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# 1 Function

## 1.1 Input voltage range

- The range is from 85VAC to 264VAC.  
In cases that conform with safety standard, input voltage range is 100VAC to 240VAC (50/60Hz).  
When DC input is required, Please contact us.
- If input value doesn't fall within above range, a unit may not operate in accordance with specifications and/or start hunting or fail.  
If you need to apply a square waveform input voltage, which is commonly used in UPS and inverters, please contact us.
- When the input voltage changes suddenly, the output voltage accuracy might exceed the specification. Please contact us.
- A unit can operate under the input voltage dip with derating.

Table 1.1 Load factor

Model	Input Voltage	
	100VAC→50VAC *	200VAC→100VAC
LHA30F	50%	100%
LHA50F	50%	100%
LHA75F	-	100%
LHA100F	-	100%
LHA150F	-	100%
LHA300F	-	100%

\*Please avoid using continuously for more than 1 second under above conditions. Doing so may cause a failure (Duty 1s/30s).

### ● LHA30F, LHA50F

- A power factor improvement circuit (active filter) is not built-in. If you use multiple units for a single system, standards for input harmonic current may not be satisfied. Please contact us for details.

## 1.2 Inrush current limiting

- An inrush current limiting circuit is built-in.
- If you need to use a switch on the input side, please select one that can withstand an input inrush current.
- Thermistor is used in the inrush current limiting circuit. When you turn the power ON/OFF repeatedly within a short period of time, please have enough intervals so that a power supply cools down before being turned on.

## 1.3 Overcurrent protection

- An overcurrent protection circuit is built-in and activated over 105% of the rated current. A unit automatically recovers when a fault condition is removed.  
Please do not use a unit in short circuit and/or under an overcurrent condition.
- Hiccup Operation Mode  
When the overcurrent protection circuit is activated and the output voltage drops to a certain extent, the output becomes hiccup so that the average current will also decrease.

## 1.4 Overvoltage protection

- An overvoltage protection circuit is built-in. If the overvoltage protection circuit is activated, shut down the input voltage, wait more than 3 minutes and turn on the AC input again to recover the output voltage. Recovery time varies depending on such factors as input voltage value at the time of the operation.

### Remarks :

Please avoid applying a voltage exceeding the rated voltage to an output terminal. Doing so may cause a power supply to malfunction or fail. If you cannot avoid doing so, for example, if you need to operate a motor, etc., please install an external diode on the output terminal to protect the unit.

### ● LHA150F, LHA300F

- In option -R2, overvoltage protection is deactivated by toggling ON/OFF signal of remote control.

## 1.5 Output voltage adjustment range

- Adjustment of output voltage is possible by using option "-Y". Please refer to instruction manual 6.1.

### 1.6 Output ripple and ripple noise

Output ripple noise may be influenced by measurement environment, measuring method fig.1.1 is recommended.

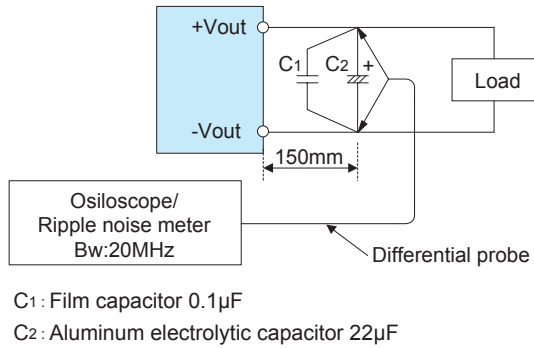


Fig.1.1 Measuring method of Ripple and Ripple Noise

**Remarks :**

When GND cable of probe with flux of magnetic force from power supply are crossing, ripple and ripple noise might not measure correctly.

Please note the measuring environment.

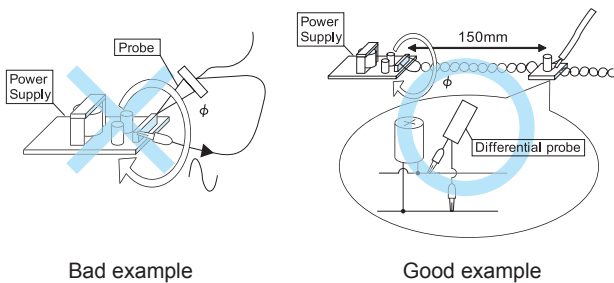


Fig.1.2. Example of measuring output ripple and ripple noise

### 1.7 Isolation

For a receiving inspection, such as Hi-Pot test, gradually increase (decrease) the voltage for the start (shut down). Avoid using Hi-Pot tester with the timer because it may generate voltage a few times higher than the applied voltage, at ON/OFF of a timer.

When you test units for isolation between the input and output, or between output and terminal FG, short-circuit between output and remote ON/OFF connector.

### 1.8 Reducing standby power

Burst operation at light loading, the internal switch element is intermittent operated, and the switching loss is decreased. The specification of the Ripple/Ripple Noise changes by this intermittent operation. The value of the Ripple / Ripple Noise when intermittent operates changes in the input voltage and the output current.

**LHA100F, LHA150F, LHA300F**

In option -R2, standby power with remote OFF is lower than the one with no load. Please refer to instruction manual 6.1.

## 2 Series Operation and Parallel Operation

### 2.1 Series Operation

You can use a power supply in series operation. The output current in series operation should be lower than the rated current of a power supply with the lowest rated current among power supplies that are serially connected. Please make sure that no current exceeding the rated current flows into a power supply.

