# AC-DC Power Supplies Open Frame Instruction Manual

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# 1 Function

# 1.1 Input voltage range

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- ■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.

Model	Input Voltage					
Model	100VAC $\rightarrow$ 50VAC *	200VAC→100VAC				
LHA10F	60%	100%				
LHA15F	60%	100%				
LHA30F	50%	100%				
LHA50F	50%	100%				
LHA75F	-	100%				
LHA100F	-	100%				
LHA150F	-	100%				
LHA300F	-	100%				

Table 1.1 Load factor

\*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.

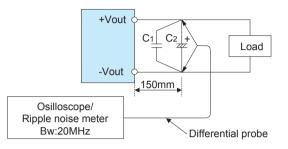
# 1.5 Output voltage adjustment range

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

# 1.6 Output ripple and ripple noise

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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.

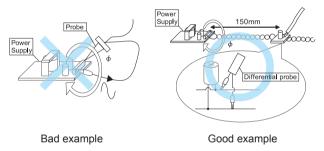


Fig.1.2. Example of measuring output ripple and ripple noise

### 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.

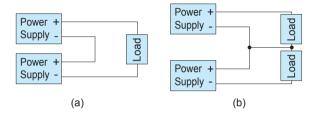


Fig.2.1 Examples of connecting in series operation

# 2.2 Parallel Operation

■Parallel operation is not possible.

Redundancy operation is available by wiring as shown below.

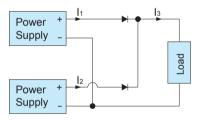


Fig.2.2 Example of redundancy operation

Even a slight difference in output voltage can affect the balance between the values of I<sub>1</sub> and I<sub>2</sub>.

Please make sure that the value of  $I_3$  does not exceed the rated current of a power supply.

 $I_3 \leq$  the rated current value

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# 3 Temperature Measurement Point

#### Installation environment

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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

Cooling	Voltage	Mounting	Load factor	Maximum ter	nperature [℃]									
Method	vollage	Method	Load lactor	1):Capacitor	(2):Capacitor									
		А	40% <lo≦100%< td=""><td>80</td><td>83</td></lo≦100%<>	80	83									
		A	lo≦40%	85	83									
		В	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75									
		D	lo≦70%	85	83									
		С	50% <lo≦100%< td=""><td>80</td><td>83</td></lo≦100%<>	80	83									
	3.3, 5,	C	lo≦50%	85	83									
	12V	D	50% <lo≦100%< td=""><td>80</td><td>77</td></lo≦100%<>	80	77									
		D	lo≦50%	85	83									
		Е	50% <lo≦100%< td=""><td>80</td><td>83</td></lo≦100%<>	80	83									
		E	lo≦50%	85	83									
		F	40% <lo≦100%< td=""><td>77</td><td>77</td></lo≦100%<>	77	77									
0 "			lo≦40%	85	83									
Convection		А	50% <lo≦100%< td=""><td>77</td><td>77</td></lo≦100%<>	77	77									
			lo≦50%	85	83									
		В	70% <lo≦100%< td=""><td>80</td><td>80</td></lo≦100%<>	80	80									
											Б	lo≦70%	85	83
		С	50% <lo≦100%< td=""><td>80</td><td>80</td></lo≦100%<>	80	80									
	45 0414	45 0414	45 0414	_	lo≦50%	85	83							
	15, 24V	D	70% <lo≦100%< td=""><td>78</td><td>80</td></lo≦100%<>	78	80									
		D	lo≦70%	84	83									
		Е	50% <lo≦100%< td=""><td>77</td><td>80</td></lo≦100%<>	77	80									
		E	lo≦50%	83	83									
		Г	50% <lo≦100%< td=""><td>77</td><td>77</td></lo≦100%<>	77	77									
		F	lo≦50%	83	83									
Forced air	3.3 - 24V	A,B,C, D,E,F	lo≦100%	80	80									

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

Cooling	Voltage Mounting		Load factor	Maximum temperature [°C]	
Method	vollage	Method	LUau laciol	<ol> <li>Capacitor</li> </ol>	<ol> <li>Capacitor</li> </ol>
		Α	40% <lo≦100%< td=""><td>75</td><td>80</td></lo≦100%<>	75	80
		A	lo≦40%	85	85
		В	60% <lo≦100%< td=""><td>75</td><td>77</td></lo≦100%<>	75	77
		Б	lo≦60%	85	85
		С	40% <lo≦100%< td=""><td>77</td><td>83</td></lo≦100%<>	77	83
	3.3, 5,		lo≦40%	87	85
	12V	D	60% <lo≦100%< td=""><td>77</td><td>77</td></lo≦100%<>	77	77
		U	lo≦60%	87	85
		Е	40% <lo≦100%< td=""><td>77</td><td>80</td></lo≦100%<>	77	80
		E	lo≦40%	85	85
		F	40% <lo≦100%< td=""><td>77</td><td>83</td></lo≦100%<>	77	83
Convertion			lo≦40%	85	83
Convection		А	60% <lo≦100%< td=""><td>77</td><td>77</td></lo≦100%<>	77	77
			lo≦60%	83	83
		В	70% <lo≦100%< td=""><td>77</td><td>77</td></lo≦100%<>	77	77
			lo≦70%	83	83
		С	70% <lo≦100%< td=""><td>85</td><td>80</td></lo≦100%<>	85	80
	15 041/	U	lo≦70%	89	85
	15, 24V	<b>D</b>	60% <lo≦100%< td=""><td>75</td><td>70</td></lo≦100%<>	75	70
		D	lo≦60%	80	80
		-	60% <lo≦100%< td=""><td>80</td><td>77</td></lo≦100%<>	80	77
		E	lo≦60%	83	83
		F	50% <lo≦100%< td=""><td>80</td><td>77</td></lo≦100%<>	80	77
		F	lo≦50%	85	85
Forced air	3.3 - 24V	A,B,C, D,E,F	lo≦100%	80	80

Table 3.3 Maximum temperature of measurement points	(LHA30F-3R3-Y, LHA30F-
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Cooling	Voltage Mounting		Load factor	Maximum temperature [°C]										
Method	vollage	Method	LUAU IACIUI	<ol> <li>Capacitor</li> </ol>	2:Capacitor									
		А	60% <lo≦100%< td=""><td>81</td><td>85</td></lo≦100%<>	81	85									
		A	lo≦60%	85	87									
		В	60% <lo≦100%< td=""><td>81</td><td>83</td></lo≦100%<>	81	83									
		Б	lo≦60%	85	85									
		С	60% <lo≦100%< td=""><td>81</td><td>85</td></lo≦100%<>	81	85									
Convection	3.3 - 24V		lo≦60%	85	87									
COnvection		D	60% <lo≦100%< td=""><td>86</td><td>84</td></lo≦100%<>	86	84									
			lo≦60%	86	82									
											Е	60% <lo≦100%< td=""><td>83</td><td>87</td></lo≦100%<>	83	87
			lo≦60%	83	83									
		F	60% <lo≦100%< td=""><td>83</td><td>85</td></lo≦100%<>	83	85									
			lo≦60%	87	87									
Forced air	22 241/	A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75									
FUICED all	3.3 - 24V	D,E,F	lo≦70%	75	75									

