



SERVOSAN[®] KURTARAN[®] KGS-series BATTERY POWERED EMERGENCY EVACUATION DEVICE

USER'S MANUAL

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 This elevator is equipped with SERVOSAN / KURTARAN KGS-series Battery Powered Emergency Evacuation Device.

 In case of a power failure,

 SERVOSAN / KURTARAN KGS starts automatically and moves the cabin to the upper or lower floor to rescue the people stuck in the cabin.

 Attention to the maintenance people!

 For your own safety, before any maintenance work, TURN OFF (down position) the W-automat on KGS unit, and DISCONNECT the cable on 48+ terminal on the battery.

Otherwise, the elevator might move without control during a power failure

<u>Note:</u> Two copies of this warning are provided as stickers to be put on the front cover of the main controller panel, and on the enterance door of the machine room.

SERVOSAN[®] KURTARAN[®] KGS-series BATTERY-POWERED EMERGENCY EVACUATION DEVICE

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2. GENERAL

KURTARAN KGS-series devices are intelligent battery-powered emergency evacuation devices developed to move the elevator cabin to the upper or lower floor in case of a mains power failure.

KURTARAN KGS-series devices are high reliability systems with a long service life. It is easy to install and put into service. It has been designed and is manufactured using the latest power electronics and micro controller technology by SERVOSAN[®]; a company with over 25 years of experience in Power Electronics and Motor Speed Control.

The operating ambient temperature of KURTARAN K-series is 0^o C - 45^o C.

3. TECHNICAL DESCRIPTION:

The internal lay-out diagram of KURTARAN KGS device is presented in Fig. 1. The units shown in this diagram are explained below :

- **3.1. AS/A:** It generates the three-phase AC voltage for the elevator motor. During the stand by state the green READY led is on. When the system gets started, the green START led starts flashing. It is protected against overload, short circuit and output phase loss, and indicated by the red FAULT led.
- **3.2. AS/C (or AS/B) :** It generates (through a transformer) 220 Volt 50Hz AC and supplies power to KB, KM1, KM2 contactor coils, and the diode bridges, feeding the brake and lir, and the door motor. In systems where three phase 380V 50Hz power is required for the door motor, **AS/B** unit is used.
- **3.3. INT9 V2 CONTROL UNIT:** This is the main control unit of KURTARAN KGS device, where the information necessary for proper functioning of the system comes and the necessary command signals are generated with a programmed micro controller.

The incoming information and the outgoing commands can be monitored via the ledss and the digital display on this unit. These displays are explained below:

3.3.a. D10 MOTION led. It ishows the information coming from the magnetic sensor contact and the magnets placed along the circumferance of the power wheel and the machine body.

3.3b. IL relay : If one or more of the phases of AC power to the system fails and it lasts for about three seconds, the IL relay and D19 led will be ON. When the IL relay is ON, the NC contact of it will be opened and the KA contactor and the transformer on the main controller will be OFF. It is kept ON during the evacuation operation.

3.3.c. KP01 and **KP02 relays:** Operate at the same time with IL relay, and used for the door control unit for control signalling.

3.3.d. DIS relay: It is on the battery supply line, and stays ON during the stand by and evacuation operation with D23 led ON, and goes OFF after the evacuation operation while waiting for the AC power to come back, to protect the batteries from being discharged.

3.3.e. LIR relay: When made ON, the lir magnet operates and D20 led becomes ON.

3.3.f. IA relay: When made ON, the light and announcement unit starts to function and D25 led becomes ON.

3.3.g. KP1 relay: Made ON to open the door #1.

3.3.h. KP2 relay: Made ON to open the door #2.

Note: KP2 and KP02 relays and J9 connectors are optional for door#2 on the cabin.

3.3.i. J1 Program Bridges: There are 14 programming pins on the INT9. By connecting or removing jumpers to these pins, the door opening duration, the delay prior to start, which floor level sensor is used,) and the contact type of the level sensors (normally open or normally closed on the floor level) can be programmed. See item 7 for more information.

