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.
If the restart time of the short interruption power failure is less than 3 seconds, perform a thorough evaluation.

■A unit can operate under the input voltage dip with derating.
Table 1.1 shows the load factors that can be output.

Table 1.1 Load factor

Model	Input Voltage	
	100VAC→50VAC ✻	200VAC→100VAC
LHA10F	60%	100%
LHA15F	60%	100%
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).

● LHA10F, LHA15F, 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

● LHA10F

■Resistance for line filter is used for inrush current limiting.

● LHA15F, LHA30F, LHA50F, LHA75F, LHA100F, LHA150F, LHA300F

■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 output voltage drops at overcurrent, the average output current is reduced by hiccup operation of power supply.
Please contact us for details.

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

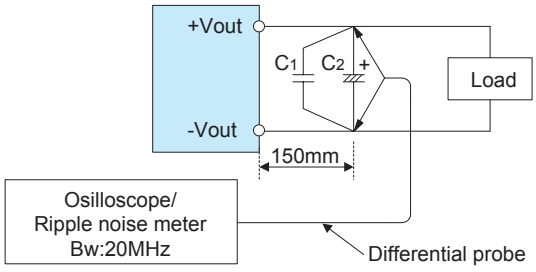
■In option -R2, overvoltage protection is deactivated by toggling ON/OFF signal of remote control.

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

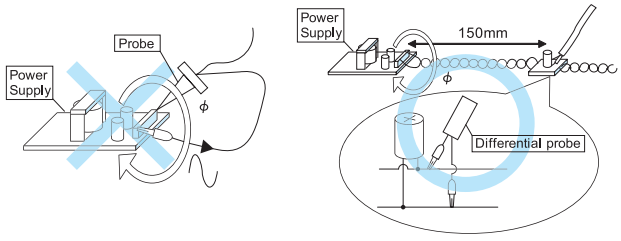
■Output ripple noise may be influenced by measurement environment, measuring method fig.1.1 is recommended.



C1 : Film capacitor 0.1μF
C2 : Aluminum electrolytic capacitor 22μF

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.



Bad example Good example

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.

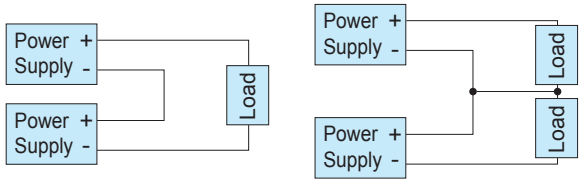


Fig.2.1 Examples of connecting in series operation

2.2 Parallel Operation

■Parallel operation is not possible.

■Redundancy operation is available by wiring as shown below.

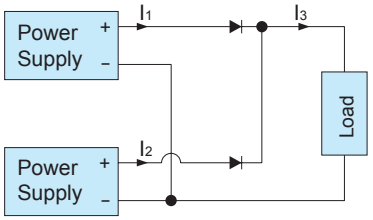


Fig.2.2 Example of redundancy operation

■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.

$I_3 \leqq$ the rated current value

3 Temperature Measurement Point

■Installation environment

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

Table 3.1 - 3.8 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 contact us for details.

■Maximum temperature of measurement points

Table 3.1 Maximum temperature of measurement points (LHA10F-3R3-Y, LHA10F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	3.3, 5, 12V	A	40%<Io≦100%	80	83
			Io≦40%	85	83
		B	70%<Io≦100%	75	75
			Io≦70%	85	83
		C	50%<Io≦100%	80	83
			Io≦50%	85	83
		D	50%<Io≦100%	80	77
			Io≦50%	85	83
		E	50%<Io≦100%	80	83
			Io≦50%	85	83
		F	40%<Io≦100%	77	77
			Io≦40%	85	83
	15, 24V	A	50%<Io≦100%	77	77
			Io≦50%	85	83
		B	70%<Io≦100%	80	80
			Io≦70%	85	83
		C	50%<Io≦100%	80	80
			Io≦50%	85	83
		D	70%<Io≦100%	78	80
			Io≦70%	84	83
		E	50%<Io≦100%	77	80
			Io≦50%	83	83
		F	50%<Io≦100%	77	77
			Io≦50%	83	83
Forced air	3.3 - 24V	A,B,C, D,E,F	Io≦100%	80	80

Table 3.2 Maximum temperature of measurement points (LHA15F-3R3-Y, LHA15F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	3.3, 5, 12V	A	40%<Io≦100%	75	80
			Io≦40%	85	85
		B	60%<Io≦100%	75	77
			Io≦60%	85	85
		C	40%<Io≦100%	77	83
			Io≦40%	87	85
		D	60%<Io≦100%	77	77
			Io≦60%	87	85
		E	40%<Io≦100%	77	80
			Io≦40%	85	85
		F	40%<Io≦100%	77	83
			Io≦40%	85	83
	15, 24V	A	60%<Io≦100%	77	77
			Io≦60%	83	83
		B	70%<Io≦100%	77	77
			Io≦70%	83	83
		C	70%<Io≦100%	85	80
			Io≦70%	89	85
		D	60%<Io≦100%	75	70
			Io≦60%	80	80
		E	60%<Io≦100%	80	77
			Io≦60%	83	83
		F	50%<Io≦100%	80	77
			Io≦50%	85	85
Forced air	3.3 - 24V	A,B,C, D,E,F	Io≦100%	80	80

Table 3.3 Maximum temperature of measurement points (LHA30F-3R3-Y, LHA30F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	3.3 - 24V	A	60%<Io≦100%	81	85
			Io≦60%	85	87
		B	60%<Io≦100%	81	83
			Io≦60%	85	85
		C	60%<Io≦100%	81	85
			Io≦60%	85	87
		D	60%<Io≦100%	86	84
			Io≦60%	86	82
		E	60%<Io≦100%	83	87
			Io≦60%	83	83
		F	60%<Io≦100%	83	85
			Io≦60%	87	87
Forced air	3.3 - 24V	A,B,C, D,E,F	70%<Io≦100%	75	75
			Io≦70%	75	75

Table 3.4 Maximum temperature of measurement points (LHA50F-3R3-Y, LHA50F-□)

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

*The maximum temperature of the LHA50F-15-S is 76℃.

