AC INVERTER　8610-45

GENERAL INFORMATION

1. SPECIFICATIONS

Item	Specification		Remarks
	220V	**110V**	
Operating voltage	DC 12.5 ~ 15.0 V	←	±0.3 V
Operating temperature	−30 ~ 75℃	←	Based on indoor installation
Output voltage	AC 198 ~ 242 V (r.m.s)	AC 103.5 ~ 126.5 V (r.m.s)	Battery voltage (12.5 ~ 15.0 V)
Output frequency	60 ± 6 Hz	←	-
Rated output capacity	200 W	150W	At temperature between −30 and 45℃
	100 W	75W	At temperature between −45 and 75℃
Full load input current	Max. 20 A	Max. 15A	-

* r.m.s = Root Mean Square

2. MAJOR CHANGES

AC inverter system

	AC socket	AC inverter unit

XLV: AC inverter system newly adopted

Modification basis	
Application basis	
Affected VIN	

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3. CAUTIONS AND WARNINGS FOR SAFETY

⚠️ **CAUTION**

- The some electronic equipment with power consumption less than the inverter power rating may not work properly:
  * Electrical appliances which need high current at startup
  * Measuring equipment which should process the exact data
  * Unit which needs stable power supply.
- Close the AC inverter cover when the AC inverter is not in use.
- Always start the engine in order to use the AC inverter and unplug it after use. The battery may be flat when you use it with the engine stopped or when plugging in the electrical appliance for a prolonged time.
- Do not plug in the electrical appliance with power consumption higher than 200 W (220 V).
- When you plug in an improper electrical appliance which causes excessive electromagnetic wave noise, you should take care since the noise comes from the audio system (or AV system) and the smart key and electrical systems in the vehicle may occur malfunction.
- Do not use the faulty electrical appliance. It may damage the AC inverter and electrical systems in the vehicle.
- Do not use more than two electrical equipment and accessories simultaneously.
  When input voltage from the AC inverter becomes low, the LED indicator flashes and the AC
- inverter is switched off automatically. It will work normally when voltage rises again.
  When the smart key is in the vicinity of the AC inverter, it may not work very well due to the electromagnetic wave from the AC inverter.

⚠️ **WARNING**

- Not paying attention to the AC inverter is very dangerous when it's not in use.
- Always follow the precautions below in order to prevent serious injury:
  * Do not use any electrical appliance using hot water. (e.g., electric kettle, toaster and iron)
  * Do not put any foreign object in the AC inverter or touch it with hands. Doing so may cause an electric shock or fire.
  * Don't let child touch the AC inverter.
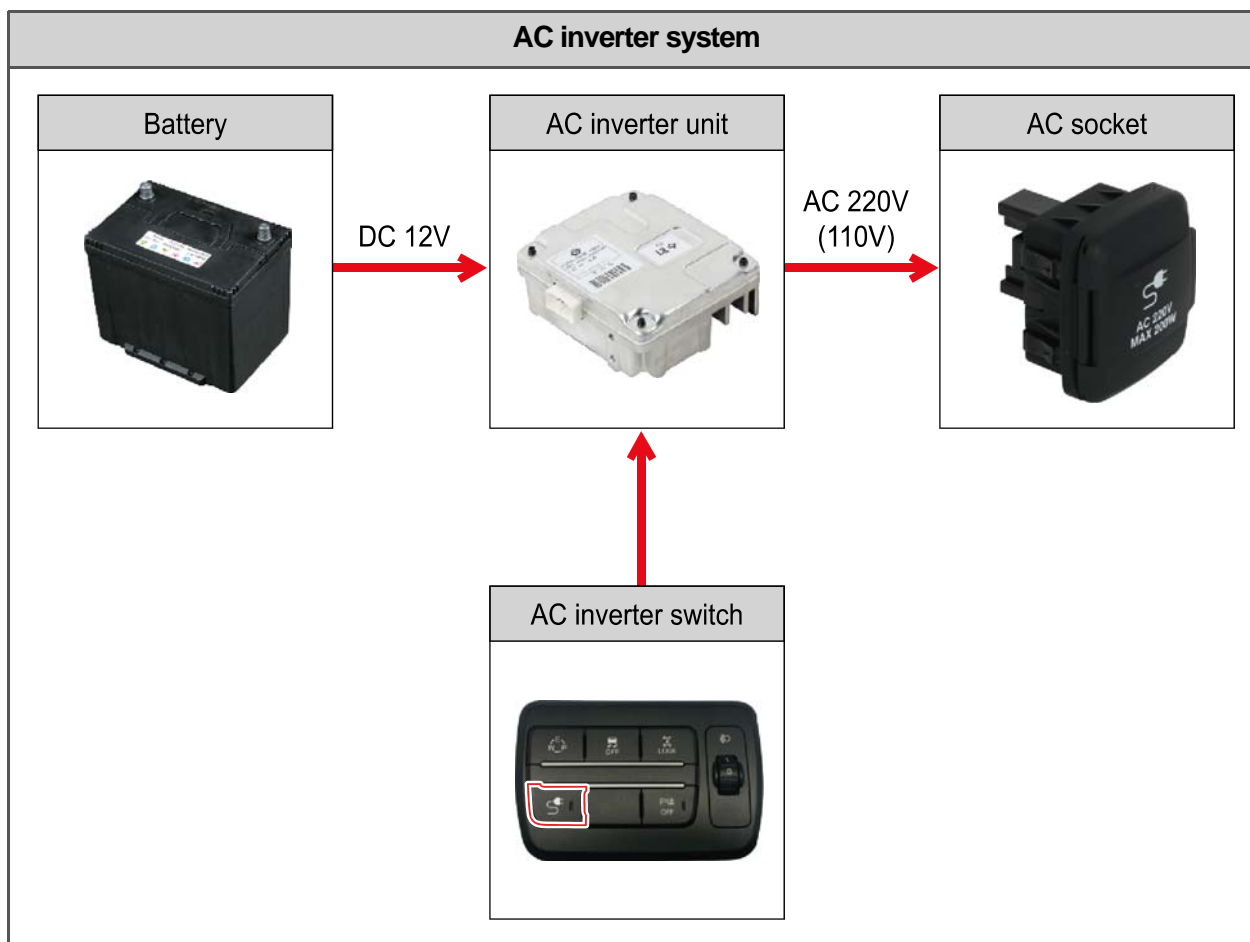 * Do not touch the inverter with wet hands. If so, electrical shock and serious bodily injury may occur as a result.