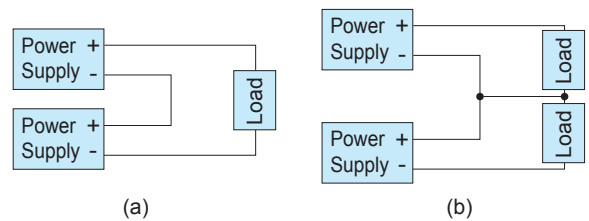


Fig.2.1 Examples of connecting in series operation

### 2.2 Parallel Operation

Parallel operation is not possible. Redundancy operation is available by wiring as shown below.

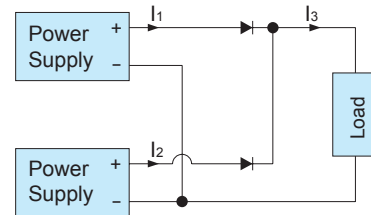


Fig.2.2 Example of redundancy operation

Even a slight difference in output voltage can affect the balance between the values of  $I_1$  and  $I_2$ . Please make sure that the value of  $I_3$  does not exceed the rated current of a power supply.

$$I_3 \leq \text{the rated current value}$$

## 3 Temperature of measurement points

### ■ Installation environment

When using it, it is necessary to radiate heat by the heat of the power supply.

Table 3.1 - 3.6 shows the relation between the upper limit temperature (Point ① and Point ②) and load factors.

Please consider the ventilation so that the convection which is enough for the whole power supply is provided.

Temperature of Point ① and Point ② become lower than upper limit temperature.

The life expectancy in the upper bound temperature (Point ① and Point ②) is three years or more.

Please refer to External View for the position of Point ① and Point ②.

### Remarks:

\* Please be careful of electric shock or earth leakage in case of temperature measurement, because Point ① and Point ② is live potential.

\* Please refer to instruction manual 4 if you want to extend the longevity of the life expectancy.

Table 3.1 Maximum temperature of measurement points (LHA30F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Max temperature [°C]	
				①:Capacitor	②:Capacitor
Convection	3.3 - 24V	A	60%<lo≤100%	81	85
			lo≤60%	85	87
		B	60%<lo≤100%	81	83
			lo≤60%	85	85
		C	60%<lo≤100%	81	85
			lo≤60%	85	87
		D	60%<lo≤100%	86	84
			lo≤60%	86	82
		E	60%<lo≤100%	83	87
			lo≤60%	83	83
		F	60%<lo≤100%	83	85
			lo≤60%	87	87
Forced air		A,B,C, D,E,F	80%<lo≤100%	75	75
			lo≤80%	75	75

Table 3.2 Maximum temperature of measurement points (LHA50F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Max temperature [°C]	
				①:Capacitor	②:Capacitor
Convection	3.3, 5, 24, 36, 48V	A	50%<lo≤100%	81	87
			lo≤50%	85	86
		B	50%<lo≤100%	78	84
			lo≤50%	84	86
		C	50%<lo≤100%	79	84
			lo≤50%	84	84
		D	50%<lo≤100%	85	81
			lo≤50%	88	85
		E	50%<lo≤100%	80	83
			lo≤50%	87	87
		F	50%<lo≤100%	81	86
			lo≤50%	86	87
	12, 15V	A	50%<lo≤100%	82	83
			lo≤50%	84	84
		B	50%<lo≤100%	80	81
			lo≤50%	85	85
		C	50%<lo≤100%	81	75
			lo≤50%	85	82
D	50%<lo≤100%	84	74		
	lo≤50%	88	82		
E	50%<lo≤100%	82	80		
	lo≤50%	88	87		
F	50%<lo≤100%	81	80		
	lo≤50%	86	85		
Forced air	3.3 - 48V	A,B,C, D,E,F	70%<lo≤100%	75	75
			lo≤70%	75	75

Table 3.3 Maximum temperature of measurement points (LHA75F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Max temperature [°C]	
				①:Capacitor	②:Capacitor
Convection	3.3, 5V	A	20%<lo≤100%	76	78
			lo≤20%	85	77
		B	20%<lo≤100%	76	72
			lo≤20%	88	76
		C	20%<lo≤100%	74	81
			lo≤20%	84	80
		D	lo≤100%	75	69
			lo≤10%	76	84
		E	10%<lo≤100%	76	84
			lo≤10%	87	87
		F	10%<lo≤100%	75	78
			lo≤10%	85	81
	12 - 48V	A	20%<lo≤100%	83	73
			lo≤20%	88	76
		B	20%<lo≤100%	83	70
			lo≤20%	88	76
		C	20%<lo≤100%	81	72
			lo≤20%	86	77
D	lo≤100%	73	60		
	lo≤100%	85	74		
E	lo≤100%	85	74		
	lo≤100%	80	66		
F	lo≤100%	80	66		
	lo≤100%	80	66		
Forced air	3.3 - 48V	A,B,C, D,E,F	70%<lo≤100%	75	75
			lo≤70%	75	75

Table 3.4 Maximum temperature of measurement points (LHA100F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Max temperature [°C]	
				①:Capacitor	②:Capacitor
Convection	5V	A	20%<lo ≤ 100%	80	84
			lo ≤ 20%	87	80
		B	20%<lo ≤ 100%	72	77
			lo ≤ 20%	82	76
		C	20%<lo ≤ 100%	73	85
			lo ≤ 20%	84	80
		D	lo ≤ 100%	84	80
		E	20%<lo ≤ 100%	73	88
			lo ≤ 20%	83	87
		F	20%<lo ≤ 100%	75	85
			lo ≤ 20%	85	81
		12 - 48V	A	25%<lo ≤ 100%	82
	lo ≤ 25%			85	78
	B		25%<lo ≤ 100%	79	82
			lo ≤ 25%	88	76
	C		25%<lo ≤ 100%	79	89
			lo ≤ 25%	86	77
	D		10%<lo ≤ 100%	80	70
			lo ≤ 10%	86	74
	E		20%<lo ≤ 100%	81	80
			lo ≤ 20%	88	83
	F		20%<lo ≤ 100%	80	72
			lo ≤ 20%	86	76
	Forced air	3.3 - 48V	A,B,C, D,E,F	70%<lo ≤ 100%	75
			lo ≤ 70%	75	75