Table 3.5 Maximum temperature of measurement points (LHA75F-3R3-Y, LHA75F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	3.3, 5V	A	20%<Io≦100%	76	78
			Io≦20%	85	77
		B	20%<Io≦100%	76	72
			Io≦20%	88	76
		C	20%<Io≦100%	74	81
			Io≦20%	84	80
		D	Io≦100%	75	71
		E	10%<Io≦100%	76	84
			Io≦10%	87	77
		F	10%<Io≦100%	75	78
			Io≦10%	85	81
	12 - 48V	A	20%<Io≦100%	83	73
			Io≦20%	88	76
		B	20%<Io≦100%	83	70
			Io≦20%	88	76
		C	20%<Io≦100%	81	72
			Io≦20%	86	77
		D	75%<Io≦100%	73	68
			Io≦75%	79	71
		E	Io≦100%	85	74
		F	75%<Io≦100%	80	66
			Io≦75%	80	73
Forced air	3.3 - 48V	A,B,C, D,E,F	70%<Io≦100%	75	75
			Io≦70%	75	75

Table 3.6 Maximum temperature of measurement points (LHA100F-□)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	5V	A	20%<Io≦100%	76	84
			Io≦20%	87	80
		B	20%<Io≦100%	72	77
			Io≦20%	82	76
		C	20%<Io≦100%	73	85
			Io≦20%	84	80
		D	Io≦100%	75	73
		E	75%<Io≦100%	66	88
			Io≦75%	81	80
		F	20%<Io≦100%	75	85
			Io≦20%	85	81
	12 - 48V	A	25%<Io≦100%	82	78
			Io≦25%	85	78
		B	25%<Io≦100%	79	73
			Io≦25%	88	76
		C	25%<Io≦100%	79	76
			Io≦25%	86	77
		D	10%<Io≦100%	80	70
			Io≦10%	86	74
		E	20%<Io≦100%	81	80
			Io≦20%	88	83
		F	20%<Io≦100%	80	72
			Io≦20%	86	76
Forced air	5 - 48V	A,B,C, D,E,F	70%<Io≦100%	75	75
			Io≦70%	75	75

Table 3.7 Maximum temperature of measurement points (LHA150F-□)

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

Table 3.8 Maximum temperature of measurement points (LHA300F-□-Y)

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

4 Life expectancy and warranty

■Life Expectancy

Table 4.1 Life Expectancy (LHA10F-3R3-Y, LHA10F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,B,C, D,E	Ta=45℃ or less	10years or more	6years
			Ta=55℃	5years	3years
		F	Ta=40℃ or less	10years or more	10years or more
			Ta=50℃	7years	5years
	15, 24V	A,C,E,F	Ta=45℃ or less	10years or more	8years
			Ta=55℃	5years	4years
		B,D	Ta=50℃ or less	10years or more	8years
			Ta=60℃	5years	4years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=60℃ or less	5years	5years
			Ta=70℃	5years	3years

Table 4.2 Life Expectancy (LHA15F-3R3-Y, LHA15F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,C,E,F	Ta=40℃ or less	10years or more	8years
			Ta=50℃	6years	4years
		B,D	Ta=45℃ or less	10years or more	7years
			Ta=55℃	6years	3years
	15, 24V	A,D,E,F	Ta=45℃ or less	10years or more	10years or more
			Ta=55℃	8years	5years
		B,C	Ta=50℃ or less	10years or more	9years
			Ta=60℃	6years	4years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=60℃ or less	5years	5years
			Ta=70℃	5years	3years

Table 4.3 Life Expectancy (LHA30F-3R3-Y, LHA30F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life Expectancy	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,B,C, D,E,F	Ta=40℃ or less	10years or more	6years
			Ta=50℃	8years	3years
	15 - 24V		Ta=40℃ or less	10years or more	10years or more
			Ta=50℃	9years	5years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=50℃ or less	5years	5years
			Ta=60℃	5years	3years

Table 4.4 Life Expectancy (LHA50F-3R3-Y, LHA50F-□)

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

Table 4.5 Life Expectancy (LHA75F-3R3-Y, LHA75F-□)

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

Table 4.6 Life Expectancy (LHA100F-□)

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

Table 4.7 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℃ or less	10years or more	9years
			Ta=40℃	10years or more	4years
		D	Ta=20℃ or less	10years or more	10years or more
			Ta=30℃	10years or more	10years or more
		E,F	Ta=15℃ or less	10years or more	10years or more
			Ta=25℃	10years or more	7years
	24 - 48V	A,B,C	Ta=40℃ or less	10years or more	6years
			Ta=50℃	6years	3years
		D,E	Ta=30℃ or less	10years or more	10years or more
			Ta=40℃	10years or more	6years
		F	Ta=20℃ or less	10years or more	10years or more
			Ta=30℃	10years or more	10years or more
Forced air	12 - 48V	A,B,C, D,E,F	Ta=50℃ or less	5years	5years
			Ta=60℃	5years	3years