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Modification basis	
Application basis	
Affected VIN	

OVERVIEW AND OPERATING PROCESS

1. OVERVIEW

The AC inverter is a system which converts the battery voltage to AC 220V(110V)(60 Hz) for all electrical appliances.
- AC inverter unit: converts DC voltage to AC voltage
- AC inverter switch: turns AC inverter on and off
- AC socket: outputs AC voltage
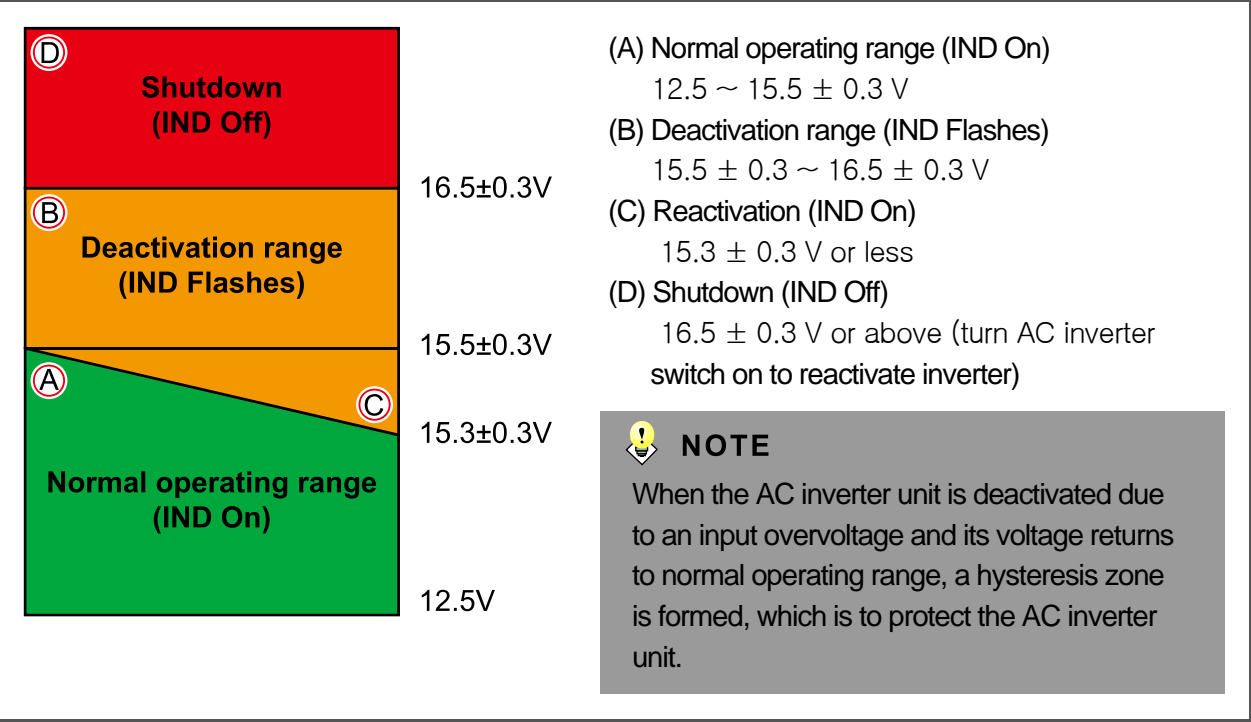
AC inverter system

Battery	AC inverter unit	AC socket

DC 12V

AC 220V (110V)