Table 3.5 Maximum temperature of measurement points (LHA150F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Max temperature [°C]			
				①:Capacitor	②:Capacitor		
Convection	12V	A	75%<lo ≤ 100%	83	83		
			25%<lo ≤ 75%	89	83		
			lo ≤ 25%	94	87		
		B	75%<lo ≤ 100%	71	73		
			25%<lo ≤ 75%	82	81		
			lo ≤ 25%	88	86		
		C	75%<lo ≤ 100%	89	86		
			25%<lo ≤ 75%	94	86		
			lo ≤ 25%	95	84		
		D	75%<lo ≤ 100%	67	67		
			25%<lo ≤ 75%	83	77		
			lo ≤ 25%	89	78		
		E	75%<lo ≤ 100%	71	91		
			25%<lo ≤ 75%	76	90		
			lo ≤ 25%	81	90		
		F	75%<lo ≤ 100%	73	72		
			25%<lo ≤ 75%	86	80		
			lo ≤ 25%	85	81		
		24 - 48V	A	75%<lo ≤ 100%	87	72	
				25%<lo ≤ 75%	94	81	
				lo ≤ 25%	94	86	
			B	75%<lo ≤ 100%	83	74	
				25%<lo ≤ 75%	91	84	
				lo ≤ 25%	93	87	
	C		75%<lo ≤ 100%	88	74		
			25%<lo ≤ 75%	94	83		
			lo ≤ 25%	92	83		
	D		75%<lo ≤ 100%	73	58		
			25%<lo ≤ 75%	93	80		
			lo ≤ 25%	91	80		
	E		75%<lo ≤ 100%	83	80		
			25%<lo ≤ 75%	86	83		
			lo ≤ 25%	90	89		
	F		75%<lo ≤ 100%	76	62		
			25%<lo ≤ 75%	88	71		
			lo ≤ 25%	89	83		
	Forced air		12 - 48V	A,B,C, D,E,F	70%<lo ≤ 100%	75	75
					lo ≤ 70%	75	75

Table 3.6 Maximum temperature of measurement points (LHA300F-□-Y)

Cooling Method	Voltage	Mounting Method	Load factor	Max temperature [°C]	
				①:Capacitor	②:Capacitor
Convection	12V	A	75%<lo≤100%	85	87
			25%<lo≤75%	91	84
			lo≤25%	90	81
		B	75%<lo≤100%	76	78
			25%<lo≤75%	88	83
			lo≤25%	91	83
		C	75%<lo≤100%	85	77
			25%<lo≤75%	91	79
			lo≤25%	91	79
		D	75%<lo≤100%	71	65
			25%<lo≤75%	89	79
			lo≤25%	90	79
		E	75%<lo≤100%	81	83
			25%<lo≤75%	90	86
			lo≤25%	91	85
		F	75%<lo≤100%	83	80
			25%<lo≤75%	89	81
			lo≤25%	91	81
	24,48V	A	75%<lo≤100%	88	76
			25%<lo≤75%	91	78
			lo≤25%	91	80
		B	75%<lo≤100%	82	72
			25%<lo≤75%	89	79
			lo≤25%	90	81
C		75%<lo≤100%	87	68	
		25%<lo≤75%	90	75	
		lo≤25%	91	79	
D		75%<lo≤100%	77	65	
		25%<lo≤75%	85	73	
		lo≤25%	88	78	
E		75%<lo≤100%	65	67	
		25%<lo≤75%	73	73	
		lo≤25%	88	85	
F		75%<lo≤100%	76	67	
		25%<lo≤75%	83	73	
		lo≤25%	91	82	
Forced air	12 - 48V	A,B,C, D,E,F	70%<lo≤100%	75	75
			lo≤70%	75	75

## 4 Life expectancy and warranty

### Life Expectancy

Table 4.1 Life Expectancy (LHA30F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy	
				lo≤75%	75%<lo≤100%
Convection	3.3 - 12V	A,B,C, D,E,F	Ta=40°C or less	10years or more	6years
			Ta=50°C	7years	3years
	15 - 24V		Ta=40°C or less	10years or more	10years or more
			Ta=50°C	9years	5years
Forced air	3.3 - 24V	Ta=50°C or less	5years	5years	
		Ta=60°C	5years	3years	

Table 4.2 Life Expectancy (LHA50F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy	
				lo≤75%	75%<lo≤100%
Convection	3.3, 5, 24, 36, 48V	A,C,	Ta=40°C or less	10years or more	6years
			Ta=50°C	7years	3years
		B,D,F	Ta=35°C or less	10years or more	6years
			Ta=45°C	8years	3years
		E	Ta=30°C or less	10years or more	9years
			Ta=40°C	10years or more	4years
	12, 15V	A	Ta=40°C or less	10years or more	6years
			Ta=50°C	10years or more	3years
		B,C,D,F	Ta=35°C or less	10years or more	6years
			Ta=45°C	9years	3years
		E	Ta=30°C or less	10years or more	10years or more
			Ta=40°C	10years or more	5years
Forced air	3.3 - 48V	A,B,C, D,E,F	Ta=50°C or less	5years	5years
		Ta=60°C	5years	3years	