Table 4.8 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℃ or less	10years or more	7years
			Ta=35℃	10years or more	3years
		D,E	Ta=20℃ or less	10years or more	10years or more
			Ta=30℃	10years or more	5years
		F	Ta=10℃ or less	10years or more	10years or more
			Ta=20℃	10years or more	10years or more
	24 - 48V	A,B,C	Ta=40℃ or less	10years or more	7years
			Ta=50℃	5years	3years
		D	Ta=35℃ or less	10years or more	10years or more
			Ta=45℃	8years	5years
		E,F	Ta=20℃ or less	10years or more	10years or more
			Ta=30℃	10years or more	10years or more
Forced air	12 - 48V	A,B,C, D,E,F	Ta=50℃ or less	5years	5years
			Ta=60℃	5years	3years

■Warranty

Table 4.9 Warranty (LHA10F-3R3-Y, LHA10F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,B,C, D,E	Ta=45℃ or less	5years	5years
			Ta=55℃	5years	3years
		F	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
	15, 24V	A,C,E,F	Ta=45℃ or less	5years	5years
			Ta=55℃	5years	3years
		B,D	Ta=50℃ or less	5years	5years
			Ta=60℃	5years	3years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=60℃ or less	5years	5years
			Ta=70℃	5years	3years

Table 4.10 Warranty (LHA15F-3R3-Y, LHA15F-□)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,C,E,F	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
		B,D	Ta=45℃ or less	5years	5years
			Ta=55℃	5years	3years
	15, 24V	A,D,E,F	Ta=45℃ or less	5years	5years
			Ta=55℃	5years	3years
		B,C	Ta=50℃ or less	5years	5years
			Ta=60℃	5years	3years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=60℃ or less	5years	5years
			Ta=70℃	5years	3years

Table 4.11 Warranty (LHA30F-3R3-Y, LHA30F-□)

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

Table 4.12 Warranty (LHA50F-3R3-Y, 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℃ or less	5years	5years
			Ta=50℃	5years	3years
		B,D,F	Ta=35℃ or less	5years	5years
			Ta=45℃	5years	3years
		E	Ta=30℃ or less	5years	5years
			Ta=40℃	5years	3years
	12, 15V	A	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
		B,C,D,F	Ta=35℃ or less	5years	5years
			Ta=45℃	5years	3years
		E	Ta=30℃ or less	5years	5years
			Ta=40℃	5years	3years
Forced air	3.3 - 48V	A,B,C, D,E,F	Ta=50℃ or less	5years	5years
			Ta=60℃	5years	3years

Table 4.13 Warranty (LHA75F-3R3-Y, 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℃ or less	5years	5years
			Ta=40℃	5years	3years
		D,E,F	Ta=25℃ or less	5years	5years
			Ta=35℃	5years	3years
	12 - 48V	A,B,C	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
		D	Ta=25℃ or less	5years	5years
			Ta=35℃	5years	3years
		E,F	Ta=35℃ or less	5years	5years
			Ta=45℃	5years	3years
Forced air	3.3 - 48V	A,B,C, D,E,F	Ta=50℃ or less	5years	5years
			Ta=60℃	5years	3years

Table 4.14 Warranty (LHA100F-□)

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

Table 4.15 Warranty (LHA150F-□)

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

Table 4.16 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℃ or less	5years	5years
			Ta=35℃	5years	3years
		D,E	Ta=20℃ or less	5years	5years
			Ta=30℃	5years	3years
		F	Ta=10℃ or less	5years	5years
			Ta=20℃	5years	3years
	24, 48V	A,B,C	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
		D	Ta=35℃ or less	5years	5years
			Ta=45℃	5years	3years
		E,F	Ta=20℃ or less	5years	5years
			Ta=30℃	5years	3years
Forced air	12 - 48V	A,B,C, D,E,F	Ta=50℃ or less	5years	5years
			Ta=60℃	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

● -C

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

● -G (LHA30F, LHA50F, LHA75F, LHA100F, LHA150F, LHA300F)

・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 (ACIN 240V 60Hz)	0.15mA max
Conducted Noise	N/A
Output Ripple Noise	Please contact us for details about Ripple Noise

● -J4

・Option -J4 units come with EP connectors (Mfr. TE Connectivity) instead of VH conectors (Mfr. J.S.T.).
Please contact us for details about external view.

■ LHA10F, LHA15F

Connector		Mating connector	Terminal
CN1	1-1123724-3	1-1123722-5	Chain : 1123721-1
			Loose : 1318912-1
CN2	1-1123723-2	1-1123722-2	Chain : 1123721-1
			Loose : 1318912-1

(Mfr. TE Conncectivity)

■ LHA30F, LHA50F

Connector		Mating connector	Terminal
CN1	1-1123724-3	1-1123722-5	Chain : 1123721-1
			Loose : 1318912-1
CN2	1-1123723-4	1-1123722-4	Chain : 1123721-1
			Loose : 1318912-1

(Mfr. TE Conncectivity)

■ LHA75F, LHA100F, LHA150F

Connector		Mating connector	Terminal
CN1	1-1123724-3	1-1123722-5	Chain : 1123721-1
			Loose : 1318912-1
CN2	1-1123723-6	1-1123722-6	Chain : 1123721-1
			Loose : 1318912-1

(Mfr. TE Conncectivity)

■ LHA300F

Connector		Mating connector	Terminal
CN1	1-1123724-3	1-1123722-5	Chain : 1123721-1
			Loose : 1318912-1
CN2	1-1123723-0	1-1123722-0	Chain : 1123721-1
			Loose : 1318912-1

(Mfr. TE Conncectivity)

● -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.