AC inverter switch

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2. AC INVERTER PROTECTION

1) Input Overvoltage Protection

When the battery input voltage exceeds the specified range, the AC inverter is deactivated in order to prevent overheating the unit and protect corresponding parts.
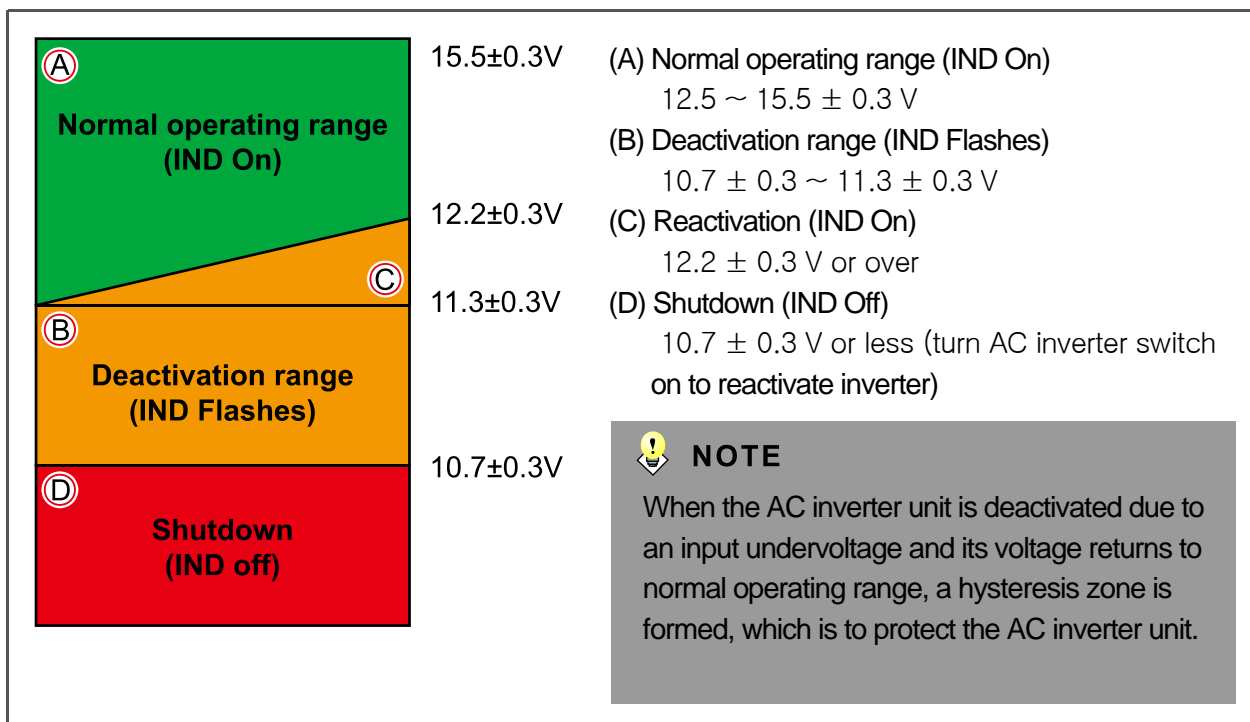
▶ **Operating condition**

D Shutdown (IND Off) 16.5±0.3V	(A) Normal operating range (IND On) 12.5 ~ 15.5 ± 0.3 V
B Deactivation range (IND Flashes) 15.5±0.3V	(B) Deactivation range (IND Flashes) 15.5 ± 0.3 ~ 16.5 ± 0.3 V
A **C** 15.3±0.3V	(C) Reactivation (IND On) 15.3 ± 0.3 V or less
Normal operating range (IND On) 12.5V	(D) Shutdown (IND Off) 16.5 ± 0.3 V or above (turn AC inverter switch on to reactivate inverter)

💡 **NOTE**

When the AC inverter unit is deactivated due to an input overvoltage and its voltage returns to normal operating range, a hysteresis zone is formed, which is to protect the AC inverter unit.

Modification basis	
Application basis	
Affected VIN	

2) Input Undervoltage Protection

When the battery input voltage falls under the specified range, the AC inverter is deactivated in order to prevent overheating the unit and protect corresponding parts.

▶ **Operating condition**

Ⓐ **Normal operating range (IND On)**	15.5±0.3V
Ⓒ	12.2±0.3V
Ⓑ **Deactivation range (IND Flashes)**	11.3±0.3V
Ⓓ **Shutdown (IND off)**	10.7±0.3V

(A) Normal operating range (IND On)
    12.5 ~ 15.5 ± 0.3 V

(B) Deactivation range (IND Flashes)
    10.7 ± 0.3 ~ 11.3 ± 0.3 V

(C) Reactivation (IND On)
    12.2 ± 0.3 V or over

(D) Shutdown (IND Off)
    10.7 ± 0.3 V or less (turn AC inverter switch on to reactivate inverter)

> 💡 **NOTE**
>
> When the AC inverter unit is deactivated due to an input undervoltage and its voltage returns to normal operating range, a hysteresis zone is formed, which is to protect the AC inverter unit.

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Modification basis	
Application basis	
Affected VIN	

## 3) Output Overvoltage Protection

(1) 220V

When the inverter's output voltage exceeds the specified range, the system detects the secondary voltage and limits it to maximum voltage (target voltage), AC 340 V (±5%), in order to prevent overheating the unit, protect the corresponding parts and electronic equipment connected to the AC 220V socket.
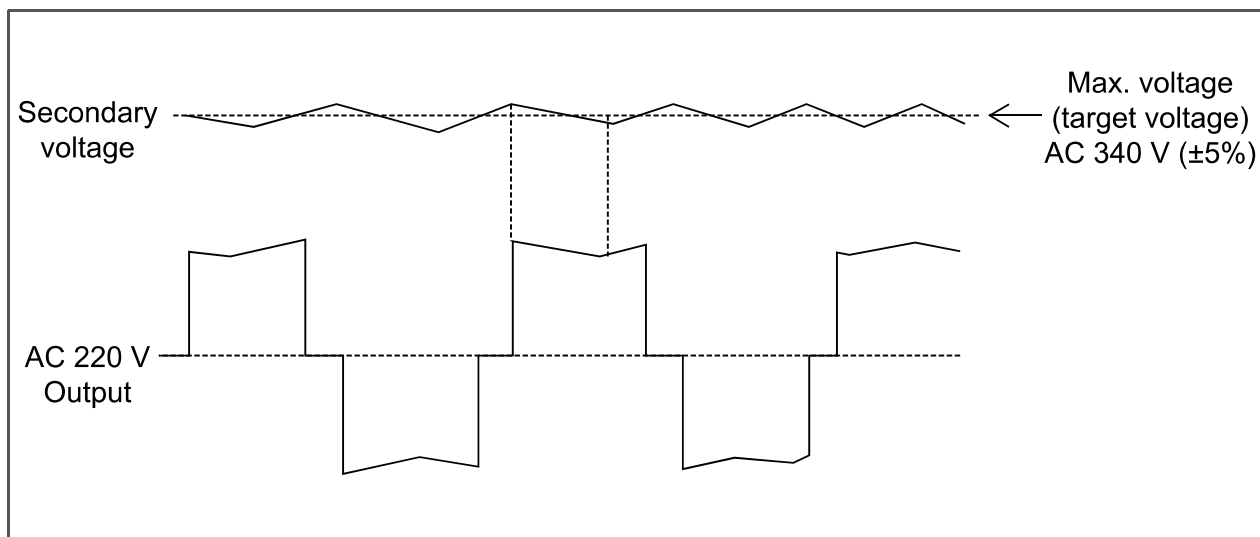
(2) 110V