3.3.k. J3 Pins: There is no connection to these pins and they used to keep the spare or extra jumpers.

3.3.I. F1 fuse: It is on the battery supply line. When it is OFF, device does not function.

- **3.4. SR BATTERY CHARGER UNIT:** This unit charges the 48V battery group optimally by temperature compansated constant voltage with limited current method. This charging technique ensures the longest life for the battery. It is always on whenever mains power is available, and the red LED at the output of the unit is lit. The DC output voltage at the terminals may rise up to 55.2 Volts when the battery is fully charged.
- 3.5. B40 W AUTOMAT CIRCUIT BREAKER: It is on the battery 48V+ line.
- **3.6. S1,S2,S3 CONNECTORS:** The connection between the main controller and the KURTARAN KGS device is made over these connectors.
- **3.7. S4 CONNECTOR:** The connection between the 3 phase transformer module and the KURTARAN KGS devise is made over these connector.
- **3.8. 3 PHASE TRANSFORMER UNIT:** Used for the 3 phase 380V door motors.
- **3.9. LIGHT and ANNOUNCEMENT UNIT:** When AC power fails, Ithis unit is activated and a 12V, 3W lamp illuminates the cabin, and the announcement unit makes the following announcement:

"Attention please. The mains electrical power is off. Servosan emergency evacuation device will automatically move you to the next floor. When the cabin stops at a floor, you may open the cabin door and leave. If the door is electrically powered, it will be opened automatically."

After a successful evacuation operation, the light will remain on for two more minutes if the mains power failure continues.

4. KURTARAN KGS- MAIN CONTROLLER CONNECTION:

The connection between the Kurtaran KGS device and the main controller is shown in fig.2.

4.1. All the connections to the KGS device are made over connectors, except the main motor connection.

4.2. If the KGS unit removed for any reason, in order for the main controller continue to operate properly, the KL1 connector must be bridged.

4.3. It is necessary to use only one extra contactor (9A auxliary type) in the main controller for the proper operation.

4.4. It is necessary to use 3 units of 2A circuit breakers on the cables numbered 11,12,13.

5. BATTERY SELECTION and KGS-BATTERY CONNECTIONS:

5.1. Kurtaran KGS device can be used for elevators motors up to 16 HP.

5.2. Four sealed and maintenance free 12V-7AH serially connected batteries (making a total of 48V 7AH) are used up to 8.2 HP motor power.

5.3. Between 8.2-16 HP motors, 4 units of 12V-12AH, instead of 7AH, must be used.

5.4. The length of the cables between the KGS unit and the batteries must be as short as possible, not longer than 150 cm, and the cross section of the cables must be at least 6 mm2, and 10mm2 for motors between 8.2HP-16 HP.

5.5. In order to keep the cables short, the batteries may be placed on a shelf under the control unit box mounted on the wall.

5.6. It is a good practice to **twist** the cables to keep the stray inductances minimum.

5.7. It is a good practice to use **red color on (+)** terminal, and **black color on (-)** terminal to avoid wrong polarity connections.

5.8. 48V (+) red colored cable must be connected to the W automat input on KGS unit.

5.9. 48V (-) black colored cable must be connected to the **black colored connecting terminal** on KGS unit.

6. OPERATION :

When the AC power fails, the KURTARAN KGS starts automatically, and disconnects the KA contactor's and TR-A transformer's connections to the neutral, and keep them disconnected, i.e. off , during the evacuation operation. Hence, the safety contacts chain and the door unit is disconnected from the main controller over KA(1-2, 3-4) and KA(5-6,53-54) contacts.

Since at the same time, the other contactors on the main controller are also off, the main motor, the brake and the lir are also disconnected from the main controller.

Then, the necessary power for the main motor, the lir, the brake, the and the safety contacts are generated by the Kurtaran KGS unit and supplied to them in the required sequence for the evacuation operation.