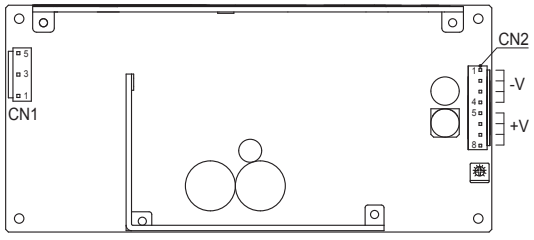


Fig.6.1 Example of option -J5

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]	
	ACIN 100V	ACIN 230V
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. (Only LHA150F, LHA300F)

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

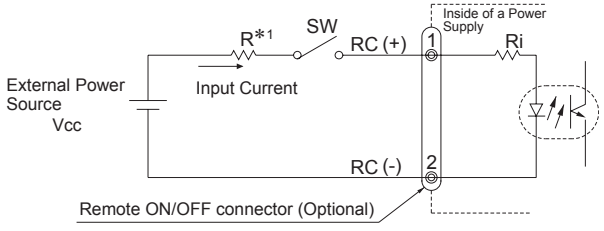


Fig.6.2 Example of using a remote ON/OFF circuit

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

✻1 If the output of an external power source (Vcc) 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.

$$R[\Omega]=\frac{Vcc-(1.1+Ri\times 0.005)}{0.005}$$

✻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

・-S indicates a type with chassis.

・In optional -S case, “Derating”, “Maximum temperature of measurement points”, “Life Expectancy” and “Warranty” is same as standard model.

・LHA10F and LHA15F are different from standard models. Please contact us.

● -SN

・-SN indicates a type with chassis and cover (Refer to external view).

・In optional -SN case, please refer to “Derating”. Also “Maximum temperature of measurement points”, “Life expectancy” and “Warranty” is different from standard models.
Please refer to Table 6.3 to Table 6.26.

Table 6.3 Maximum temperature of measurement points
(LHA10F-3R3-SNY, LHA10F-□-SN)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	3.3, 5, 12V	A	20%<Io≦100%	74	83
			Io≦20%	80	83
		B	20%<Io≦100%	74	83
			Io≦20%	80	83
		C	20%<Io≦100%	74	83
			Io≦20%	80	83
		D	20%<Io≦100%	74	83
			Io≦20%	80	83
		E	20%<Io≦100%	74	83
			Io≦20%	80	83
	15, 24V	A	50%<Io≦100%	78	78
			Io≦50%	83	83
		B	60%<Io≦100%	78	78
			Io≦60%	83	83
		C	50%<Io≦100%	80	78
			Io≦50%	87	83
		D	60%<Io≦100%	78	78
			Io≦60%	83	83
		E	50%<Io≦100%	78	78
			Io≦50%	83	83
Forced air	3.3 - 24V	A,B,C, D,E,F	Io≦100%	80	80

Table 6.4 Maximum temperature of measurement points
(LHA15F-3R3-SNY, LHA15F-□-SN)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	3.3, 5, 12V	A	30%<Io≦100%	75	78
			Io≦30%	83	85
		B	50%<Io≦100%	75	81
			Io≦50%	83	85
		C	30%<Io≦100%	81	83
			Io≦30%	85	85
		D	50%<Io≦100%	75	75
			Io≦50%	85	85
		E	30%<Io≦100%	75	83
			Io≦30%	81	85
	15, 24V	A	60%<Io≦100%	75	73
			Io≦60%	86	83
		B	60%<Io≦100%	73	73
			Io≦60%	83	83
		C	60%<Io≦100%	80	73
			Io≦60%	87	83
		D	60%<Io≦100%	73	73
			Io≦60%	83	83
		E	60%<Io≦100%	76	73
			Io≦60%	86	85
Forced air	3.3 - 24V	A,B,C, D,E,F	Io≦100%	80	80

Table 6.5 Maximum temperature of measurement points
(LHA30F-3R3-SNY, LHA30F-□-SN)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	3.3, 12, 15, 24V	A	75%<Io≦100%	77	69
			40%<Io≦75%	83	79
			Io≦40%	86	85
		B	75%<Io≦100%	79	66
			40%<Io≦75%	83	78
			Io≦40%	88	84
		C	75%<Io≦100%	70	70
			40%<Io≦75%	81	81
			Io≦40%	85	86
		D	75%<Io≦100%	74	61
			40%<Io≦75%	83	76
			Io≦40%	87	82
		E	75%<Io≦100%	76	78
			40%<Io≦75%	81	81
			Io≦40%	84	87
	5V	A	75%<Io≦100%	85	80
			40%<Io≦75%	87	83
			Io≦40%	86	83
		B	75%<Io≦100%	85	74
			40%<Io≦75%	87	81
			Io≦40%	88	83
		C	75%<Io≦100%	75	81
			40%<Io≦75%	83	84
			Io≦40%	85	85
		D	75%<Io≦100%	84	70
			40%<Io≦75%	87	79
			Io≦40%	87	81
		E	75%<Io≦100%	79	85
			40%<Io≦75%	82	85
			Io≦40%	84	87
Forced air	3.3 - 24V	A,B,C, D,E,F	70%<Io≦100%	75	75
			Io≦70%	75	75