When the inverter's output voltage exceeds the specified range, the system detects the secondary voltage and limits it to maximum voltage (target voltage), AC 170 V (±5%), in order to prevent overheating the unit, protect the corresponding parts and electronic equipment connected to the AC 110V socket.

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Modification basis	
Application basis	
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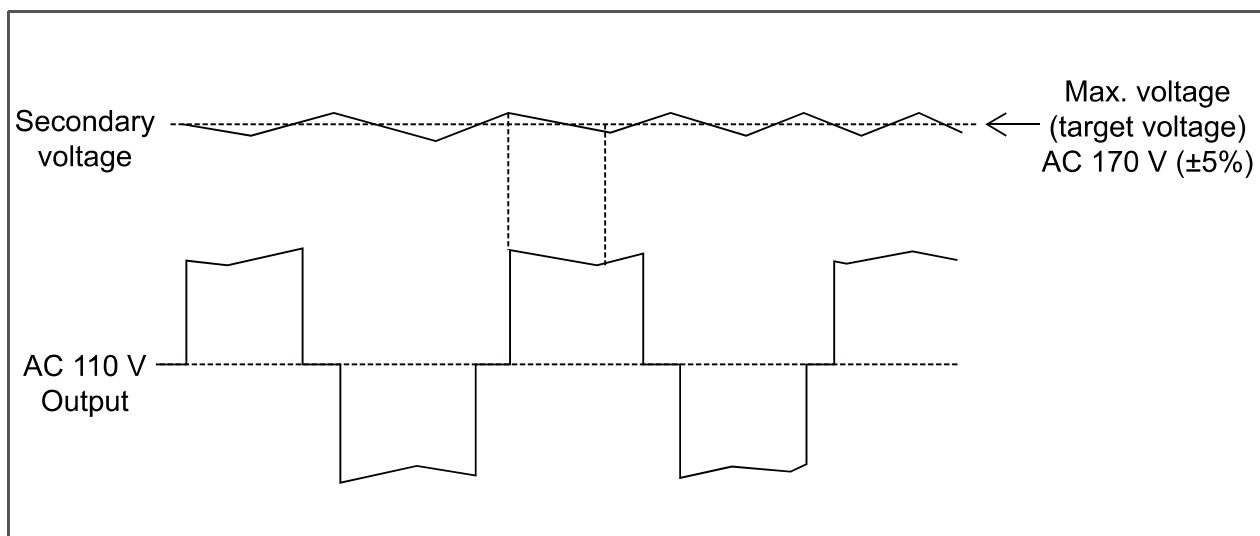
4) Overcurrent Protection

When the current to the inverter unit exceeds the specified range, the AC inverter is deactivated in order to prevent overheating the unit and protect the corresponding parts.

▶ **Operating condition**
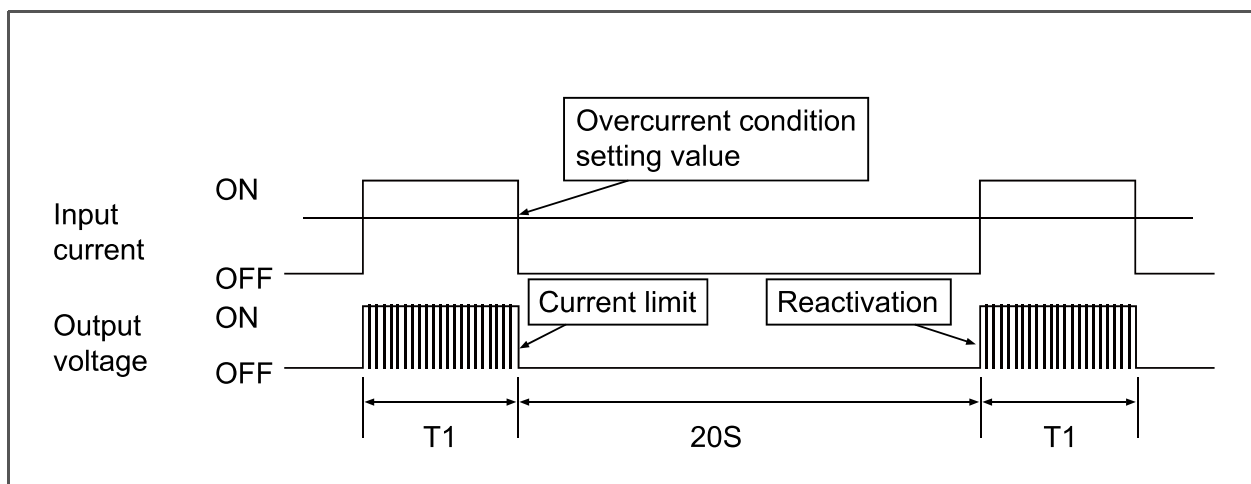
- Deactivation: input current ≥ overcurrent condition setting value (±5%) & T1 (timer value)
- Reactivation: reactivated after 20 sec. (±5%) (3rd Off)