Table 4.3 Life Expectancy (LHA75F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy		
				lo≤75%	75%<lo≤100%	
Convection	3.3, 5V	A,B,C	Ta=30°C or less	10years or more	8years	
			Ta=40°C	10years or more	4years	
		D,E,F	Ta=25°C or less	10years or more	6years	
			Ta=35°C	9years	3years	
		12 - 48V	A,B,C	Ta=40°C or less	10years or more	7years
				Ta=50°C	5years	3years
	D		Ta=25°C or less	10years or more	10years or more	
			Ta=35°C	10years or more	5years	
	E,F	Ta=35°C or less	10years or more	6years		
		Ta=45°C	6years	3years		
Forced air		3.3 - 48V	A,B,C, D,E,F	Ta=50°C or less	5years	5years
			Ta=60°C	5years	3years	

Table 4.4 Life Expectancy (LHA100F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy		
				lo≤75%	75%<lo≤100%	
Convection	5V	A,B,C	Ta=30°C or less	10years or more	6years	
			Ta=40°C	7years	3years	
		D	Ta=25°C or less	10years or more	10years or more	
			Ta=35°C	10years or more	10years or more	
		E,F	Ta=25°C or less	10years or more	8years	
			Ta=35°C	8years	4years	
	12 - 48V	A,B,C	Ta=40°C or less	10years or more	5years	
			Ta=50°C	5years	3years	
		D,E,F	Ta=35°C or less	10years or more	8years	
			Ta=45°C	8years	4years	
Convection		5 - 48V	A,B,C, D,E,F	Ta=50°C or less	5years	5years
			Ta=60°C	5years	3years	

Table 4.5 Life Expectancy (LHA150F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy	
				Io ≤ 75%	75% < Io ≤ 100%
Convection	12V	A,B,C	Ta=30°C or less	10years or more	8years
			Ta=40°C	10years or more	4years
		D	Ta=20°C or less	10years or more	10years or more
			Ta=30°C	10years or more	9years
		E,F	Ta=15°C or less	10years or more	6years
			Ta=25°C	8years	3years
	24 - 48V	A,B,C	Ta=40°C or less	10years or more	6years
			Ta=50°C	5years	3years
		D,E	Ta=30°C or less	10years or more	10years or more
F	Ta=40°C	10years or more	6years		
	Ta=20°C or less	10years or more	10years or more		
Ta=30°C	10years or more	10years or more			
	10years or more	10years or more			
Forced air	12 - 48V	A,B,C, D,E,F	Ta=60°C	5years	3years

Table 4.6 Life Expectancy (LHA300F-□-Y)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy	
				Io ≤ 75%	75% < Io ≤ 100%
Convection	12V	A,B,C	Ta=25°C or less	10years or more	7years
			Ta=35°C	10years or more	3years
		D,E	Ta=20°C or less	10years or more	10years or more
			Ta=30°C	10years or more	5years
		F	Ta=10°C or less	10years or more	10years or more
			Ta=20°C	10years or more	10years or more
	24 - 48V	A,B,C	Ta=40°C or less	10years or more	6years
			Ta=50°C	5years	3years
		D	Ta=35°C or less	10years or more	8years
			Ta=45°C	10years or more	4years
		E,F	Ta=20°C or less	10years or more	10years or more
			Ta=30°C	10years or more	5years
Forced air	12 - 48V	A,B,C, D,E,F	Ta=60°C	5years	3years

■Warranty

Table 4.7 Warranty (LHA30F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io ≤ 75%	75% < Io ≤ 100%
Convection	3.3 - 12V	A,B,C, D,E,F	Ta=40°C or less	5years	5years
			Ta=50°C	5years	3years
	15 - 24V		Ta=40°C or less	5years	5years
			Ta=50°C	5years	3years
Forced air	3.3 - 24V		Ta=50°C or less	5years	5years
			Ta=60°C	5years	3years

Table 4.8 Warranty (LHA50F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io ≤ 75%	75% < Io ≤ 100%
Convection	3.3, 5, 24, 36, 48V	A,C	Ta=40°C or less	5years	5years
			Ta=50°C	5years	3years
		B,D,F	Ta=35°C or less	5years	5years
			Ta=45°C	5years	3years
		E	Ta=30°C or less	5years	5years
			Ta=40°C	5years	3years
	12, 15V	A	Ta=40°C or less	5years	5years
			Ta=50°C	5years	3years
		B,C,D,F	Ta=35°C or less	5years	5years
			Ta=45°C	5years	3years
		E	Ta=30°C or less	5years	5years
			Ta=40°C	5years	3years
Forced air	3.3 - 48V	A,B,C, D,E,F	Ta=50°C or less	5years	5years
			Ta=60°C	5years	3years

Table 4.9 Warranty (LHA75F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io ≤ 75%	75% < Io ≤ 100%
Convection	3.3, 5V	A,B,C	Ta=30°C or less	5years	5years
			Ta=40°C	5years	3years
		D,E,F	Ta=25°C or less	5years	5years
			Ta=35°C	5years	3years
	12 - 48V	A,B,C	Ta=40°C or less	5years	5years
			Ta=50°C	5years	3years
		D	Ta=25°C or less	5years	5years
			Ta=35°C	5years	3years
		E,F	Ta=35°C or less	5years	5years
			Ta=45°C	5years	3years
Forced air	3.3 - 48V	A,B,C, D,E,F	Ta=50°C or less	5years	5years
			Ta=60°C	5years	3years