Table 6.6 Maximum temperature of measurement points
(LHA50F-3R3-SNY, LHA50F-□-SN)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	3.3, 12, 15, 24, 36, 48V	A	75%<Io≦100%	77	72
			40%<Io≦75%	86	84
			Io≦40%	89	87
		B	75%<Io≦100%	73	71
			40%<Io≦75%	84	82
			Io≦40%	88	86
		C	75%<Io≦100%	77	73
			40%<Io≦75%	85	83
			Io≦40%	88	86
		D	75%<Io≦100%	82	64
			40%<Io≦75%	87	80
			Io≦40%	90	83
		E	75%<Io≦100%	70	73
			25%<Io≦75%	80	82
			Io≦25%	84	87
	5V	A	75%<Io≦100%	69	87
			40%<Io≦75%	82	86
			Io≦40%	86	87
		B	75%<Io≦100%	68	87
			40%<Io≦75%	81	85
			Io≦40%	85	87
		C	75%<Io≦100%	73	84
			40%<Io≦75%	82	83
			Io≦40%	84	86
		D	75%<Io≦100%	81	80
			40%<Io≦75%	85	81
			Io≦40%	89	85
		E	75%<Io≦100%	66	87
			25%<Io≦75%	77	83
			Io≦25%	83	87
Forced air	3.3 - 48V	A,B,C, D,E,F	70%<Io≦100%	75	75
			Io≦70%	75	75

Table 6.7 Maximum temperature of measurement points
(LHA75F-3R3-SNY, LHA75F-□-SN)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	3.3, 5V	A	75%<Io≦100%	81	72
			25%<Io≦75%	86	74
			Io≦25%	88	74
		B	75%<Io≦100%	80	61
			25%<Io≦75%	82	64
			Io≦25%	89	71
		C	75%<Io≦100%	75	65
			25%<Io≦75%	81	70
			Io≦25%	84	72
		D	75%<Io≦100%	79	53
			20%<Io≦75%	80	60
			Io≦20%	83	68
		E	75%<Io≦100%	77	70
			20%<Io≦75%	82	75
			Io≦20%	86	76
	12 - 48V	A	75%<Io≦100%	87	66
			25%<Io≦75%	86	70
			Io≦25%	88	74
		B	75%<Io≦100%	86	61
			25%<Io≦75%	87	67
			Io≦25%	91	73
		C	75%<Io≦100%	76	60
			25%<Io≦75%	79	67
			Io≦25%	84	73
		D	75%<Io≦100%	71	46
			20%<Io≦75%	78	61
			Io≦20%	82	67
		E	75%<Io≦100%	87	74
			20%<Io≦75%	84	76
			Io≦20%	88	79
Forced air	3.3 - 48V	A,B,C, D,E,F	70%<Io≦100%	75	75
			Io≦70%	75	75

Table 6.8 Maximum temperature of measurement points (LHA100F-□-SN)

Cooling Method	Voltage	Mounting Method	Load factor	Maximum temperature [℃]	
				①:Capacitor	②:Capacitor
Convection	5V	A	75%<Io≦100%	76	85
			25%<Io≦75%	82	80
			Io≦25%	85	74
		B	75%<Io≦100%	70	74
			25%<Io≦75%	78	74
			Io≦25%	83	72
		C	75%<Io≦100%	76	79
			25%<Io≦75%	80	76
			Io≦25%	82	73
		D	75%<Io≦100%	80	74
			25%<Io≦75%	81	70
			Io≦25%	83	70
		E	75%<Io≦100%	73	86
			25%<Io≦75%	80	82
			Io≦25%	83	78
	12 - 48V	A	75%<Io≦100%	82	64
			25%<Io≦75%	84	70
			Io≦25%	86	73
		B	75%<Io≦100%	75	60
			25%<Io≦75%	80	68
			Io≦25%	82	70
		C	75%<Io≦100%	76	63
			25%<Io≦75%	80	70
			Io≦25%	82	72
		D	75%<Io≦100%	70	49
			25%<Io≦75%	75	59
			Io≦25%	81	68
		E	75%<Io≦100%	82	75
			25%<Io≦75%	81	77
			Io≦25%	84	78
Forced air	5 - 48V	A,B,C, D,E,F	70%<Io≦100%	75	75
			Io≦70%	75	75

Table 6.9 Maximum temperature of measurement points (LHA150F-□-SN)

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

Table 6.10 Maximum temperature of measurement points (LHA300F-□-SNY)

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

■Life expectancy

Table 6.11 Life expectancy (LHA10F-3R3-SNY, LHA10F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life expectancy	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,C	Ta=35℃ or less	10years or more	6years
			Ta=45℃	5years	3years
		B,D,E	Ta=40℃ or less	10years or more	6years
			Ta=50℃	5years	3years
	15, 24V	A,C,E	Ta=45℃ or less	10years or more	9years
			Ta=55℃	6years	4years
		B,D	Ta=45℃ or less	10years or more	10years or more
			Ta=55℃	7years	6years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=60℃ or less	5years	5years
			Ta=70℃	5years	3years

Table 6.12 Life expectancy (LHA15F-3R3-SNY, LHA15F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life expectancy	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,C,E	Ta=35℃ or less	10years or more	7years
			Ta=45℃	7years	3years
		B,D	Ta=40℃ or less	10years or more	8years
			Ta=50℃	8years	4years
	15, 24V	A,C,E	Ta=40℃ or less	10years or more	10years or more
			Ta=50℃	10years or more	6years
		B,D	Ta=45℃ or less	10years or more	10years or more
			Ta=55℃	10years or more	8years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=60℃ or less	5years	5years
			Ta=70℃	5years	3years

Table 6.13 Life expectancy (LHA30F-3R3-SNY, LHA30F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life expectancy	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,B,C, D,E	Ta=30℃ or less	10years or more	7years
			Ta=40℃	10years or more	3years
	15, 24V		Ta=30℃ or less	10years or more	10years or more
			Ta=40℃	10years or more	7years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years