	Overcurrent condition setting value		T1 (timer value)
	220V	**110V**	
Condition 1	0 ~ 20 A	0 ~ 15 A	Continuous
Condition 2	20 ~ 26 A	15 ~ 18 A	2 sec.
Condition 3	26 ~ 32 A	18 ~ 22 A	1 sec.
Condition 4	32 A or above	22 A or above	0.05 sec.

Modification basis	
Application basis	
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5) Overheating Protection

When the AC inverter is out of the normal operating temperature range, it is deactivated in order to prevent overheating the unit and protect the corresponding parts.
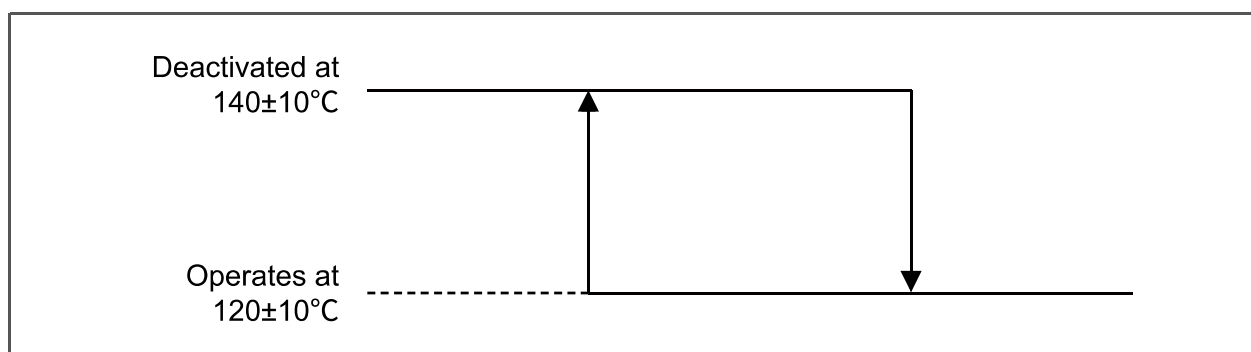
▶ **Operating condition**

1. Temperature in inverter unit

Deactivated at
105±10°C

Operates at
95±10°C
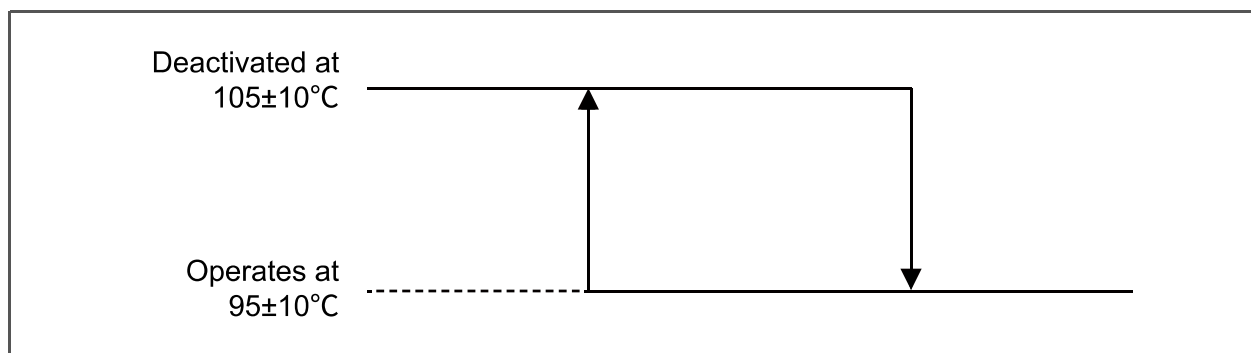
- Deactivated at 105 ± 10°C
- Reactivated at 95 ± 10°C (10°C lower than deactivated temperature)

2. Temperature around inverter unit

Deactivated at
140±10°C

Operates at
120±10°C

- Deactivated at 140 ± 10°C
- Reactivated at 120 ± 10°C (20°C lower than deactivated temperature)