During the evacuation operation the main controller is kept off.

When KURTARAN KGS starts, it goes through the following steps: INT9-V2 S0

- **6.1.** In the stand by mode, the display shows **H**, **DIS** relay, **D23** led, and the red led on the charging unit are on.
- **6.2.** Following an ac power failure, **IA** relay and **D25** led become ON and the light and announcement start. Starting with the power loss, display **H flashes**. If the power loss is less than 3 seconds, it stops flashing and the device returns to item 6.1 again.
- **6.3.** If the power loss is going on, and if **J1/1:0**, 3 seconds later (if **J1/1:1**, 20 seconds later) **IL** relay and **D19** led become **on**, and the display shows **1**. This is the **beginning of evacuation**. Together with IL, KP01 and KP02 relays become on also, to provide close commands to the door units.
- **6.4.** About 0.5 seconds after the IL relay, **AS-B-C starts**, and after a few seconds 220V 50Hz and hence ISO24V DC are generated. ISO24V DC supply is fully isolated and floating supply within the KGS unit.
- **6.5.** The ISO24V supply is **checked** if it is available or not. If it is not available, the evacuation operation stops, and the display shows **flashing 5**, AS-B **stops**. In this case the evacuation operation is not succesfull, the light goes on for about **2 hours** more, and at the end of 2 hours **DIS** relay becomes off, KGS becomes dead or goes into display **4** mode.
- **6.6.** ------(this line is left empty)
- **6.7.** ------(this line is left empty)

- **6.8.** ------(this line is left empty)
- 6.9. If ISO24V is available, the floor level informations are checked. If the cabin is at a floor level, then the door is opened. Depending on the floor level information source, i.e. if it is from the floor contact #1 or #2, the corrospanding door is opened. If both information is present, then both of the doors are opened. The door opening duratins are set by the jumpers J1/3-4-5. During the door #1 opening duration the display shows 2. During the door #2 or #1 + #2 doors opening duration the display shows 7.
- 6.10. At the end of the door opening duration, AS-B-C stops.
- **6.11.** During the time interval starting from the evacuation operation **beginning** (when **IL** relay becomes **on**) till the end of door opening duation, **if the ac power comes back**, it is considered as **absent**. It is taken into account at the end of the door opening duration, and the KGS unit **returns to item 6.1**.
- **6.12.** If the ac power is still absent after the door opening duration, the display shows **3**, and the light goes on for 2 minutes more. If ac power comes during this interval, the KGS unit **returns to item 6.1**.

If ac power is still absent after 2 minutes, DIS relay becomes off, KGS becomes dead or goes into display **4** mode.

Up to this point, since the car was at the floor level at the beginning of evacuation operation, the doors were opened and the evacuation operation completed.

- **6.13.** In item 6.9, the floor level informations were checked. If the cabin is **not at the floor** level, **LIR** relay becomes **on** the lir is activated. The lir magnet voltage is used as **'close'** command for the door unit in several main controllers. If so, it is necessary to wait for some time for the door is closed, and this time is set from **J1/10** as 5 or 10 seconds.
- **6.14.** At the end of the J1/10 waiting duration, **AS-A starts**.
- **6.15.** About 1 second after AS-A start, **KM1 and KM2** contactors become **on** and the 3 phase power is applied to the main motor, and after a few seconds the rotation information is checked.
- **6.16.** If the rotation information is ON within the normal limits, then it goes on rotating, and the **cabin moves**. When the cabin comes to a floor level, the floor level information **comes**, and **AS-A stops**, and **LIR** becomes **off**, and the **cabin stops**.
- **6.17.** Then the **door opening** operation starts. Depending on where the floor level information is coming from, eitheer the **door #1** or the **door #2** or **both** open. The door opening duration can be set from **J1/3-4-5** between 3-16 seconds.
- **6.18.** In item 6.15, if there is **no rotation**, then AS-A stops, the power applied to the main motor becomes off and the brake activates. After about 1 second AS-A starts again but with an **opposite phase sequence** to supply the motor in the **other direction**. After about a few seconds the rotation information is checked, and if it is within the normal limits, it returns to item 6.16.
- **6.19.** If there is no rotation in the other direction also, then the display shows **flashing U**, that means the motor is not rotating in both direction, and the evacuation operation failed. Then the **AS-A**, the **AS-B** stops, and the **LIR** becomes off. Since the evacuation operation is not succesfull, the light goes on for about **2 hours** more, and at the end of 2 hours **DIS** relay becomes off, KGS becomes dead or goes into display **4** mode.