Table 4.10 Warranty (LHA100F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io ≤ 75%	75% < Io ≤ 100%
Convection	5V	A,B,C	Ta=30°C or less	5years	5years
			Ta=40°C	5years	3years
		D	Ta=25°C or less	5years	5years
			Ta=35°C	5years	3years
		E,F	Ta=25°C or less	5years	5years
			Ta=35°C	5years	3years
	12 - 48V	A,B,C	Ta=40°C or less	5years	5years
			Ta=50°C	5years	3years
		D,E,F	Ta=35°C or less	5years	5years
			Ta=45°C	5years	3years
Convection	5 - 48V	A,B,C, D,E,F	Ta=50°C or less	5years	5years
			Ta=60°C	5years	3years

Table 4.11 Warranty (LHA150F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io ≤ 75%	75% < Io ≤ 100%
Convection	12V	A,B,C	Ta=30°C or less	5years	5years
			Ta=40°C	5years	3years
		D	Ta=20°C or less	5years	5years
			Ta=30°C	5years	3years
		E,F	Ta=15°C or less	5years	5years
			Ta=25°C	5years	3years
	24 - 48V	A,B,C	Ta=40°C or less	5years	5years
			Ta=50°C	5years	3years
		D,E	Ta=30°C or less	5years	5years
			Ta=40°C	5years	3years
		F	Ta=20°C or less	5years	5years
			Ta=30°C	5years	3years
Forced air	12 - 48V	A,B,C, D,E,F	Ta=50°C or less	5years	5years
			Ta=60°C	5years	3years

Table 4.12 Warranty (LHA300F-□-Y)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io ≤ 75%	75% < Io ≤ 100%
Convection	12V	A,B,C	Ta=25°C or less	5years	5years
			Ta=35°C	5years	3years
		D,E	Ta=20°C or less	5years	5years
			Ta=30°C	5years	3years
		F	Ta=10°C or less	5years	5years
			Ta=20°C	5years	3years
	24, 48V	A,B,C	Ta=40°C or less	5years	5years
			Ta=50°C	5years	3years
		D	Ta=35°C or less	5years	5years
			Ta=45°C	5years	3years
		E,F	Ta=20°C or less	5years	5years
			Ta=30°C	5years	3years
Forced air	12 - 48V	A,B,C, D,E,F	Ta=50°C or less	5years	5years
			Ta=60°C	5years	3years

## 5 Ground

- When installing the power supply with your unit, ensure that the input FG terminal of CN1 or mounting hole FG is connected to safety ground of the unit.
- \* It is recommended to electrically connect terminal FG and mounting hole FG to metal chassis for reducing noise.

## 6 Option and Others

### 6.1 Outline of options

- \* Please contact us for details of specifications and delivery timing.
- \* You can combine multiple options. Some options, however, cannot be combined with other options. Please contact us for details.

#### ● -C

- Option -C units have coated internal PCB for better moisture resistance.

#### ● -G

- Option -G units are low leakage current type.
- Differences from standard versions are summarized in Table 6.1.

Table 6.1 Low leakage current type

Leakage Current (AC IN 240VAC 60Hz)	0.15mA max
Conducted Noise	N/A
Output Ripple Noise	Please contact us for details about Ripple Noise

#### ● -J4

- Option -J5 units come with VH connectors (Mfr. J.S.T.) instead of a standard models.
- Keep the drawing current less than 5A per pin.

#### ● -J5 (LHA300F)

- Option -J5 units come with 8 pin connector instead of a 10 pin connector.(24V,48V)
- Keep the drawing current less than 5A per pin.

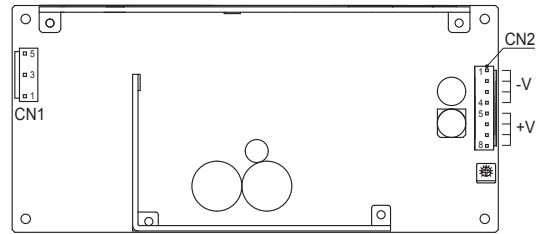


Fig.6.1 Example of option -J5

Table 6.2 Pin assignments of CN2

Pin No.	Output
1 to 4	-V
5 to 8	+V

Connector	Mating connector	Terminal
CN2	B8P-VH	VHR-8N
		Chain : SVH-21T-P1.1
		Loose : BVH-21T-P1.1

(Mfr. J.S.T.)

#### ● -R2 (LHA100F, LHA150F, LHA300F)

- You can control output ON/OFF remotely in Option -R2 units. To do so, connect an external DC power supply and apply a voltage to a remote ON/OFF connector, which is available as option.
- Standby power with remote OFF is lower than the one with no load.

Model	Standby power[W]	
	AC IN 100VAC	AC IN 230VAC
LHA100F	0.50typ	1.80typ *
LHA150F	0.15typ	0.70typ
LHA300F	0.20typ	0.80typ

\* It is the same as standard model.

- Start up time by ON signal in remote control is 700 ms typ. (LHA100F:70ms typ)
- Overvoltage protection is reactivated by toggling ON/OFF signal of remote control.

Model	Built-in Resistor Ri [ Ω ]	Voltage between RC (+) and RC (-) [V]		Input Current [mA]
		Output ON	Output OFF	
LHA100F, LHA150F, LHA300F	1500	4.5 - 12.5	0 - 0.5	10max

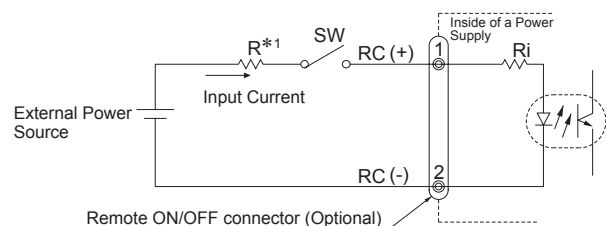


Fig.6.2 Example of using a remote ON/OFF circuit



· Dedicated harnesses are available for purchase. Please see Optional Parts for details.