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

Cooling	Voltago	Mounting	Load factor	Maximum ten	nperature [°C]		
Method	Voltage	Method	LUAU IACIUI	1):Capacitor	<ol> <li>Capacitor</li> </ol>		
		Α	50% <lo≦100%< td=""><td>81</td><td>87</td></lo≦100%<>	81	87		
		A	lo≦50%	85	86		
		В	50% <lo≦100%< td=""><td>78</td><td>84</td></lo≦100%<>	78	84		
		В	lo≦50%	84	86		
	225	с	50% <lo≦100%< td=""><td>79</td><td>84</td></lo≦100%<>	79	84		
	3.3, 5, 24, 36,		lo≦50%	84	84		
	24, 30, 48V	D	50% <lo≦100%< td=""><td>85</td><td>81</td></lo≦100%<>	85	81		
	701		lo≦50%	88	85		
		Е	50% <lo≦100%< td=""><td>80</td><td>83</td></lo≦100%<>	80	83		
			lo≦50%	87	87		
		F	50% <lo≦100%< td=""><td>81</td><td>86</td></lo≦100%<>	81	86		
Convection			lo≦50%	86	87		
COnvection		A	50% <lo≦100%< td=""><td>82</td><td>83</td></lo≦100%<>	82	83		
		~	lo≦50%	84	84		
				в	50% <lo≦100%< td=""><td>80</td><td>81*</td></lo≦100%<>	80	81*
		В	lo≦50%	85	85		
		С	50% <lo≦100%< td=""><td>81</td><td>75</td></lo≦100%<>	81	75		
	12. 15V		lo≦50%	85	82		
	12, 130	D	50% <lo≦100%< td=""><td>84</td><td>74</td></lo≦100%<>	84	74		
			lo≦50%	88	82		
		E	50% <lo≦100%< td=""><td>82</td><td>80</td></lo≦100%<>	82	80		
			lo≦50%	88	87		
		F	50% <lo≦100%< td=""><td>81</td><td>80</td></lo≦100%<>	81	80		
		1	lo≦50%	86	85		
Forced air	3.3 - 48V	A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75		
	5.5 - 46 V	D,E,F	lo≦70%	75	75		

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

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Cooling	Voltage	Mounting	Load factor	Maximum temperature [°C]	
Method	vollage	Method	Load lactor	1):Capacitor	(2):Capacito
		А	20% <lo≦100%< td=""><td>76</td><td>84</td></lo≦100%<>	76	84
		A	lo≦20%	87	80
		В	20% <lo≦100%< td=""><td>72</td><td>77</td></lo≦100%<>	72	77
		Б	lo≦20%	82	76
		С	20% <lo≦100%< td=""><td>73</td><td>85</td></lo≦100%<>	73	85
	5V	C	lo≦20%	84	80
		D	lo≦100%	75	73
		Е	75% <lo≦100%< td=""><td>66</td><td>88</td></lo≦100%<>	66	88
		E	lo≦75%	81	80
		F	20% <lo≦100%< td=""><td>75</td><td>85</td></lo≦100%<>	75	85
			lo≦20%	85	81
Convection		Α	25% <lo≦100%< td=""><td>82</td><td>78</td></lo≦100%<>	82	78
			lo≦25%	85	78
		В	25% <lo≦100%< td=""><td>79</td><td>73</td></lo≦100%<>	79	73
			lo≦25%	88	76
		С	25% <lo≦100%< td=""><td>79</td><td>76</td></lo≦100%<>	79	76
	12 - 48V	C	lo≦25%	86	77
	12 - 40 V	D	10% <lo≦100%< td=""><td>80</td><td>70</td></lo≦100%<>	80	70
		D	lo≦10%	86	74
		F	20% <lo≦100%< td=""><td>81</td><td>80</td></lo≦100%<>	81	80
		E	lo≦20%	88	83
		Г	20% <lo≦100%< td=""><td>80</td><td>72</td></lo≦100%<>	80	72
		F	lo≦20%	86	76
Forood air	E 40\/	A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75
Forced air	5 - 48V	D,E,F	lo≦70%	75	75

\*The maximum temperature of the LHA50F-15-S is 76°C.

Cooling Mathema Mounting Load Gates Maximum temperature [°C]					
Method	Voltage	Method	Load factor	(1):Capacitor	(2):Capacitor
mounou			20% <lo≦100%< td=""><td>76</td><td>78</td></lo≦100%<>	76	78
		A	lo≦20%	85	77
		В	20% <lo≦100%< td=""><td>76</td><td>72</td></lo≦100%<>	76	72
		В	lo≦20%	88	76
		С	20% <lo≦100%< td=""><td>74</td><td>81</td></lo≦100%<>	74	81
	3.3, 5V	C	lo≦20%	84	80
		D	lo≦100%	75	71
		Е	10% <lo≦100%< td=""><td>76</td><td>84</td></lo≦100%<>	76	84
			lo≦10%	87	77
		F	10% <lo≦100%< td=""><td>75</td><td>78</td></lo≦100%<>	75	78
Convection			lo≦10%	85	81
CONVECTION		А	20% <lo≦100%< td=""><td>83</td><td>73</td></lo≦100%<>	83	73
			lo≦20%	88	76
		В	20% <lo≦100%< td=""><td>83</td><td>70</td></lo≦100%<>	83	70
			lo≦20%	88	76
		С	20% <lo≦100%< td=""><td>81</td><td>72</td></lo≦100%<>	81	72
	12 - 48V	L L	lo≦20%	86	77
		D	75% <lo≦100%< td=""><td>73</td><td>68</td></lo≦100%<>	73	68
			lo≦75%	79	71
		E	lo≦100%	85	74
		F	75% <lo≦100%< td=""><td>80</td><td>66</td></lo≦100%<>	80	66
		Г	lo≦75%	80	73
Forced air	22 401/	A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75
FUICEU all	3.3 - 48V	D,E,F	lo≦70%	75	75

Table 3.5 Maximum temperature of measurement	nointe	1 UA75E 2D2 V	
Table 3.5 Maximum temperature of measurement	points	(LNA/ 3F-3K3-1	, L⊓A/ ЭГ-∐)