Table 6.14 Life expectancy (LHA50F-3R3-SNY, LHA50F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life expectancy	
				Io≦75%	75%<Io≦100%
Convection	3.3, 12, 24, 36, 48V	A,C,D	Ta=30℃ or less	10years or more	10years or more
			Ta=40℃	10years or more	6years
		B	Ta=25℃ or less	10years or more	10years or more
			Ta=35℃	10years or more	10years or more
		E	Ta=20℃ or less	10years or more	10years or more
			Ta=30℃	10years or more	8years
	5, 15V	A,B,D	Ta=25℃ or less	10years or more	10years or more
			Ta=35℃	10years or more	5years
		C	Ta=30℃ or less	10years or more	10years or more
			Ta=40℃	10years or more	6years
		E	Ta=20℃ or less	10years or more	10years or more
			Ta=30℃	10years or more	10years or more
Forced air	3.3 - 48V	A,B,C, D,E,F	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years

Table 6.15 Life expectancy (LHA75F-3R3-SNY, LHA75F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life expectancy	
				Io≦75%	75%<Io≦100%
Convection	3.3, 5V	A,B,C	Ta=20℃ or less	10years or more	10years or more
			Ta=30℃	10years or more	6years
		D,E	Ta=15℃ or less	10years or more	10years or more
			Ta=25℃	10years or more	6years
	12 - 48V	A,B	Ta=30℃ or less	10years or more	6years
			Ta=40℃	5years	3years
		C,E	Ta=25℃ or less	10years or more	6years
			Ta=35℃	6years	3years
		D	Ta=15℃ or less	10years or more	10years or more
			Ta=25℃	10years or more	9years
Forced air	3.3 - 48V	A,B,C, D,E,F	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years

Table 6.16 Life expectancy (LHA100F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life expectancy	
				Io≦75%	75%<Io≦100%
Convection	5V	A,B,C, D,E	Ta=20℃ or less	10years or more	7years
			Ta=30℃	8years	3years
	12 - 48V	A,B, C,E	Ta=25℃ or less	10years or more	10years or more
			Ta=35℃	9years	5years
		D	Ta=15℃ or less	10years or more	10years or more
			Ta=25℃	10years or more	10years or more
Forced air	5 - 48V	A,B,C, D,E,F	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years

Table 6.17 Life expectancy (LHA150F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Life expectancy	
				Io≦75%	75%<Io≦100%
Convection	12V	A,B,C	Ta=20℃ or less	10years or more	10years or more
			Ta=30℃	10years or more	3years
		D	Ta=10℃ or less	10years or more	10years or more
			Ta=20℃	10years or more	10years or more
		E	Ta=15℃ or less	10years or more	9years
			Ta=25℃	9years	4years
	24 - 48V	A,B,C	Ta=25℃ or less	10years or more	9years
			Ta=35℃	9years	4years
		D	Ta=10℃ or less	10years or more	10years or more
			Ta=20℃	10years or more	10years or more
		E	Ta=20℃ or less	10years or more	10years or more
			Ta=30℃	10years or more	7years
Forced air	12 - 48V	A,B,C, D,E,F	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years

Table 6.18 Life expectancy (LHA300F-□-SNY)

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

■Warranty

Table 6.19 Warranty (LHA10F-3R3-SNY, LHA10F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,C	Ta=35℃ or less	5years	5years
			Ta=45℃	5years	3years
		B,D,E	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
	15, 24V	A,B,C, D,E	Ta=45℃ or less	5years	5years
			Ta=55℃	5years	3years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=60℃ or less	5years	5years
			Ta=70℃	5years	3years

Table 6.20 Warranty (LHA15F-3R3-SNY, LHA15F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io≦75%	75%<Io≦100%
Convection	3.3 - 12V	A,C,E	Ta=35℃ or less	5years	5years
			Ta=45℃	5years	3years
		B,D	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
	15, 24V	A,C,E	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
		B,D	Ta=45℃ or less	5years	5years
			Ta=55℃	5years	3years
Forced air	3.3 - 24V	A,B,C, D,E,F	Ta=60℃ or less	5years	5years
			Ta=70℃	5years	3years

Table 6.21 Warranty (LHA30F-3R3-SNY, LHA30F-□-SN)

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

Table 6.22 Warranty (LHA50F-3R3-SNY, LHA50F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io≦75%	75%<Io≦100%
Convection	3.3, 12, 24, 36, 48V	A,C,D	Ta=30℃ or less	5years	5years
			Ta=40℃	5years	3years
		B	Ta=25℃ or less	5years	5years
			Ta=35℃	5years	3years
		E	Ta=20℃ or less	5years	5years
			Ta=30℃	5years	3years
	5, 15V	A,B,D	Ta=25℃ or less	5years	5years
			Ta=35℃	5years	3years
		C	Ta=30℃ or less	5years	5years
			Ta=40℃	5years	3years
		E	Ta=20℃ or less	5years	5years
			Ta=30℃	5years	3years
Forced air	3.3 - 48V	A,B,C, D,E,F	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years

Table 6.23 Warranty (LHA75F-3R3-SNY, LHA75F-□-SN)

Cooling Method	Voltage	Mounting Method	Average ambient temperature (year)	Warranty	
				Io≦75%	75%<Io≦100%
Convection	3.3, 5V	A,B,C	Ta=20℃ or less	5years	5years
			Ta=30℃	5years	3years
		D,E	Ta=15℃ or less	5years	5years
			Ta=25℃	5years	3years
	12 - 48V	A,B	Ta=30℃ or less	5years	5years
			Ta=40℃	5years	3years
		C,E	Ta=25℃ or less	5years	5years
			Ta=35℃	5years	3years
		D	Ta=15℃ or less	5years	5years
			Ta=25℃	5years	3years
Forced air	3.3 - 48V	A,B,C, D,E,F	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years

Table 6.24 Warranty (LHA100F-□-SN)

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

Table 6.25 Warranty (LHA150F-□-SN)

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

Table 6.26 Warranty (LHA300F-□-SNY)

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

● -T (LHA300F)

- Option -T units has changed the I /O interface from the connector to the terminal block (M3.5) Type.
- Refer to fig.6.3 for terminal arrangement.
- The size specification is different from standard model. Please contact us for details.