\* 1 If the output of an external power supply is within the range of 4.5 - 12.5V, you do not need a current limiting resistor R. If the output exceeds 12.5V, however, please connect the current limiting resistor R.

To calculate a current limiting resistance value, please use the following equation.

$$R[\Omega] = \frac{V_{cc} - (1.1 + R_i \times 0.005)}{0.005}$$

\* Please wire carefully. If the wire incorrect, the internal components may be damaged.

■ Remote ON/OFF circuits (RC(+)) and RC(-) are isolated from input, output and FG.

**● -S, -SN (LHA150F, LHA300F)**

- -S indicates a type with chassis, and -SN indicates a type with chassis and cover (Refer to external view).
- In optional -SN, please refer to “Derating”. Also “Maximum temperature of measurement points”, “Expectancy life” and “Warranty” is different from standard models.

Please refer to Table 6.2 to Table 6.7.

Table 6.2 Maximum temperature of measurement points (LHA150F-□-SN)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [°C]	
				①:Capacitor	②:Capacitor
Convection	12V	A	75%<I <sub>o</sub> ≤100%	82	69
			25%<I <sub>o</sub> ≤75%	92	81
			I <sub>o</sub> ≤25%	95	86
		B	75%<I <sub>o</sub> ≤100%	69	67
			25%<I <sub>o</sub> ≤75%	84	81
			I <sub>o</sub> ≤25%	94	89
		C	75%<I <sub>o</sub> ≤100%	90	78
			25%<I <sub>o</sub> ≤75%	96	82
			I <sub>o</sub> ≤25%	96	86
		D	75%<I <sub>o</sub> ≤100%	64	53
			25%<I <sub>o</sub> ≤75%	87	75
			I <sub>o</sub> ≤25%	96	86
	E	75%<I <sub>o</sub> ≤100%	79	86	
		25%<I <sub>o</sub> ≤75%	83	90	
		I <sub>o</sub> ≤25%	90	90	
	24 - 48V	A	75%<I <sub>o</sub> ≤100%	85	62
			25%<I <sub>o</sub> ≤75%	92	75
			I <sub>o</sub> ≤25%	95	83
		B	75%<I <sub>o</sub> ≤100%	77	64
			25%<I <sub>o</sub> ≤75%	84	75
			I <sub>o</sub> ≤25%	91	85
		C	75%<I <sub>o</sub> ≤100%	90	63
			25%<I <sub>o</sub> ≤75%	96	76
			I <sub>o</sub> ≤25%	96	83
D		75%<I <sub>o</sub> ≤100%	63	42	
		25%<I <sub>o</sub> ≤75%	81	68	
		I <sub>o</sub> ≤25%	92	81	
E	75%<I <sub>o</sub> ≤100%	83	80		
	25%<I <sub>o</sub> ≤75%	89	89		
	I <sub>o</sub> ≤25%	91	90		
Forced air	12 - 48V	A,B,C,D, E and F	70%<I <sub>o</sub> ≤100%	75	75
			I <sub>o</sub> ≤70%	75	75

Table 6.3 Maximum temperature of measurement points (LHA300F-□-SN)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [°C]	
				①:Capacitor	②:Capacitor
Convection	12V	A	75%<I <sub>o</sub> ≤100%	84	84
			25%<I <sub>o</sub> ≤75%	90	84
			I <sub>o</sub> ≤25%	90	80
		B	75%<I <sub>o</sub> ≤100%	73	75
			25%<I <sub>o</sub> ≤75%	89	82
			I <sub>o</sub> ≤25%	90	81
		C	75%<I <sub>o</sub> ≤100%	86	75
			25%<I <sub>o</sub> ≤75%	90	74
			I <sub>o</sub> ≤25%	90	76
		D	75%<I <sub>o</sub> ≤100%	69	64
			25%<I <sub>o</sub> ≤75%	79	68
			I <sub>o</sub> ≤25%	88	77
	E	75%<I <sub>o</sub> ≤100%	79	84	
		25%<I <sub>o</sub> ≤75%	90	86	
		I <sub>o</sub> ≤25%	90	85	
	24, 48V	A	75%<I <sub>o</sub> ≤100%	90	73
			25%<I <sub>o</sub> ≤75%	90	74
			I <sub>o</sub> ≤25%	90	76
		B	75%<I <sub>o</sub> ≤100%	83	69
			25%<I <sub>o</sub> ≤75%	86	72
			I <sub>o</sub> ≤25%	90	78
		C	75%<I <sub>o</sub> ≤100%	89	63
			25%<I <sub>o</sub> ≤75%	90	71
			I <sub>o</sub> ≤25%	83	73
D		75%<I <sub>o</sub> ≤100%	71	53	
		25%<I <sub>o</sub> ≤75%	77	66	
		I <sub>o</sub> ≤25%	88	75	
E	75%<I <sub>o</sub> ≤100%	90	83		
	25%<I <sub>o</sub> ≤75%	90	84		
	I <sub>o</sub> ≤25%	90	83		
Forced air	12 - 48V	A,B,C,D, E and F	70%<I <sub>o</sub> ≤100%	75	75
			I <sub>o</sub> ≤70%	75	75

