 250 Volt in an authorized workshop	The engine must be set to the rated speed of 3180 1/min,
		Climatic influences reduce the power of the gas-electric generating set	Do not load the gas-electric generating set with the rated speed, see operating instructions of the engine
5	Excessive voltage of the gas-electric	Excessive speed of the engine generating set	Adjust the rated speed of the engine, however max. 253 Volt
6	Generator gets inadmissible warm	Overloading of the gas-electric generating set	Switch off some consumers

No.	Faults	Origin	Elimination
		Power reduction because of situating in the height	Only partial loading possible
		Excessive environment temp.	The gas-electric generating sets are designed for an environment temperature up to 40°C
7	The aggregate turns off but can again be started after cooling	The overtemperature breaker of the gas-electric generating set is actuated	See No. 6

It is forbidden to change the installations of the adjusting screws marked with red varnish. Otherwise, all guarantees are cancelled. If defects repeat, it is necessary to address to the manufacturer or an authorized workshop (see the list of the authorized workshops in the Appendix). Mount only original components when replacing them.

14. Scheduled maintenance

Before the beginning of maintenance works, the engine should be stopped.

14.1 Electric components

The generator does not require maintenance. It is only necessary to periodically clean the case from dust to avoid the worsening of cooling conditions.

14.2 Engine

The screw of regulating the quality of the mixture, rotation-frequency regulator, and throttle valve restrictor are sealed with red varnish. It is forbidden to disturb adjustments, because the generator and consumers can be damaged.

14.2.1 Check of the fuel tank and fuel guides

* Check the fuel tank and fuel guides on tightness and the absence of damages.
* Check the condition of the thread of the fuel-tank cover.
* Clean components from pollution.

Maintenance Schedule

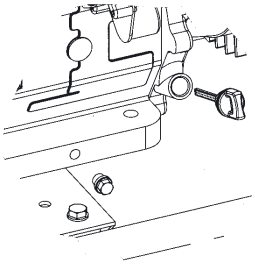
REGULAR SERVICE PERIOD Performed at every indicated month or operating hour interval, whichever comes first. ITEM		Each use	First month or 20 Hrs.	Every 3 month or 50 Hrs.	Every 6 month or 100 Hrs.	Every year or 300 Hrs.
Engine oil	Check level	○				
	Change		○		○	
Reduction gear oil (applicable models only)	Check level	○				
	Change		○			○
Air cleaner	Check	○				
	Clean			○(1)		
Sediment cup	Clean				○	
Spark plug	Check—Clean				○	
Spark arrester (optional part)	Clean				○	
Valve clearance	Check—Adjust					○(2)
Fuel tank and strainer	Clean					○(2)
Fuel line	Check (Replace if necessary)	Every 2 years (2)				

NOTE: (1):Service more frequently when used in dusty areas.
(2):These items should be serviced by an authorized Honda dealer, unless the owner has the proper tools and is mechanically proficient. See the Honda Shop Manual.

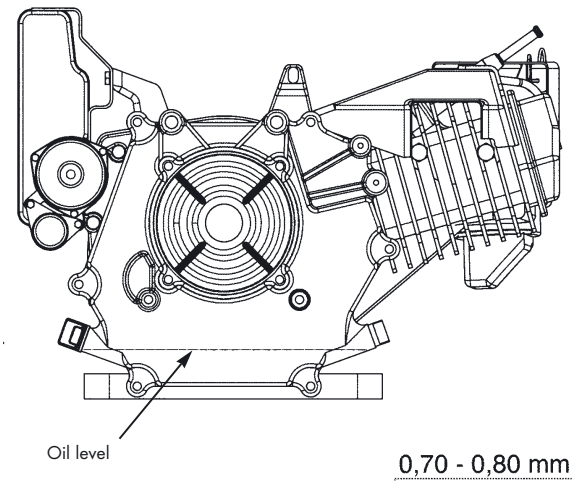
14.2.2 Replacement of oil in the engine and check of the oil level

Oil is replaced only on the hot engine and according to the engine operation manual.

* Place the electric plant on a suitable raised basis and slightly incline aside the sink hole.
* Unscrew the cap of the filler neck.
* Turn out the plug of the sink hole and pour oil out.
* After the removal of old oil, turn in the plug of the sink hole and place the electric plant on the flat basis.
* Fill engine oil up to the top label of an oil dip stick.
* Tightly screw the cap of the oil-filler neck by hand.



Spilled engine oil should be immediately picked up.
Waste oil is subject to recycling according to rules currently in force.



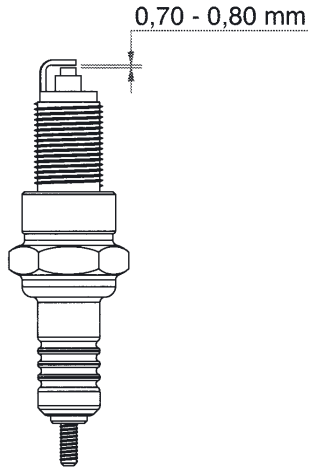
Check of the oil level

* After opening the cap of the filler neck, insert the dip stick into the neck, but not screw (oil level should be between the bottom and top labels). If necessary, add oil.