Cooling	Voltage	Mounting	Load factor	Maximum temperature [°C]	
Method	voltage	Method		1):Capacitor	<ol> <li>Capacitor</li> </ol>
			75% <lo≦100%< td=""><td>83</td><td>83</td></lo≦100%<>	83	83
		A	25% <lo≦75%< td=""><td>89</td><td>83</td></lo≦75%<>	89	83
			lo≦25%	94	87
			75% <lo≦100%< td=""><td>71</td><td>73</td></lo≦100%<>	71	73
		В	25% <lo≦75%< td=""><td>82</td><td>81</td></lo≦75%<>	82	81
			lo≦25%	88	86
			75% <lo≦100%< td=""><td>89</td><td>86</td></lo≦100%<>	89	86
		С	25% <lo≦75%< td=""><td>94</td><td>86</td></lo≦75%<>	94	86
	12V		lo≦25%	95	84
	120		75% <lo≦100%< td=""><td>67</td><td>67</td></lo≦100%<>	67	67
		D	25% <lo≦75%< td=""><td>83</td><td>77</td></lo≦75%<>	83	77
			lo≦25%	89	78
			75% <lo≦100%< td=""><td>71</td><td>91</td></lo≦100%<>	71	91
		E	25% <lo≦75%< td=""><td>76</td><td>90</td></lo≦75%<>	76	90
			lo≦25%	81	90
			75% <lo≦100%< td=""><td>73</td><td>72</td></lo≦100%<>	73	72
		F	25% <lo≦75%< td=""><td>86</td><td>80</td></lo≦75%<>	86	80
0 1			lo≦25%	85	81
Convection		A	75% <lo≦100%< td=""><td>87</td><td>72</td></lo≦100%<>	87	72
			25% <lo≦75%< td=""><td>94</td><td>81</td></lo≦75%<>	94	81
			lo≦25%	94	86
			75% <lo≦100%< td=""><td>83</td><td>74</td></lo≦100%<>	83	74
		В	25% <lo≦75%< td=""><td>91</td><td>84</td></lo≦75%<>	91	84
			lo≦25%	93	87
			75% <lo≦100%< td=""><td>88</td><td>74</td></lo≦100%<>	88	74
		С	25% <lo≦75%< td=""><td>94</td><td>83</td></lo≦75%<>	94	83
			lo≦25%	92	83
	24 - 48V		75% <lo≦100%< td=""><td>73</td><td>58</td></lo≦100%<>	73	58
		D	25% <lo≦75%< td=""><td>93</td><td>80</td></lo≦75%<>	93	80
			lo≦25%	91	80
			75% <lo≦100%< td=""><td>83</td><td>80</td></lo≦100%<>	83	80
		E	25% <lo≦75%< td=""><td>86</td><td>83</td></lo≦75%<>	86	83
			lo≦25%	90	89
			75% <lo≦100%< td=""><td>76</td><td>62</td></lo≦100%<>	76	62
		F	25% <lo≦75%< td=""><td>88</td><td>71</td></lo≦75%<>	88	71
		-	lo≦25%	89	83
		A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75
Forced air	12 - 48V	D,E,F	lo≦70%	75	75

# Table 3.7 Maximum temperature of measurement points (LHA150F-

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

Cooling	Voltage	Mounting	Load factor	Maximum ter	nperature [°C]
Method	vollage	Method		<ol> <li>Capacitor</li> </ol>	<ol> <li>Capacitor</li> </ol>
			75% <lo≦100%< td=""><td>85</td><td>87</td></lo≦100%<>	85	87
		A	25% <lo≦75%< td=""><td>91</td><td>84</td></lo≦75%<>	91	84
			lo≦25%	90	81
			75% <lo≦100%< td=""><td>76</td><td>78</td></lo≦100%<>	76	78
		В	25% <lo≦75%< td=""><td>88</td><td>83</td></lo≦75%<>	88	83
			lo≦25%	91	83
			75% <lo≦100%< td=""><td>85</td><td>77</td></lo≦100%<>	85	77
		С	25% <lo≦75%< td=""><td>91</td><td>79</td></lo≦75%<>	91	79
	4014		lo≦25%	91	79
	12V		75% <lo≦100%< td=""><td>71</td><td>65</td></lo≦100%<>	71	65
		D	25% <lo≦75%< td=""><td>89</td><td>79</td></lo≦75%<>	89	79
			lo≦25%	90	79
			75% <lo≦100%< td=""><td>81</td><td>83</td></lo≦100%<>	81	83
		E	25% <lo≦75%< td=""><td>90</td><td>86</td></lo≦75%<>	90	86
			lo≦25%	91	85
			75% <lo≦100%< td=""><td>83</td><td>80</td></lo≦100%<>	83	80
		F	25% <lo≦75%< td=""><td>89</td><td>81</td></lo≦75%<>	89	81
			lo≦25%	91	81
Convection		A	75% <lo≦100%< td=""><td>88</td><td>76</td></lo≦100%<>	88	76
			25% <lo≦75%< td=""><td>91</td><td>78</td></lo≦75%<>	91	78
			lo≦25%	91	80
			75% <lo≦100%< td=""><td>82</td><td>72</td></lo≦100%<>	82	72
		в	25% <lo≦75%< td=""><td>89</td><td>79</td></lo≦75%<>	89	79
			lo≦25%	90	81
			75% <lo≦100%< td=""><td>87</td><td>68</td></lo≦100%<>	87	68
		С	25% <lo≦75%< td=""><td>90</td><td>75</td></lo≦75%<>	90	75
			lo≦25%	91	79
	24,48V		75% <lo≦100%< td=""><td>77</td><td>65</td></lo≦100%<>	77	65
		D	25% <lo≦75%< td=""><td>85</td><td>73</td></lo≦75%<>	85	73
			lo≦25%	88	78
			75% <lo≦100%< td=""><td>65</td><td>67</td></lo≦100%<>	65	67
		E	25% <lo≦75%< td=""><td>73</td><td>73</td></lo≦75%<>	73	73
			lo≦25%	88	85
			75% <lo≦100%< td=""><td>76</td><td>67</td></lo≦100%<>	76	67
		F	25% <lo≦75%< td=""><td>83</td><td>73</td></lo≦75%<>	83	73
			25%<10≦75% Io≦25%	91	82
			10≦25% 70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75
Forced air	12 - 48V	A,B,C, D,E,F		75	75
			lo≦70%	/5	/5

# 4 Life expectancy and warranty

#### ■Life Expectancy

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

Cooling	Vallana	Mounting	Average ambient	Life Exp	ectancy
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C,	Ta=45℃ or less	10years or more	6years
	3.3 - 12V	D,E	Ta=55℃	5years	3years
	3.3 - 12V	F	Ta=40℃ or less	10years or more	10years or more
Convection		Г	Ta=50℃	7years	5years
COnvection	15.00/	A,C,E,F	Ta=45℃ or less	10years or more	8years
			Ta=55℃	5years	4years
	15, 24V	РП	Ta=50°C or less	10years or more	8years
		B,D	Ta=60℃	5years	4years
Earood air	22 241/	.3 - 24V A,B,C, D,E,F	Ta=60℃ or less	5years	5years
Forced air	3.3 - 24V		Ta=70℃	5years	3years