6) Output Undervoltage (Short circuit) Protection

When the AC inverter unit's output voltage is lower than the specified range due to short circuit or overload, is deactivated in order to prevent overheating the unit and protect the corresponding parts.
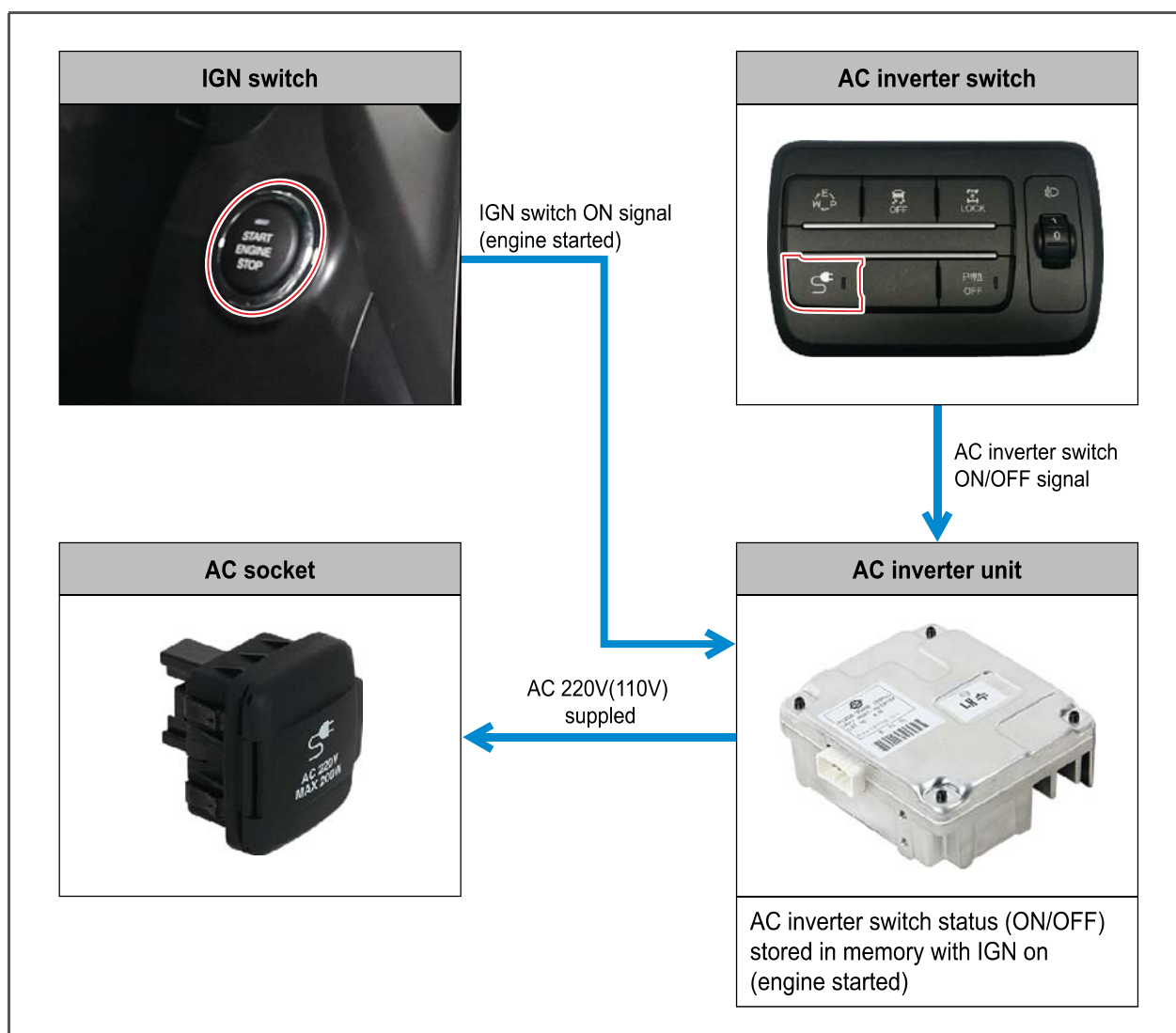
▶ **Operating condition**

- Deactivated at output voltage of AC 90 ± 20 V
- Reactivated when AC inverter switch turned on

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Modification basis	
Application basis	
Affected VIN	

3. AC INVERTER SWITCH EEPROM (MEMORY) FUNCTION

The AC inverter switch EEPROM (memory) function allows ON/OFF signal from the AC inverter switch to be stored at the EEPROM (memory) fitted in the AC inverter unit with IGN on (engine started) and the AC inverter switch returns the operating status before the ignition is turned off without operating it when the ignition is turned off and back on (engine started).

1) Operating Process

IGN switch	AC inverter switch

IGN switch ON signal
(engine started)

AC inverter switch
ON/OFF signal

AC socket	AC inverter unit

AC 220V(110V)
suppled

AC inverter switch status (ON/OFF)
stored in memory with IGN on
(engine started)

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1) AC Inverter Switch EEPROM (Memory) Function

▶ **Normal operating mode**

Operation 1.(with IGN2 ON)