- 6.20. Starting with the motor rotation information, the cabin must come to a floor level within 150 seconds. If there is no any floor level information after 150 seconds, the the display shows a flasing 8. Then the AS-A, the AS-B stops, and the LIR becomes off. Since the evacuation operation is not succesfull, the light goes on for about 2 hours more, and at the end of 2 hours DIS relay becomes off, KGS becomes dead or goes into display 4 mode.
- **6.21.** The speed of the motor is checked continuously while it is running. If due to any reason, it speeds up, then the display shows **flashing 9**. Then the **AS-A**, the **AS-B stops**, and the **LIR** becomes **off**. Since the evacuation operation is not succesfull, the light goes on for about **2 hours** more, and at the end of 2 hours **DIS** relay becomes off, KGS becomes dead or goes into display **4** mode.

7. PROGRAM BRIDGES:

J1/1: Delay Before Start:

If there is an emergency electric generator for power failures, Kurtaran KGS waits for 20 seconds to let the generator work. If the generator does not work, KURTARAN KGS will operate.

- 1. No bridge on pin 1; (0), IL becomes on after 2.5 seconds.
- 2. Bridge on pin 1; (1), IL becomes on after 20 seconds

J1/2: Floor sensing contact type:

- 1. No bridge on pin 2; (0), floor sensing contact is NC (normally closed), opens at floor level.
- 2. Bridge on pin 2; (1), floor sensing contact is NO (normally open), closes at floor level.

J1/3-4-5 Door opening time durations:

- 1. No bridges on pins 3+4+5; (000), the door opening time duration is 4 seconds.
- 2. Bridge on pin 5, no bridges on pin 3+4; (001), the door opening time duration is 5 seconds.
- 3. Bridge on pin 4, no bridges on pin 3+5; (010), the door opening time duration is 6 seconds.
- 4. Bridges on pin 4+5, no bridge on pin 3; (011), the door opening time duration is 7 seconds.
- 5. Bridge on pin 3, no bridges on pin 4+5; (100), the door opening time duration is 10 seconds.
- 6. Bridges on pin 3+5, no bridge on pin 4; (101), the door opening time duration is 12 seconds.
- 7. Bridges on pin 3+4, no bridge on pin 5; (110), the door opening time duration is 14 seconds.
- 8. Bridges on pin 3+4+5; (111), the door opening time duration is **16** seconds.

J1/6-7 JF time delay:

The JF contact may not be located precisely at the floor level for the operation from the main elevator panel. When JF contact is used as the floor level sensing contact for the KURTARAN KGS device, it may be necessary to have a time delay between the sensing of the JF contact and stopping the cabin.

- 1. No bridges on pin 6+7; (00), the time delay is 0,0 second.
- 2. Bridge on pin 7, no bridge on pin 6; (01), the time delay is 0.5 seconds.
- 3. Bridge on pin 6, no bridge on pin 7; (10), the time delay is 1.0 second.
- 4. Bridges on pin 6+7; (11), the time delay is 1.5 seconds.

J1/8 Not functional

J1/9 Door #2 is active or not:

- 1. No bridge on pin 9; (0), floor #2 is not sensed, so the door #2 is not active.
- 2. Bridge on pin 9; (1), floor #2 is sensed, so the door #2 is active.