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

Cooling	Valtana	Mounting	Average ambient	Life Expectancy	
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A O F F	Ta=40℃ or less	10years or more	8years
	2 2 4 2 1/	A,C,E,F	Ta=50℃	6years	4years
	3.3 - 12V		Ta=45℃ or less	10years or more	7years
Convection		B,D	Ta=55℃	6years	3years
COnvection	15.00/	A,D,E,F	Ta=45℃ or less	10years or more	10years or more
			Ta=55℃	8years	5years
	15, 24V	B,C	Ta=50°C or less	10years or more	9years
		D,C	Ta=60℃	6years	4years
Forced air	22 241	A,B,C,	Ta=60℃ or less	5years	5years
FUICED all	3.3 - 24V	D,E,F	Ta=70℃	5years	3years

#### Table 4.3 Life Expectancy (LHA30F-3R3-Y, LHA30F-

		•			
Cooling	Voltage	Mounting	Average ambient	Life Exp	ectancy
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
	3.3 - 12V		Ta=40℃ or less	10years or more	6years
Convection	3.3 - 12V	A,B,C,	Ta=50℃	8years	3years
COnvection	15 - 24V	D,E,F	Ta=40℃ or less	10years or more	10years or more
	15-240		Ta=50℃	9years	5years
Forced air	3.3 - 24V	A,B,C,	Ta=50℃ or less	5years	5years
FUICED all	3.3 - Z4V	D,E,F	Ta=60℃	5years	3years

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

Voltago	Mounting	Average ambient	Life Exp	ectancy
vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
	A.C.	Ta=40℃ or less	10years or more	6years
	A,C,	Ta=50℃	7years	3years
3.3, 5, 24,		Ta=35℃ or less	10years or more	6years
36, 48V	B,D,F	Ta=45℃	8years	3years
	Е	Ta=30℃ or less	10years or more	9years
	E	Ta=40℃	10years or more	4years
	A	Ta=40℃ or less	10years or more	6years
		Ta=50℃	8years	3years
10 151/		Ta=35℃ or less	10years or more	6years
12, 130	D,C,D,F	Ta=45℃	9years	3years
	E	Ta=30℃ or less	10years or more	10years or more
	E	Ta=40℃	10years or more	5years
22 401/	A,B,C,	Ta=50℃ or less	5years	5years
3.3 - 48V	D,E,F	Ta=60°C	5years	3years
		Method           3.3, 5, 24, 36, 48V         A,C,           B,D,F         E           12, 15V         A,C,           B,C,D,F         E           3.3, -48V         A,B,C,	Voltage         Method         temperature (year)           3.3, 5, 24, 36, 48V         A,C, B,D,F         Ta=40°C or less Ta=50°C           B,D,F         Ta=35°C or less Ta=40°C           Ta=40°C or less Ta=40°C         Ta=40°C or less Ta=40°C           12, 15V         B,C,D,F         Ta=35°C or less Ta=45°C           B,C,D,F         Ta=30°C or less Ta=45°C           Ta=30°C or less Ta=40°C         Ta=40°C or less Ta=40°C           3.3, 48V         A,B,C,         Ta=50°C or less	$\begin{tabular}{ c c c c c } \hline Voltage & Method & temperature (year) & Io \leq 75\% & Io \leq 375\% & Ia \leq 30\% & Ia \in 30\% & Ia $

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

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

#### Table 4.6 Life Expectancy (LHA100F-

Cooling	Voltage	Mounting	Average ambient	Life Exp	ectancy
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C	Ta=30℃ or less	10years or more	6years
		A,B,C	Ta=40℃	7years	3years
	5V	D	Ta=25℃ or less	10years or more	10years or more
	50		Ta=35℃	10years or more	10years or more
Convection		E,F	Ta=25℃ or less	10years or more	8years
Convection		E,F	Ta=35℃	8years	4years
		A,B,C	Ta=40℃ or less	10years or more	5years
	12 - 48V	A,D,C	Ta=50℃	5years	3years
	12 - 40V		Ta=35℃ or less	10years or more	8years
		D,E,F	Ta=45℃	8years	4years
Forced air	E 49\/	A,B,C,	Ta=50℃ or less	5years	5years
FUICED all	5 - 48V	D,E,F	Ta=60℃	5years	3years

#### Table 4.7 Life Expectancy (LHA150F-

				. ,	
Cooling	Voltage	Mounting	Average ambient	Life Exp	ectancy
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C	Ta=30℃ or less	10years or more	9years
		A,B,C	Ta=40℃	10years or more	4years
	12V	D	Ta=20℃ or less	10years or more	10years or more
	121		Ta=30℃	10years or more	10years or more
		E,F	Ta=15℃ or less	10years or more	10years or more
Convection		E,F	Ta=25℃	10years or more	7years
Convection		A,B,C	Ta=40℃ or less	10years or more	6years
			Ta=50℃	6years	3years
	24 - 48V		Ta=30℃ or less	10years or more	10years or more
	24 - 40V	D,E	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	10 401/	A,B,C,	Ta=50℃ or less	5years	5years
Forced all	12 - 48V	D,E,F	Ta=60℃	5years	3years

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Cooling	Voltage	Mounting	Average ambient	Life Exp	ectancy			
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>			
		A,B,C	Ta=25℃ or less	10years or more	7years			
		A,D,C	Ta=35℃	10years or more	3years			
	12V	D,E	Ta=20℃ or less	10years or more	10years or more			
	120	D,E	Ta=30℃	10years or more	5years			
		F	Ta=10℃ or less	10years or more	10years or more			
Convection			Ta=20℃	10years or more	10years or more			
COnvection			Ta=40℃ or less	10years or more	7years			
		A,B,C	Ta=50℃	5years	3years			
	24 - 48V	D	Ta=35℃ or less	10years or more	10years or more			
	24 - 40V		Ta=45℃	8years	5years			
			Ta=20℃ or less	10years or more	10years or more			
		E,F	Ta=30℃	10years or more	10years or more			
Forced air	10 10\/	A,B,C,	Ta=50℃ or less	5years	5years			
Forced all	12 - 48V	D,E,F	Ta=60℃	5years	3years			