  A. AC inverter switch ON
  B. AC inverter output ON
  C. AC inverter switch ON status stored at EEPROM
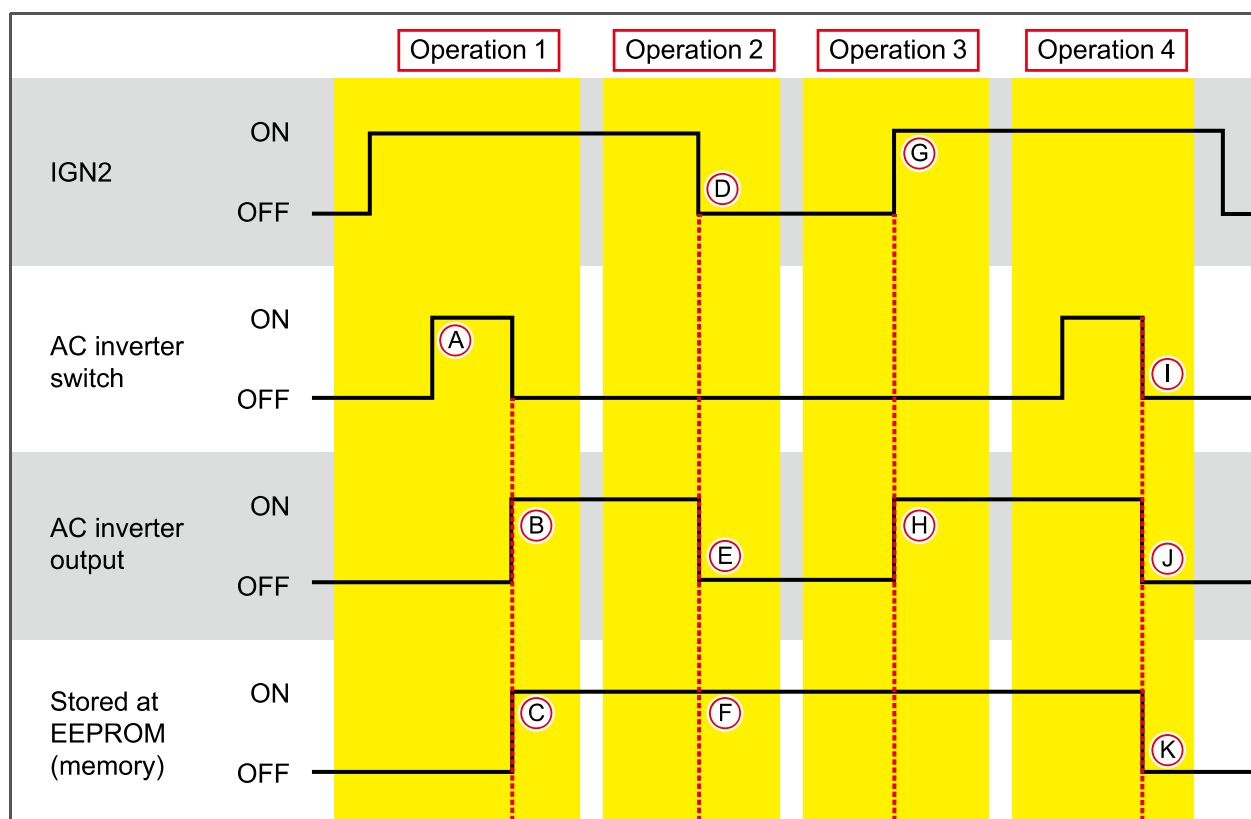
Operation 2.(Operation 1. condition)

  D. With IGN2 OFF
  E. AC inverter output OFF
  F. AC inverter switch ON status still stored at EEPROM

Operation 3.(Operation 2. condition)

  G. With IGN2 ON
  H. AC inverter output ON

Operation 4.(Operation 3. condition)

  I. AC inverter switch OFF
  J. AC inverter output OFF
  K. AC inverter switch OFF status stored at EEPROM

	Operation 1	Operation 2	Operation 3	Operation 4
IGN2		D	G	
AC inverter switch	A			I
AC inverter output	B	E	H	J
Stored at EEPROM (memory)	C	F		K

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Modification basis	
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▶ **Shutdown mode**

Operation 1.(with IGN2 ON)

  A. AC inverter switch ON
  B. AC inverter output ON
  C. AC inverter switch ON status stored at EEPROM
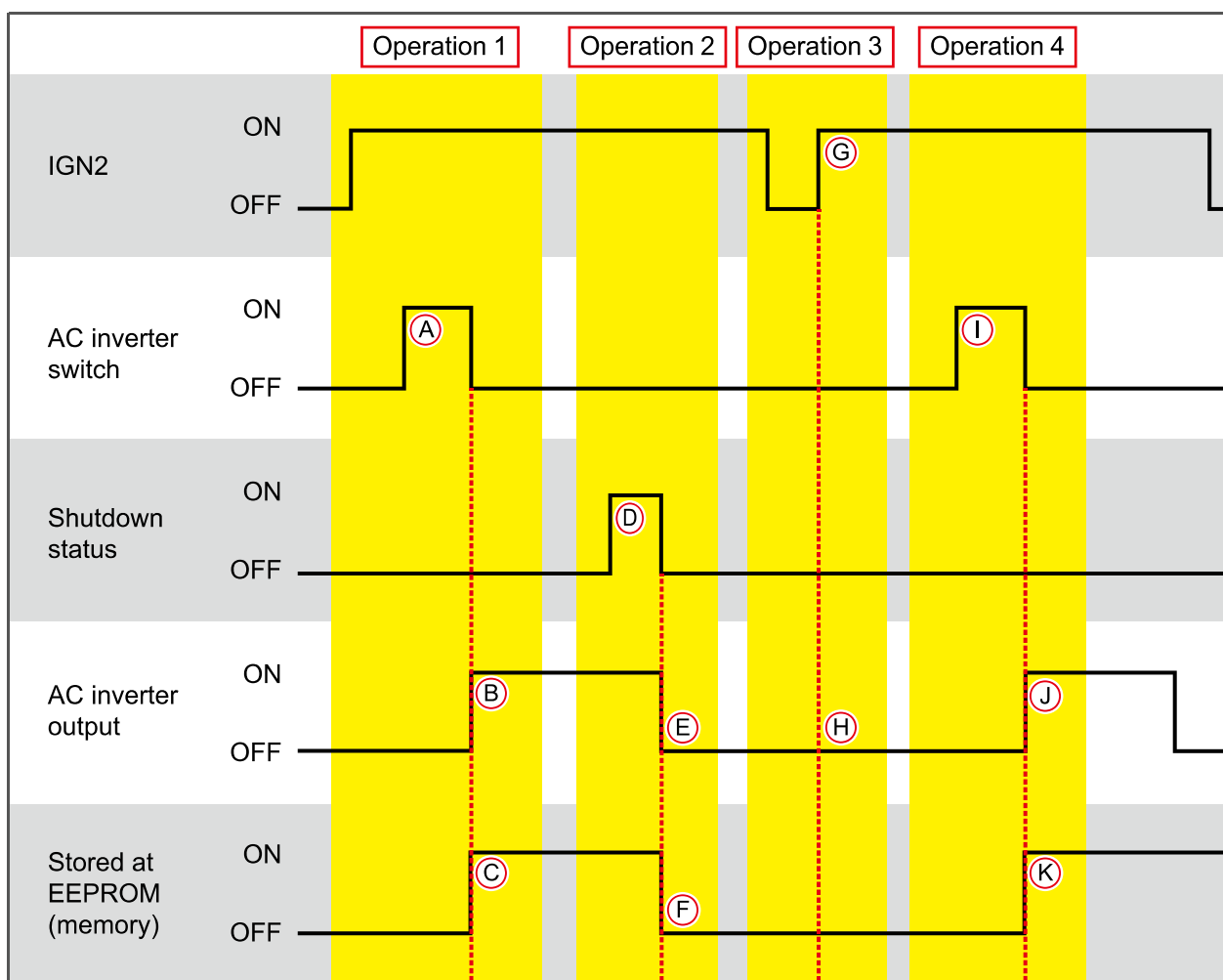
Operation 2.(Operation 1. condition)