Table 6.4 Life expectancy (LHA150F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy	
				I <sub>o</sub> ≤75%	75%<I <sub>o</sub> ≤100%
Convection	12V	A,B,C	Ta=20°C or less	10years or more	7years
			Ta=30°C	7years	3years
		D	Ta=10°C or less	10years or more	10years or more
			Ta=20°C	10years or more	10years or more
		E	Ta=15°C or less	10years or more	9years
			Ta=25°C	9years	4years
	24 - 48V	A,B,C	Ta=25°C or less	10years or more	6years
			Ta=35°C	6years	3years
		D	Ta=10°C or less	10years or more	10years or more
			Ta=20°C	10years or more	10years or more
		E	Ta=20°C or less	10years or more	10years or more
			Ta=30°C	10years or more	7years
Forced air	12 - 48V	A,B,C, D,E,F	Ta=40°C	5years	5years
			Ta=50°C	5years	3years

Table 6.5 Life expectancy (LHA300F-□-SNY)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy	
				$I_o \leq 75\%$	$75\% < I_o \leq 100\%$
Convection	12V	A,B,C,D	Ta=10°C or less	10years or more	10years or more
			Ta=20°C	10years or more	6years
		E	Ta=5°C or less	10years or more	9years
	24, 48V	A,B,C	Ta=15°C	10years or more	4years
			Ta=25°C or less	10years or more	6years
		Ta=35°C	6years	3years	
D,E	Ta=15°C or less	10years or more	10years or more		
	Ta=25°C	10years or more	5years		
Forced air	12 - 48V	A,B,C, D,E,F	Ta=40°C	5years	5years
			Ta=50°C	5years	3years

Table 6.6 Warranty (LHA150F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				$I_o \leq 75\%$	$75\% < I_o \leq 100\%$
Convection	12V	A,B,C	Ta=20°C or less	5years	5years
			Ta=30°C	5years	3years
		D	Ta=10°C or less	5years	5years
			Ta=20°C	5years	3years
		E	Ta=15°C or less	5years	5years
			Ta=25°C	5years	3years
	24 - 48V	A,B,C	Ta=25°C or less	5years	5years
			Ta=35°C	5years	3years
		D	Ta=10°C or less	5years	5years
Ta=20°C	5years		3years		
E	Ta=20°C or less	5years	5years		
	Ta=30°C	5years	3years		
Forced air	12 - 48V	A,B,C, D,E,F	Ta=40°C	5years	5years
			Ta=50°C	5years	3years

Table 6.7 Warranty (LHA300F-□-SNY)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				$I_o \leq 75\%$	$75\% < I_o \leq 100\%$
Convection	12V	A,B,C,D	Ta=10°C or less	5years	5years
			Ta=20°C	5years	3years
		E	Ta=5°C or less	5years	5years
	24, 48V	A,B,C	Ta=15°C	5years	3years
			Ta=25°C or less	5years	5years
		Ta=35°C	5years	3years	
D,E	Ta=15°C or less	5years	5years		
	Ta=25°C	5years	3years		
Forced air	12 - 48V	A,B,C, D,E,F	Ta=40°C	5years	5years
			Ta=50°C	5years	3years

● -T (LHA300F)

- Option -T units have vertically positioned screws on a terminal block.
- Please contact us for details about appearance.

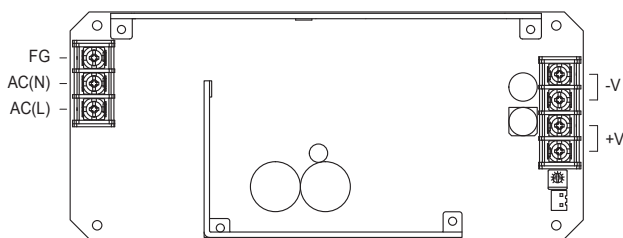


Fig.6.3 Example of option -T

● -U1 (LHA150F,LHA300F)

- By connecting the external capacitor unit CR-HUT (optional parts) to CN4, Hold-up time is extendable.

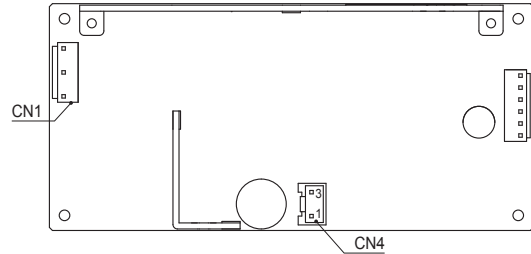


Fig.6.4 CN4 location (LHA150F-□-U1)

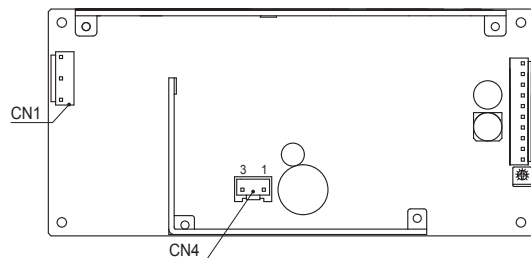


Fig.6.5 CN4 location (LHA300F-□-U1Y)

Table 6.8 Pin assignments of CN4 (LHA150F-□-U1, LHA300F-□-U1Y)

CN4	
Pin No.	Function
1	VC(-)
2	
3	VC(+)

Connector	Mating connector	Terminal
CN4	B2P3-VH-1	VHR-3N
		Chain : SVH-21T-P1.1
		Loose : BVH-21T-P1.1

(Mfr. J.S.T.)