#### Warranty

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

					,
Cooling	14.11	Mounting	Average ambient	Wari	ranty
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C,	Ta=45℃ or less	5years	5years
	3.3 - 12V	D,E	Ta=55℃	5years	3years
	3.3 - 12V	F	Ta=40℃ or less	5years	5years
Convection		Г	Ta=50℃	5years	3years
Convection	45 0414	A,C,E,F	Ta=45℃ or less	5years	5years
			Ta=55℃	5years	3years
	15, 24V	вD	Ta=50℃ or less	5years	5years
		B,D	Ta=60℃	5years	3years
Forced air	3.3 - 24V	A,B,C,	Ta=60℃ or less	5years	5years
FUICEU all	3.3 - 24 V	D,E,F	Ta=70℃	5years	3years

#### Table 4.10 Warranty (LHA15F-3R3-Y, LHA15F-

			• •		,
Cooling	Valtaga	Mounting	Average ambient	War	ranty
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
			Ta=40℃ or less	5years	5years
	3.3 - 12V	A,C,E,F	Ta=50℃	5years	3years
	3.3 - 12V	B,D	Ta=45℃ or less	5years	5years
Convection		<u>, в, р</u>	Ta=55℃	5years	3years
Convection	45.041	A,D,E,F	Ta=45℃ or less	5years	5years
			Ta=55℃	5years	3years
	15, 24V	B,C	Ta=50℃ or less	5years	5years
		<u> В,С</u>	Ta=60℃	5years	3years
Forced air	22 2411	A,B,C,	Ta=60℃ or less	5years	5years
Forced all	3.3 - 24V	D,E,F	Ta=70℃	5years	3years

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

				• •		
	Cooling	Valtara	Mounting	Average ambient	Wari	ranty
	Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
	Convection	3.3 - 24V	A,B,C,	Ta=40℃ or less	5years	5years
	COnvection	5.5 - 24 V	D,E,F	Ta=50℃	5years	3years
	Forced air	3.3 - 24V	A,B,C,	Ta=50℃ or less	5years	5years
			D,E,F	Ta=60℃	5years	3years

#### Table 4.12 Warranty (LHA50F-3R3-Y, LHA50F-

-					
Cooling	Voltage	Mounting	Average ambient	Wari	ranty
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
			Ta=40℃ or less	5years	5years
		A,C	Ta=50℃	5years	3years
	3.3, 5, 24,	B,D,F	Ta=35℃ or less	5years	5years
	36, 48V	D,D,F	Ta=45℃	5years	3years
		Е	Ta=30℃ or less	5years	5years
Convection		E	Ta=40℃	5years	3years
Convection		A	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
	12, 15V		Ta=35℃ or less	5years	5years
	12, 150	B,C,D,F	Ta=45℃	5years	3years
		E	Ta=30℃ or less	5years	5years
		E	Ta=40℃	5years	3years
Forced air	22 101/	A,B,C,	Ta=50℃ or less	5years	5years
Forced all	3.3 - 48V	D,E,F	Ta=60℃	5years	3years

Table 4.15 Warranty (LHA751-5K5-1, LHA751- $\Box$ )					
Cooling	Voltage	Mounting	Average ambient	Warranty	
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C	Ta=30℃ or less	5years	5years
	3.3, 5V	A,D,C	Ta=40℃	5years	3years
	3.3, 5V	D,E,F	Ta=25℃ or less	5years	5years
			Ta=35℃	5years	3years
Convection			Ta=40℃ or less	5years	5years
Convection		A,B,C	Ta=50℃	5years	3years
	10 10\/	12 - 48V D	Ta=25℃ or less	5years	5years
	12 - 40V		Ta=35°C	5years	3years
		E,F	Ta=35°C or less	5years	5years
		Е,Г	Ta=45℃	5years	3years
Forced air	3.3 - 48V	A,B,C,	Ta=50℃ or less	5years	5years
FUICED all	3.3 - 48V	D,E,F	Ta=60°C	5years	3years

#### Table 4.13 Warranty (LHA75F-3R3-Y, LHA75F-)

#### Table 4.14 Warranty (LHA100F-

			• •	,	
Cooling	Voltage	Mounting	Average ambient	War	ranty
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
			Ta=30℃ or less	5years	5years
	5\/	A,B,C	Ta=40℃	5years	3years
	50	5V D,E,F	Ta=25℃ or less	5years	5years
Convection			Ta=35℃	5years	3years
COnvection		ARC	Ta=40℃ or less	5years	5years
	12 - 48V	A,B,C	Ta=50℃	5years	3years
	12 - 40V	D,E,F	Ta=35℃ or less	5years	5years
			Ta=45℃	5years	3years
Forced air	5 - 48V	A,B,C,	Ta=50℃ or less	5years	5years
FUICED all	5 - 46V	D,E,F	Ta=60℃	5years	3years

#### Table 4.15 Warranty (LHA150F-

Cooling	Voltage	Mounting	Average ambient	War	ranty
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C	Ta=30℃ or less	5years	5years
		A,D,C	Ta=40℃	5years	3years
	12V	D	Ta=20℃ or less	5years	5years
	120	D	Ta=30℃	5years	3years
		E,F	Ta=15℃ or less	5years	5years
Convertion		Е,Г	Ta=25℃	5years	3years
Convection		A,B,C	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
	24 - 48V		Ta=30℃ or less	5years	5years
	24 - 40V	D,E	Ta=40℃	5years	3years
		F	Ta=20℃ or less	5years	5years
		Г	Ta=30℃	5years	3years
Forced air	12 - 48V	A,B,C,	Ta=50℃ or less	5years	5years
FOICEU all	12 - 40V	D,E,F	Ta=60℃	5years	3years

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Cooling	Voltage	Mounting	Average ambient	War	ranty
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C	Ta=25℃ or less	5years	5years
		A,D,C	Ta=35℃	5years	3years
	12V	D,E	Ta=20℃ or less	5years	5years
	120	D,E	Ta=30℃	5years	3years
		F	Ta=10℃ or less	5years	5years
Convection		Г	Ta=20℃	5years	3years
Convection	24 401/	A,B,C	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
		D	Ta=35℃ or less	5years	5years
	24, 48V	D	Ta=45℃	5years	3years
		E,F	Ta=20℃ or less	5years	5years
		_ с,г	Ta=30℃	5years	3years
Forced air	12 - 48V	A,B,C,	Ta=50℃ or less	5years	5years
FUICED all	12 - 40V	D,E,F	Ta=60℃	5years	3years

# 5 Ground

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- 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

#### **J**4

 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
CINT	1-1123724-3	1-1123722-3	Loose : 1318912-1
CN2	1-1123723-2	1-1123722-2	Chain : 1123721-1
GINZ	1-1123723-2	1-1123722-2	Loose : 1318912-1
			(Mfr. TE Conncectivity)

#### LHA30F, LHA50F

Connector		Mating connector	Terminal
CN1	1-1123724-3	1-1123722-5	Chain : 1123721-1
CINT	1-1123724-3	1-1123722-3	Loose : 1318912-1
CN2	1-1123723-4	1-1123722-4	Chain : 1123721-1
GNZ	1-1123723-4	1-1123/22-4	Loose : 1318912-1