  D. During shutdown
  E. AC inverter output shutdown
  F. AC inverter switch ON status cleared from EEPROM

Operation 3.(Operation 2. condition)
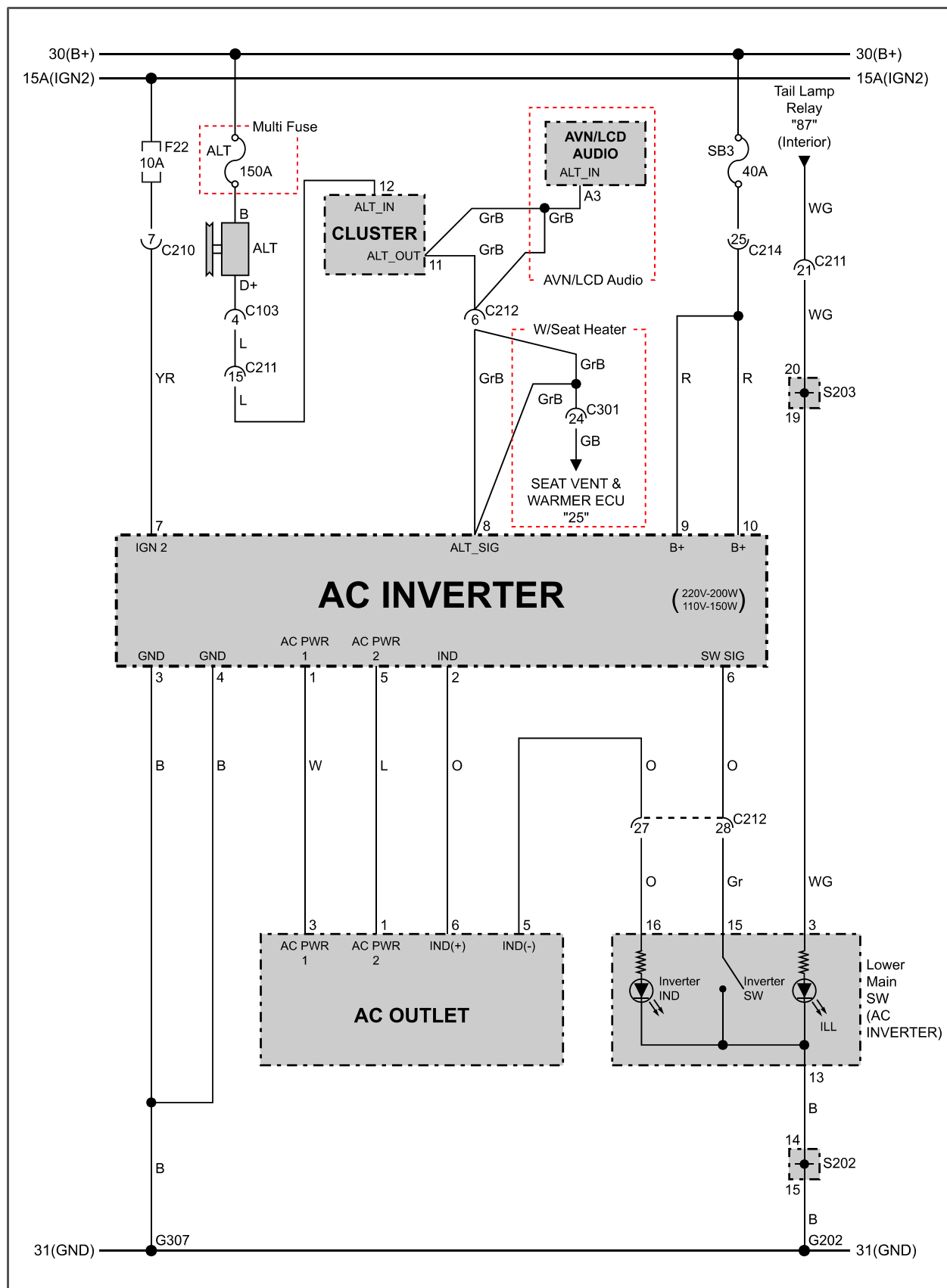
  G. IGN2 OFF and ON again
  H. AC inverter output OFF

Operation 4.(Operation 3. condition)

  I. AC inverter switch ON
  J. AC inverter output ON
  K. AC inverter switch ON status stored at EEPROM

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4. CIRCUIT DIAGRAM

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