J1/10 Delay after LIR:

- 1. No bridge on pin 10; (0), time delay is 5 sec.
- 2. Bridge on pin 9; (1), time delay is 10 sec.

8. DS DISPLAY:

During the normal operation sequence:

- 1. Display (H): AC is on, Kurtaran KGS is in the stand by mode.
- 2. Display (flashing H): AC is off...
- 3. Display (1): IL is on, the evacuation operation started.
- 4. Display (2): Door #1 opening period started.
- 5. Display (3): Light is on for 120 sec. more.
- 6. Display (4) : After an evacuation operation, the phase on the SR unit is ON, the other phases are off.
- 7. Display (7) : Both doors are active.
- 8. Display (-): At the very beginning only the phase on the SR unit is on, the others are off.
- 9. Display flashing (.): Flashes during the stand by mode, once every one sec.

During warning:

10. Display flashing **0**: Battery voltage is low.

During the faults:

- 11. Display (flashing A): Battery is disconnected or fully discaharged.
- 12. Display (flashing 5): ISO24V does not exist.
- 13. -----(This line is left empty)
- 14. Display (flashing 8): Evacuation time is out, 150 sec. is over.
- 15. Display (flashing 9): Over speed.
- 14. Display (flashing U): Revolution information does not exist.

9. WARNINGS, DIAGNOSES AND CORRECTIONS

Display shows (flashing 0): Low Battery Voltage

KURTARAN KGS monitors the battery voltage continuously. If the battery voltage falls below a preset value at any time, the display shows **flashing 0**. at the same time the announcement unit gives **ding-dong warning** periodically. During this time, if the mains power fails, KURTARAN

KGS will nevertheless start an evacuation operation, but there is **no guarantee** to complete it with success. If batteries are charged in time, the display shows **H** again, indicating stand by state.

Sometimes one or more of the batteries within the battery group may not work properly. To understand this:

- 9.1 Open the W-automat (OFF). Measure the terminal voltage of each battery. They should be approximately equal to each other and around 12 Volt. During these measurement the batteries must be **loaded**. A 12V, 25W auto lamp can be used as a load. Be carefull of the high temperature on the lamp.
- 9.2 Measure the output voltage of the SR charging unit while the W-automat is open (OFF). It should be around 54.5 V at 25 C degrees and if it is not, replace it with a new one..
- 9.3 Close the W-automat (ON). Observe that the total battery voltage increases gradually from 48 Volts to 54.5 Volts. The total charging time may be about 20 hours depending on the initial charge of the batteries.
- 9.4 During the charging period of the batteries, measure the terminal voltages of each battery. Replace those whose output voltage is widely different than the rest or whose output voltage is lower than 11 Volts during charging.
- 9.5 Recharge the batteries for at least 20 hours if the total battery voltage drops below 44V during the first loading when KURTARAN KGS starts to move the cabin. If after 20 hours of charging this condition persists, replace the batteries.

10. FAULTS, DIAGNOSES AND REPAIR:

Unlike the warnings, **faults arise only while KURTARAN KGS is active during An evacuation operation.** The digital display flashes and shows the code corresponding to this error.

- **10.1.** Display shows **flashing A** : Battery is not connected.
- **10.2.** Display shows **flashing 5**: ISO24V doe not exist.
- **10.3.** -----(This line is left empty)

10.4. Display shows **flashing 8:** If the cabin does not reach any floor level within **150 sec.**, KURTARAN KGS stops and display shows **flashing 8**. When this happens, check the floor level sensors and their connections.

10.5. Display shows **flashing 9:** If the cabin speed increases above the normal evacuation speed, the display shows (9). In such a situation the evacuation operation stops, the elevator motor supply is cut-off and brake is applied and the cabin is stopped.