(Mfr. TE Conncectivity)

#### LHA75F, LHA100F, LHA150F

	Connector Mating connector		Terminal	
CN1	1-1123724-3	1-1123722-5	Chain : 1123721-1	
CINT	1-1123724-3	1-1123722-3	Loose : 1318912-1	
CN2	1 1100700 6	N2 1-1123723-6 1-1123722-6	1-1123722-6	Chain : 1123721-1
GNZ	1-1123723-0	1-1123/22-0	Loose : 1318912-1	

#### (Mfr. TE Conncectivity)

#### LHA300F

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

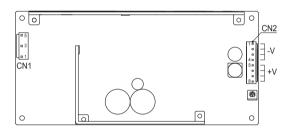


Fig.6.1 Example of option -J5

#### 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
GNZ	DOF-VI	VIIK-ON	Loose : BVH-21T-P1.1
			(11) IO T

(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]		
Model	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.

COSEL

- 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)

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

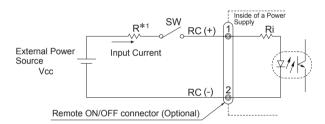


Fig.6.2 Example of using a remote ON/OFF circuit

- 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.

Cooling Maximum temperature [°C] Mounting Voltage Load factor Method Method (1):Capacitor (2):Capacitor 20%<lo≦100% 74 83 A lo≦20% 80 83  $20\% < |0 \le 100\%$ 74 83 В lo≦20% 80 83 3.3, 5, 20%<lo≦100% 74 83 С 12V lo≦20% 80 83 20%<lo≦100% 74 83 D lo≦20% 80 83 20%<lo≦100% 83 74 Е 80 83 lo≦20% Convection 50%<lo≦100% 78 78 А lo≦50% 83 83 60%<lo≦100% 78 78 В 83 lo≦60% 83 50%<lo≦100% 80 78 С 15, 24V lo≦50% 87 83 78 78  $60\% < lo \le 100\%$ D lo≦60% 83 83 50%<lo≦100% 78 78 Е 83 lo≦50% 83 A,B,C Forced air 3.3 - 24V lo≦100% 80 80 D.E.F

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



(LHA15F-3R3-SNY, LHA15F-□-SN)					
Cooling	Voltage	Mounting	Load factor	Maximum ter	nperature [°C]
Method	vollage	Method	Luau laciol	<ol> <li>Capacitor</li> </ol>	<ol> <li>Capacitor</li> </ol>
		Α	30% <lo≦100%< td=""><td>75</td><td>78</td></lo≦100%<>	75	78
		~	lo≦30%	83	85
		в	50% <lo≦100%< td=""><td>75</td><td>81</td></lo≦100%<>	75	81
			lo≦50%	83	85
	3.3, 5,	с	30% <lo≦100%< td=""><td>81</td><td>83</td></lo≦100%<>	81	83
	12V		lo≦30%	85	85
		D	50% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75
			lo≦50%	85	85
		E	30% <lo≦100%< td=""><td>75</td><td>83</td></lo≦100%<>	75	83
Convection			lo≦30%	81	85
CONVECTION		A	60% <lo≦100%< td=""><td>75</td><td>73</td></lo≦100%<>	75	73
			lo≦60%	86	83
		в	60% <lo≦100%< td=""><td>73</td><td>73</td></lo≦100%<>	73	73
			lo≦60%	0% 73 73 83 83	83
	15, 24V	с	60% <lo≦100%< td=""><td>80</td><td>85 73 83 73</td></lo≦100%<>	80	85 73 83 73
	10, 240		lo≦60%	87	83
		D	60% <lo≦100%< td=""><td>73</td><td>73</td></lo≦100%<>	73	73
			lo≦60%	83	83
		E	60% <lo≦100%< td=""><td>76</td><td>73</td></lo≦100%<>	76	73
		Ē	lo≦60%	86	85
Forced air	3.3 - 24V	A,B,C, D,E,F	lo≦100%	80	80

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

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

Cooling	Voltage	Mounting	Load factor	Maximum ten	
Method	voltage	Method		1):Capacitor	<ol> <li>Capacito</li> </ol>
			75% <lo≦100%< td=""><td>77</td><td>69</td></lo≦100%<>	77	69
		Α	40% <lo≦75%< td=""><td>83</td><td>79</td></lo≦75%<>	83	79
			lo≦40%	86	85
			75% <lo≦100%< td=""><td>79</td><td>66</td></lo≦100%<>	79	66
		В	40% <lo≦75%< td=""><td>83</td><td>78</td></lo≦75%<>	83	78
			lo≦40%	88	84
	0 0 4 0		75% <lo≦100%< td=""><td>70</td><td>70</td></lo≦100%<>	70	70
	3.3, 12, 15, 24V	С	40% <lo≦75%< td=""><td>81</td><td>81</td></lo≦75%<>	81	81
	15, 24 V		lo≦40%	85	86
			75% <lo≦100%< td=""><td>74</td><td>61</td></lo≦100%<>	74	61
		D	40% <lo≦75%< td=""><td>83</td><td>76</td></lo≦75%<>	83	76
			lo≦40%	87	82
		E	75% <lo≦100%< td=""><td>76</td><td>78</td></lo≦100%<>	76	78
			40% <lo≦75%< td=""><td>81</td><td>81</td></lo≦75%<>	81	81
Convection			lo≦40%	84	87
Convection		A	75% <lo≦100%< td=""><td>85</td><td>80</td></lo≦100%<>	85	80
			40% <lo≦75%< td=""><td>87</td><td>83</td></lo≦75%<>	87	83
			lo≦40%	86	83
			75% <lo≦100%< td=""><td>85</td><td>74</td></lo≦100%<>	85	74
		В	40% <lo≦75%< td=""><td>87</td><td>81</td></lo≦75%<>	87	81
			lo≦40%	88	83
			75% <lo≦100%< td=""><td>75</td><td>81</td></lo≦100%<>	75	81
	5V	С	40% <lo≦75%< td=""><td>83</td><td>84</td></lo≦75%<>	83	84
			lo≦40%	85	85
			75% <lo≦100%< td=""><td>84</td><td>70</td></lo≦100%<>	84	70
		D	40% <lo≦75%< td=""><td>87</td><td>79</td></lo≦75%<>	87	79
			lo≦40%	87	81
			75% <lo≦100%< td=""><td>79</td><td>85</td></lo≦100%<>	79	85
		Е	40% <lo≦75%< td=""><td>82</td><td>85</td></lo≦75%<>	82	85
			lo≦40%	84	87
Forood cir	22 241	A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75
Forced air	3.3 - 24V	D,E,F	lo≦70%	75	75