■ Connection method

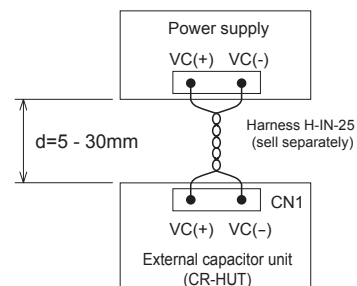


Fig.6.6 Connection method

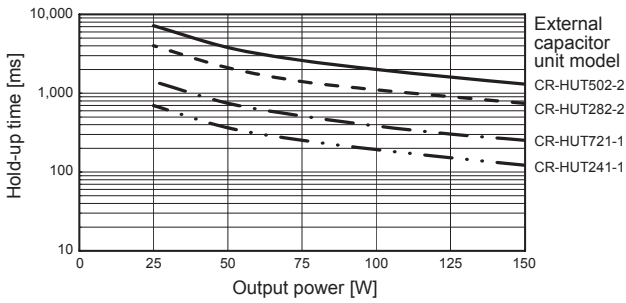


Fig. 6.7 Hold-up time by LHA150F-□-U1 (Reference data)

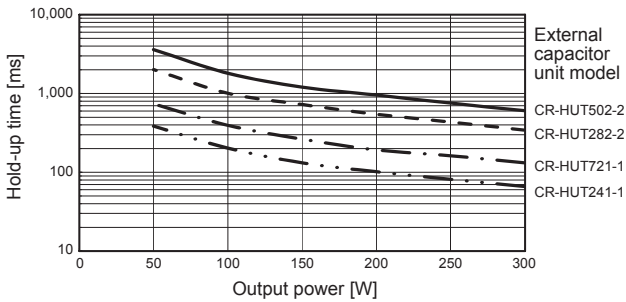


Fig. 6.8 Hold-up time by LHA300F-□-U1Y (Reference data)

●Caution

- Distance between the external capacitor unit and power supply unit must be secured more than 5mm.
- It must be 30mm or less, since the noise is generated from the wire which connects the external capacitor unit and power supply. It is necessary to twist the wire as short as possible.
- It is necessary to use wires which are rated for voltage of 600V or more.
- It must be used with the external capacitor unit (CR-HUT).
- For more information about the external capacitor unit and harness, please refer to the optional parts page.

●-Y

- Option -Y units can adjust the output voltage by attached potentiometer.
- Refer to the adjustable range to the table 6.2 and table 6.3.

■LHA30F, LHA50F, LHA75F, LHA100F

Table 6.9 Output voltage adjustment range

Output voltage	Output voltage adjustment range[V]
3.3V*	2.85 to 3.63
5V	4.5 to 5.5
12V	10.8 to 13.2
15V	13.5 to 16.5
24V	21.6 to 26.4
36V	32.4 to 39.6
48V	43.2 to 52.8

\* For some products, -Y is standard equipment.  
(LHA30F-3R3-Y, LHA50F-3R3-Y, LHA75F-3R3-Y)

■LHA150F, LHA300F

Table 6.10 Output voltage adjustment range

Output voltage	Output voltage adjustment range[V]
12V	11.4 to 13.2
24V	22.8 to 26.4
36V	34.2 to 39.6
48V	45.6 to 52.8

\*LHA300F, -Y is standard equipment.

- To increase output voltage, turn a built-in potentiometer clockwise. To decrease the output voltage, turn it counterclockwise.
- Please take care when you adjust output voltage by potentiometer, because there is possibility of electric shock and breakdown when contacting to other internal circuit by electrically conductive tool.
- LHA150F and LHA300F has two potentiometers. You can use only a output voltage potentiometer. Please confirm external view on a catalog.

## 6.2 Output side attaching external capacitor

- Depending on the capacitance of the external capacitor, resonance may occur due to ESR, ESL, and wiring inductance, so please be careful of ripple increase.
- If the external capacitor is too large, the power supply might not start up.

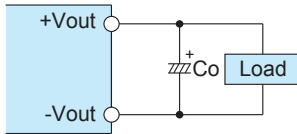


Fig.6.9 Output side external capacitor connection method

Table 6.11 Connectable External capacitor on the output side [ $\mu$ F]

Model Output voltage [V]	LHA30F	LHA50F	LHA75F	LHA100F	LHA150F	LHA300F
3.3	0 to 2800	0 to 6100	0 to 9200	-	-	-
5	0 to 1300	0 to 2800	0 to 9200	0 to 24000	-	-
12	0 to 1300	0 to 2800	0 to 4200	0 to 8700	0 to 6300	0 to 5600
15	0 to 1300	0 to 2800	0 to 4200	0 to 8700	-	-
24	0 to 920	0 to 1900	0 to 2800	0 to 6300	0 to 2800	0 to 4900
36	-	0 to 1100	0 to 1600	0 to 3500	0 to 1600	-
48	-	0 to 920	0 to 1200	0 to 2800	0 to 1000	0 to 1400

## 6.3 Others

- This power supply is the rugged PCB type. Do not drop conductive objects in the power supply.
- At light load, there remains high voltage inside the power supply for a few minutes after power OFF.  
Be careful of electric shock during maintenance.
- This power supply is manufactured by SMD technology. The stress to PCB like twisting or bending causes the defect of the unit, so handle the unit with care.
  - Tighten all the screws in the mounting holes.

Model	Mounting holes
LHA30F	2 positions
LHA50F, LHA75F, LHA100F, LHA150F, LHA300F	4 positions

- Install it so that PCB may become parallel to the clamp face.
- Avoid dropping unit.
- While turning on the electricity, and for a while after turning off, please don't touch the inside of power supply because some components could be hot.