10.6. Display shows **flashing U:** KURTARAN KGS monitors the rotation of the elevator motor when three-phase power is applied to it. If the motor cannot rotate in the first direction, it will be stopped and will be rotated in the opposite direction. If the motor cannot rotate in this direction also, the display will show flashing U.This may be due to a excessive load, faults in the motor connections or cables, defects in the motion sensing unit (cables, inappropriate magnet and sensor locations etc), fault in brake operation, an open contact in safety contact chain. In such a situation:

- a) Check the connections on contactors KM1 and KM2 and the motor cables.
- b) Check the cables and the terminal connections of the motion sensor.
- c) Chek the motion sensor magnets on the flywheel of the motor.
- d) Make sure that the distance between the motion sensor coil and the magnets on the flywheel is suitable.
- e) Check the brake unit and its connections.
- f) Check the safety contact cahain.

g) Check FE and FB fuses.

11. PERIODICAL MAINTENANCE

- **11.1** The batteries are the most critical components used in the system. Generally they are very sensitive on the ambient temperature and this should be limited to maximum 50 C degree. Since the maximum temperature in the machine room is limited to 45 C degree, this condition may be satisfied.
- **11.2** Read item 9 for the maintenance of the batteries. Additionally, to discharge and charge the batteries periodiacally helps to activate the batteries for their maximum use. To do this, let the KGS unit make an evacuation operation at least once during the periodical maintenance work of the elevator once in a month.
- **11.3** Keep the device in a clean environment.



Fig. 1. KURTARAN KGS GENERAL VIEW







Fig.3. How to fix the magnets and the sensing contacts

Magnets and the sensor contact can either be placed between the gear and the drive wheel as shown in fig.1, or oposite side of drive wheel as shown in fig.2.

Magnets are fixed with self adhesive band, and are equally placed from each other. Do not touch the adhesive side of the magnets with hands. Clean the surface on the drive wheel where the magnets will be placed.

Since the drive wheel turns at low speed, there is no risk for the magnets to fly away from their place due to centrifugal force.

1 /



Fig. 4. How to divide the circumference into 18 equal section

- 1. Measure the radius 'r'.
- 2. Mark point '1' on the circumference.
- 3. Mark point '2' which is 'r' distance away from the point '1'.
- 4. Continue marking till point '6'.
- 5. Divide the segments into 3 equal parts between 1,2,3,4,5,6.

WARRANTY

SERVOSAN® KURTARAN KGS-series® battery powered emergency evacuation device is GUARANTEED FOR A DURATION OF TWO YEARS from the date of purchase against breakdowns or faults in parts, components, material and workmanship. Within the guarantee period any parts or components which are found to be defective or fail due to imperfections in material or workmanship will be fixed and faulty parts or components will be replaced free of charge by **SERVOSAN**.

CONDITIONS OF THE WARRANTY

- a) **SERVOSAN** is free to choose the method used for fixing the fault and/or replacing defective part. This warranty is valid only if the customer has fullfilled the responsibilities stated in the user manual.
- b) This warranty is valid for a duration of two years starting from the date of purchase and covers only breakdowns ar faults in KURTARAN KGS-series. SERVOSAN can not be held responsible from nor it is liable due to any damages caused by inappropriate use of its equipment.
- c) A guarantee document without the signature of the supplier and/or the date of purchase is not valid.
- d) This guarantee by **SERVOSAN** does not cover the following failures or breakdowns due to use of the equipment under ubnormal conducts and conditions:
 - Damages and breakdowns which occur as a result of inapropriate mains supply voltages (too low or too high) or due to defective or incorrect electrical connections.
 - Damages or breakdowns which may result during service or maintenance work carried out by agencies not authorized by **SERVOSAN**.
 - Damages and breakdowns resulting from failures of components and/or parts that are connected to **KURTARAN KGS-series**.

Serial No:	Model: KURTARAN KGS		Brake/Lir Pump Voltage:
Invoice Date and Number:		Address of the	last user
Dealer Signature			

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Cut from here. This piece must be sent to SERVOSAN.

Serial No:	Model: KURTARAN KGS		Brake /Cam Voltage:
Invoice Date and Number:		Address of the L	.ast User:
Dealer Signature			