	(LF	1A50F-3	R3-SNY, LHA50H	∟-SN)	
Cooling	Valtaga	Mounting	Load factor	Maximum ten	nperature [°C]
Method	Voltage	Method	Load factor	(1):Capacitor	(2):Capacitor
		75% <lo≦100%< td=""><td>77</td><td>72</td></lo≦100%<>	77	72	
		А	40% <lo≦75%< td=""><td>86</td><td>84</td></lo≦75%<>	86	84
			lo≦40%	89	87
			75% <lo≦100%< td=""><td>73</td><td>71</td></lo≦100%<>	73	71
		В	40% <lo≦75%< td=""><td>84</td><td>82</td></lo≦75%<>	84	82
			lo≦40%	88	86
	3.3, 12,		75% <lo≦100%< td=""><td>77</td><td>73</td></lo≦100%<>	77	73
	15, 24,	С	40% <lo≦75%< td=""><td>85</td><td>83</td></lo≦75%<>	85	83
	36, 48V		lo≦40%	88	86
			75% <lo≦100%< td=""><td>82</td><td>64</td></lo≦100%<>	82	64
		D	40% <lo≦75%< td=""><td>87</td><td>80</td></lo≦75%<>	87	80
			lo≦40%	90	83
			75% <lo≦100%< td=""><td>70</td><td>73</td></lo≦100%<>	70	73
		E	25% <lo≦75%< td=""><td>80</td><td>82</td></lo≦75%<>	80	82
			lo≦25%	84	87
Convection		A	75% <lo≦100%< td=""><td>69</td><td>87</td></lo≦100%<>	69	87
			40% <lo≦75%< td=""><td>82</td><td>86</td></lo≦75%<>	82	86
			lo≦40%	86	87
		В	75% <lo≦100%< td=""><td>68</td><td>87</td></lo≦100%<>	68	87
			40% <lo≦75%< td=""><td>81</td><td>85</td></lo≦75%<>	81	85
			lo≦40%	85	87
			75% <lo≦100%< td=""><td>73</td><td>84</td></lo≦100%<>	73	84
	5V	С	40% <lo≦75%< td=""><td>82</td><td>83</td></lo≦75%<>	82	83
			lo≦40%	84	86
			75% <lo≦100%< td=""><td>81</td><td>80</td></lo≦100%<>	81	80
		D	40% <lo≦75%< td=""><td>85</td><td>81</td></lo≦75%<>	85	81
			lo≦40%	89	85
			75% <lo≦100%< td=""><td>66</td><td>87</td></lo≦100%<>	66	87
		Е	25% <lo≦75%< td=""><td>77</td><td>83</td></lo≦75%<>	77	83
			lo≦25%	83	87
Farrad all	2.2 4014	A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75
Forced air	3.3 - 48V	D,E,F	lo≦70%	75	75

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

0 "	(LI		R3-SNY, LHA75	,	1 I°O
Cooling	Voltage	Mounting	Load factor	Maximum ten	
Method		Method		1):Capacitor	(2):Capacitor
			75% <lo≦100%< td=""><td>81</td><td>72</td></lo≦100%<>	81	72
		A	25% <lo≦75%< td=""><td>86</td><td>74</td></lo≦75%<>	86	74
			lo≦25%	88	74
			75% <lo≦100%< td=""><td>80</td><td>61</td></lo≦100%<>	80	61
		В	25% <lo≦75%< td=""><td>82</td><td>64</td></lo≦75%<>	82	64
			lo≦25%	89	71
			75% <lo≦100%< td=""><td>75</td><td>65</td></lo≦100%<>	75	65
	3.3, 5V	С	25% <lo≦75%< td=""><td>81</td><td>70</td></lo≦75%<>	81	70
			lo≦25%	84	72
			75% <lo≦100%< td=""><td>79</td><td>53</td></lo≦100%<>	79	53
		D	20% <lo≦75%< td=""><td>80</td><td>60</td></lo≦75%<>	80	60
			lo≦20%	83	68
		E	75% <lo≦100%< td=""><td>77</td><td>70</td></lo≦100%<>	77	70
			20% <lo≦75%< td=""><td>82</td><td>75</td></lo≦75%<>	82	75
Convertion			lo≦20%	86	76
Convection		A	75% <lo≦100%< td=""><td>87</td><td>66</td></lo≦100%<>	87	66
			25% <lo≦75%< td=""><td>86</td><td>70</td></lo≦75%<>	86	70
			lo≦25%	88	74
			75% <lo≦100%< td=""><td>86</td><td>61</td></lo≦100%<>	86	61
			25% <lo≦75%< td=""><td>87</td><td>67</td></lo≦75%<>	87	67
			lo≦25%	91	73
			75% <lo≦100%< td=""><td>76</td><td>60</td></lo≦100%<>	76	60
	12 - 48V	С	25% <lo≦75%< td=""><td>79</td><td>67</td></lo≦75%<>	79	67
			lo≦25%	84	73
			75% <lo≦100%< td=""><td>71</td><td>46</td></lo≦100%<>	71	46
		D	20% <lo≦75%< td=""><td>78</td><td>61</td></lo≦75%<>	78	61
			lo≦20%	82	67
			75% <lo≦100%< td=""><td>87</td><td>74</td></lo≦100%<>	87	74
		Е	20% <lo≦75%< td=""><td>84</td><td>76</td></lo≦75%<>	84	76
			lo≦20%	88	79
		A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75
Forced air	3.3 - 48V	D,E,F	lo≦70%	75	75