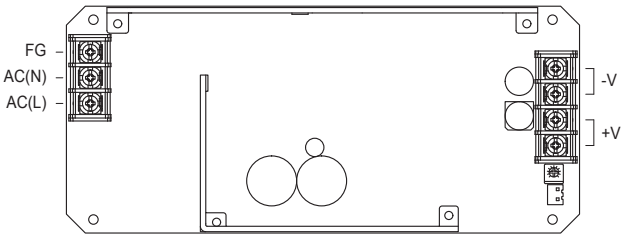


Fig.6.3 Example of option -T

● -T4 (LHA300F)

- Option -T4 units has changed the I/O interface from the connector to the Push-in terminal block Type.
- Refer to fig.6.4 for terminal arrangement.
- The size specification is different from standard model. Please contact us for details.

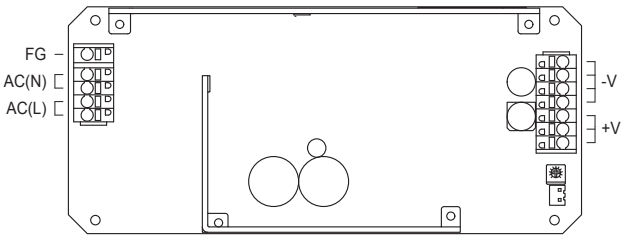


Fig.6.4 Example of option -T4

- Table 6.27 is the recommended Ferrule terminals.
  Table 6.28 is the applicable wire size for the solid wire and the stranded wire.

Table6.27 Recommended Ferrule terminals

Type	Manufacturer	Wire size	Model	Crimp tool
Square type	Phoenix Contact	AWG 16	AI1.5-10BK	CRIMPFOX UD6
		AWG 18	AI1-10RD	
		AWG 20	AI0.5-10WH	
		AWG 22	AI0.34-10TQ	
Round type	Nichifu	AWG 16 - 22	TC-1.25-11T	NH32

Table6.28 Applicable wire size (Solid wire,Stranded wire)

Wire size	AWG 12 - 24
Wire insulation strip length	9mm - 11mm

Fig.6.5, fig6.6 and fig.6.7 is the how to connect/release the wire.

・How to connect the Ferrule terminals and the solid wire

Step1: Insert the wire until the electrode is not visible. (Refer to the fig.6.5(a).)
Inserting a flat-blade screwdriver into the release hole makes it easier to insert. (Refer to the fig.6.5(b).)

Step2: Pull the wire lightly in order to make sure it is fixed.

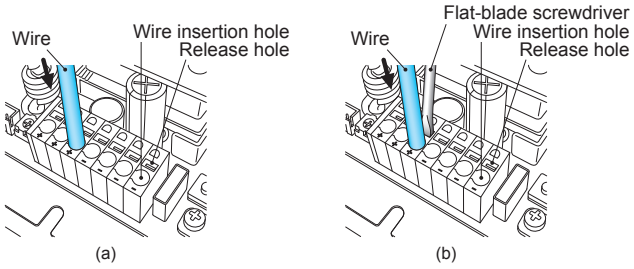


Fig.6.5 Connecting method of Ferrule terminal and Solid wire

・How to connect the stranded wire

Step1: Insert a flat-blade screwdriver into the release hole. (Refer to the fig.6.6(a).)

Step2: Insert the wire until the electrode is not visible with the flat-blade screwdriver inserted in the release hole. (Refer to the fig.6.6(b).)

Step3: Remove the flat-blade screwdriver from the release hole. (Refer to the fig.6.6(c).)

Step4: Pull the wire lightly in order to make sure it is fixed.

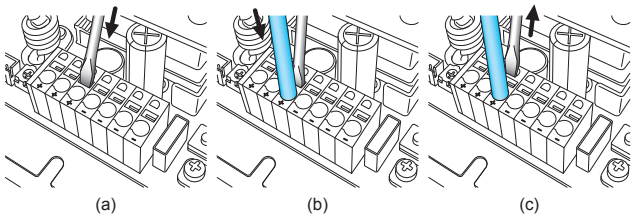


Fig.6.6 Connecting method of Stranded wire

・How to release the Ferrule terminal, Solid wire and Stranded wire

Step1: Insert a flat-blade screwdriver into the release hole. (Refer to the fig.6.7(a).)

Step2: Remove the wire with the flat-blade screwdriver inserted in the release hole. (Refer to the fig.6.7(b).)

Step3: Remove the flat-blade screwdriver from the release hole. (Refer to the fig.6.7(c).)

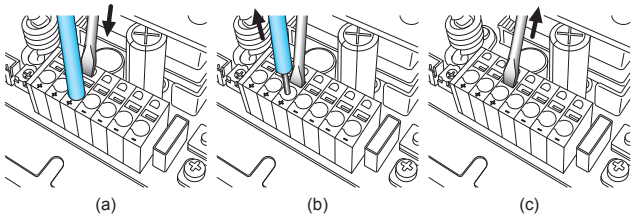


Fig.6.7 Releasing method of Ferrule terminal, Solid wire and Stranded wire

● -U1 (LHA150F,LHA300F)

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

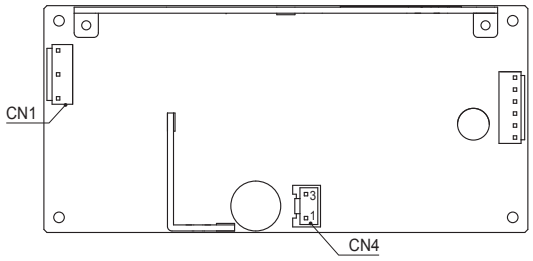


Fig.6.8 CN4 location (LHA150F-□-U1)