14.2.3 Check and replacement of the spark plug

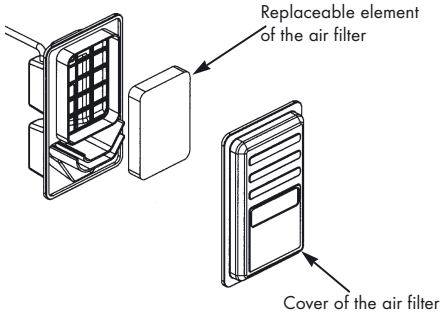
If the electric plant worked before this procedure, its silencer is strongly heated. Danger of burn.

* Remove the ignition wire from the spark plug.
* Unscrew the spark plug by a spark-plug wrench.
* If necessary, clean electrodes by a brass brush. If the spark plug is damaged, replace it.
* Check the interelectrode gap, if necessary install the appropriate gap. A feeler should be introduced smoothly between electrodes.
* In order to provide entry on the thread, screw the spark plug by hand and then draw it up by the spark-plug wrench through a half-turn.
* The spark plug should be tightly screwed. The insufficiently screwed spark plug is strongly heated and can cause the damage of the engine.
* Put the ignition wire on the spark plug.
* Spark plugs BPR6ES (NGK), and W20EPR-U (Denso) are recommended.



14.2.4 Cleaning and replacement of the air filter

* Carefully take out a cartridge.
* Wash out a foam-rubber replaceable element in warm water with a household washing-up liquid, then carefully rinse and dry. Immerse the element in clean engine oil, and then wring it out. If excessive oil remains on the insert, the engine will smoke at the first start.
* Clean the pressboard cartridge by knocking out on a flat surface.
* When pollution is heavy, replace the filtering element.

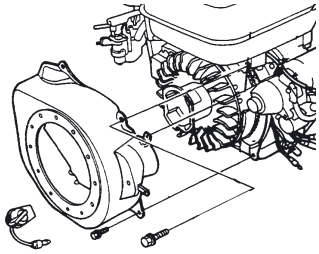


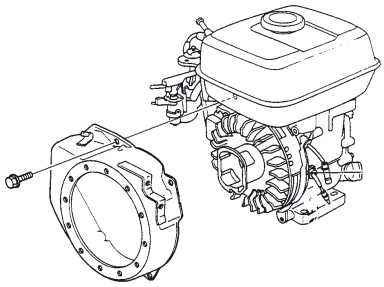
14.3 Replacement of the generator

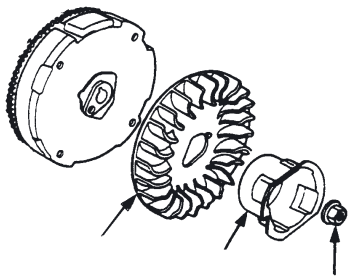
Warning! These works must be carried out only in a specialized workshop.

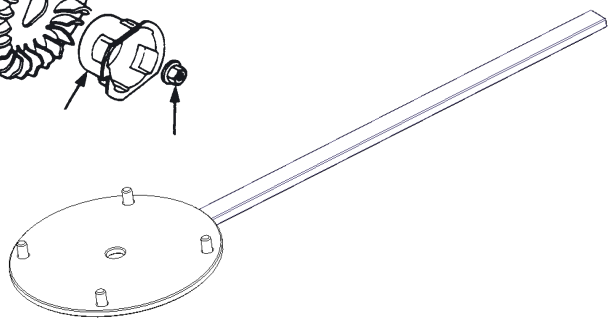
The generator is assembled in the reverse order.

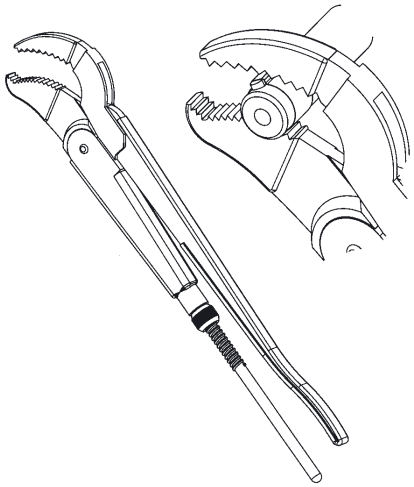
* Remove the starter case (four screws with six-sided heads).
* Unscrew the central nut, remove the starter cup and fan.
* Insert a lever lock with four dowels (special tool absent in the delivery set, order no. 919091) to the threaded holes of the flywheel, again turn the central nut.

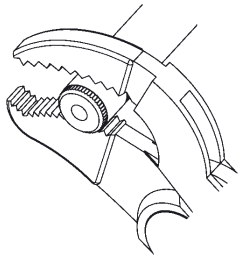












* Unscrew four screws with six-sided heads (drawing moment 7.3 N m), and remove the fan case.
* Weaken the clamp, and remove the fan propeller.
* Unscrew screws, and remove the bearing board.
* Remove the stator.
* Block the engine from unforeseen rotation by the lever lock, and unscrew the rotor, clamping its tail by a tube wrench (counter-clockwise rotation).

Warning! In order to prevent the damage of the tail by the tube wrench, interlay a brass sheet between the shaft and wrench.

* When a new rotor is installed, preliminarily screw a threaded pin into the shaft of the engine.