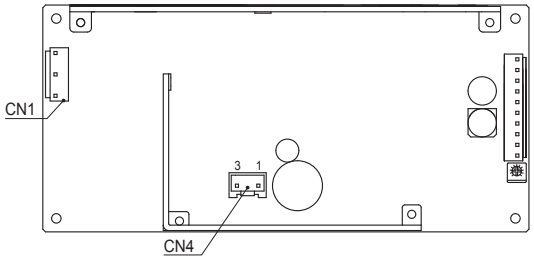


Fig.6.9 CN4 location (LHA300F-□-U1Y)

Table 6.29 Pin assignments of CN4 (LHA150F-□-U1, LHA300F-□-U1Y)

CN4

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

Connector		Mating connector	Terminal
CN4	BH2P3-VH-1	VHR-3N	Chain : SVH-21T-P1.1
			Loose : BVH-21T-P1.1

(Mfr. J.S.T.)

■Connection method

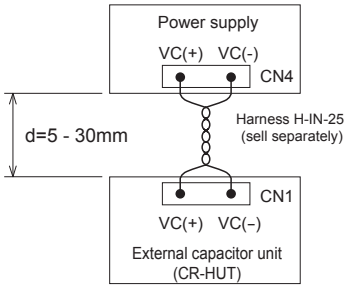


Fig.6.10 Connection method

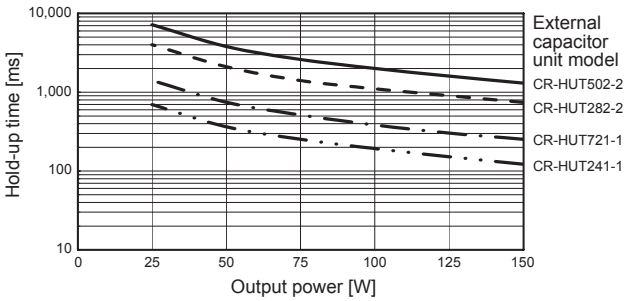


Fig. 6.11 Hold-up time by LHA150F-□-U1 (Reference data)

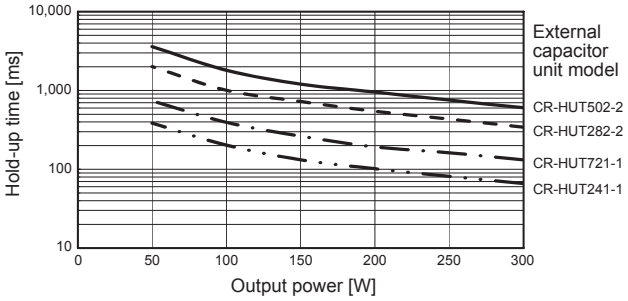


Fig. 6.12 Hold-up time by LHA300F-□-U1Y (Reference data)

●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 (H-IN-25), 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 6.30 and table 6.31.

■LHA10F,LHA15F,LHA30F,LHA50F,LHA75F,LHA100F

Table 6.30 Output voltage adjustment range

Output voltage	Output voltage adjustment range[V]
3.3V ＊1	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 ＊2	32.4 to 39.6
48V ＊2	43.2 to 52.8

＊1 For some products, -Y is standard equipment.
(LHA10F-3R-3Y, LHA15F-3R3-Y, LHA30F-3R3-Y, LHA50F-3R3-Y, LHA75F-3R3-Y)
＊2 Only for some models.
(LHA50F, LHA75F, LHA100F)

■LHA150F, LHA300F

Table 6.31 Output voltage adjustment range

Output voltage ＊1	Output voltage adjustment range[V]
12V	11.4 to 13.2
24V	22.8 to 26.4
36V ＊2	34.2 to 39.6
48V	45.6 to 52.8

＊1 LHA300F, -Y is standard equipment.
＊2 Only for LHA150F.

■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.

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.

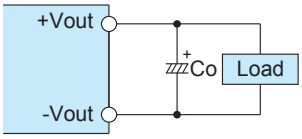


Fig.6.13 Output side external capacitor connection method

Table 6.32 Connectable External capacitor on the output side [μF]
(LHA10F, LHA15F, LHA30F, LHA50F)

Model / Output voltage	LHA10F	LHA15F	LHA30F	LHA50F
3.3V	0 to 3000	0 to 4000	0 to 2800	0 to 6100
5V	0 to 3000	0 to 4000	0 to 1300	0 to 2800
12V	0 to 1500	0 to 2000	0 to 1300	0 to 2800
15V	0 to 1500	0 to 2000	0 to 1300	0 to 2800
24V	0 to 1000	0 to 1500	0 to 920	0 to 1900
36V	-	-	-	0 to 1100
48V	-	-	-	0 to 920

Table 6.33 Connectable External capacitor on the output side [μF]
(LHA75F, LHA100F, LHA150F, LHA300F)

Model / Output voltage	LHA75F	LHA100F	LHA150F	LHA300F
3.3V	0 to 9200	-	-	-
5V	0 to 9200	0 to 240000	-	-
12V	0 to 4200	0 to 8700	0 to 6300	0 to 5600
15V	0 to 4200	0 to 8700	-	-
24V	0 to 2800	0 to 6300	0 to 2800	0 to 4900
36V	0 to 1600	0 to 1600	0 to 1600	-
48V	0 to 1200	0 to 1000	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.

・Please tighten screws in all mounting holes.

Model	Mounting holes
LHA10F, LHA15F, 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.