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



Cooling	Voltage	Mounting	Load factor	Maximum temperature [°C]			
Method	vollage	Method	LUAU IACIUI	(1):Capacitor	<ol> <li>Capacitor</li> </ol>		
			75% <lo≦100%< td=""><td>76</td><td>85</td></lo≦100%<>	76	85		
		A	25% <lo≦75%< td=""><td>82</td><td>80</td></lo≦75%<>	82	80		
			lo≦25%	85	74		
			75% <lo≦100%< td=""><td>70</td><td>74</td></lo≦100%<>	70	74		
		В	25% <lo≦75%< td=""><td>78</td><td>74</td></lo≦75%<>	78	74		
			lo≦25%	83	72		
			75% <lo≦100%< td=""><td>76</td><td>79</td></lo≦100%<>	76	79		
	5V	С	25% <lo≦75%< td=""><td>80</td><td>76</td></lo≦75%<>	80	76		
			lo≦25%	82	73		
			75% <lo≦100%< td=""><td>80</td><td>74</td></lo≦100%<>	80	74		
		D	25% <lo≦75%< td=""><td>81</td><td>70</td></lo≦75%<>	81	70		
			lo≦25%	83	70		
			75% <lo≦100%< td=""><td>73</td><td>86</td></lo≦100%<>	73	86		
		E	25% <lo≦75%< td=""><td>80</td><td>82</td></lo≦75%<>	80	82		
Convection			lo≦25%	83	78		
CONVECTION		A	75% <lo≦100%< td=""><td>82</td><td>64</td></lo≦100%<>	82	64		
			25% <lo≦75%< td=""><td>84</td><td>70</td></lo≦75%<>	84	70		
			lo≦25%	86	73		
		В	75% <lo≦100%< td=""><td>75</td><td>60</td></lo≦100%<>	75	60		
			25% <lo≦75%< td=""><td>80</td><td>68</td></lo≦75%<>	80	68		
			lo≦25%	82	80           74           74           74           72           79           76           73           74           70           86           82           78           64           70           73           60		
			75% <lo≦100%< td=""><td>76</td><td>63</td></lo≦100%<>	76	63		
	12 - 48V	С	25% <lo≦75%< td=""><td>80</td><td>70</td></lo≦75%<>	80	70		
			lo≦25%	82	72		
			75% <lo≦100%< td=""><td>70</td><td>49</td></lo≦100%<>	70	49		
		D	25% <lo≦75%< td=""><td>75</td><td>59</td></lo≦75%<>	75	59		
			lo≦25%	81	68		
			75% <lo≦100%< td=""><td>82</td><td>75</td></lo≦100%<>	82	75		
		E	25% <lo≦75%< td=""><td>81</td><td>77</td></lo≦75%<>	81	77		
			lo≦25%	84	78		
Forced air	5 - 48V	A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75		
	J - 40V	D,E,F	lo≦70%	75	75		

Cooling	Voltage	Mounting	Load factor	Maximum ter	nperature [°C
Method	voltage	Method		1):Capacitor	<ol> <li>Capacitor</li> </ol>
			75% <lo≦100%< td=""><td>82</td><td>69</td></lo≦100%<>	82	69
		A	25% <lo≦75%< td=""><td>92</td><td>81</td></lo≦75%<>	92	81
			lo≦25%	95	86
			75% <lo≦100%< td=""><td>69</td><td>67</td></lo≦100%<>	69	67
		В	25% <lo≦75%< td=""><td>84</td><td>81</td></lo≦75%<>	84	81
			lo≦25%	94	89
			75% <lo≦100%< td=""><td>90</td><td>78</td></lo≦100%<>	90	78
	12V	С	25% <lo≦75%< td=""><td>96</td><td>82</td></lo≦75%<>	96	82
			lo≦25%	96	86
			75% <lo≦100%< td=""><td>64</td><td>53</td></lo≦100%<>	64	53
		D	25% <lo≦75%< td=""><td>87</td><td>75</td></lo≦75%<>	87	75
			lo≦25%	96	86
		E	75% <lo≦100%< td=""><td>79</td><td>86</td></lo≦100%<>	79	86
			25% <lo≦75%< td=""><td>83</td><td>90</td></lo≦75%<>	83	90
Convection			lo≦25%	90	90
Convection		А	75% <lo≦100%< td=""><td>85</td><td>62</td></lo≦100%<>	85	62
			25% <lo≦75%< td=""><td>92</td><td>75</td></lo≦75%<>	92	75
			lo≦25%	95	83
		В	75% <lo≦100%< td=""><td>77</td><td>64</td></lo≦100%<>	77	64
			25% <lo≦75%< td=""><td>84</td><td>75</td></lo≦75%<>	84	75
			lo≦25%	91	85
			75% <lo≦100%< td=""><td>90</td><td>63</td></lo≦100%<>	90	63
	24 - 48V	С	25% <lo≦75%< td=""><td>96</td><td>76</td></lo≦75%<>	96	76
			lo≦25%	96	83
			75% <lo≦100%< td=""><td>63</td><td>42</td></lo≦100%<>	63	42
		D	25% <lo≦75%< td=""><td>81</td><td>68</td></lo≦75%<>	81	68
			lo≦25%	92	81
			75% <lo≦100%< td=""><td>83</td><td>80</td></lo≦100%<>	83	80
		Е	25% <lo≦75%< td=""><td>89</td><td>89</td></lo≦75%<>	89	89
			lo≦25%	91	90
Forood cir	12 - 48V	A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75
Forced air	12 - 48V	D,E,F	lo≦70%	75	75

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

CO	SEL

Cooling	Voltage	Mounting	Load factor	Maximum temperature [°C]				
Method	voltage	Method	Load lactor	1):Capacitor	<ol> <li>Capacitor</li> </ol>			
			75% <lo≦100%< td=""><td>84</td><td>84</td></lo≦100%<>	84	84			
		A	25% <lo≦75%< td=""><td>90</td><td>84</td></lo≦75%<>	90	84			
			lo≦25%	90	80			
			75% <lo≦100%< td=""><td>73</td><td>75</td></lo≦100%<>	73	75			
		В	25% <lo≦75%< td=""><td>89</td><td>82</td></lo≦75%<>	89	82			
			lo≦25%	90	81			
			75% <lo≦100%< td=""><td>86</td><td>75</td></lo≦100%<>	86	75			
	12V	С	25% <lo≦75%< td=""><td>90</td><td>74</td></lo≦75%<>	90	74			
			lo≦25%	90	76			
			75% <lo≦100%< td=""><td>69</td><td>64</td></lo≦100%<>	69	64			
		D	25% <lo≦75%< td=""><td>79</td><td>68</td></lo≦75%<>	79	68			
			lo≦25%	88	77			
			75% <lo≦100%< td=""><td>79</td><td>84</td></lo≦100%<>	79	84			
		E	25% <lo≦75%< td=""><td>90</td><td>86</td></lo≦75%<>	90	86			
Convection			lo≦25%	90	85			
COnvection			75% <lo≦100%< td=""><td>90</td><td>73</td></lo≦100%<>	90	73			
		A	25% <lo≦75%< td=""><td>90</td><td>74</td></lo≦75%<>	90	74			
			lo≦25%	90	76			
			75% <lo≦100%< td=""><td>83</td><td>69</td></lo≦100%<>	83	69			
		В	25% <lo≦75% 86<="" td=""><td>72</td></lo≦75%>		72			
			lo≦25%	90	84           84           80           75           82           81           75           74           76           64           68           77           84           86           85           73           74           76			
			75% <lo≦100%< td=""><td>89</td><td>63</td></lo≦100%<>	89	63			
	24, 48V	С	25% <lo≦75%< td=""><td>90</td><td>71</td></lo≦75%<>	90	71			
			lo≦25%	83	73			
			75% <lo≦100%< td=""><td>71</td><td>53</td></lo≦100%<>	71	53			
		D	25% <lo≦75%< td=""><td>77</td><td>66</td></lo≦75%<>	77	66			
			lo≦25%	88	75			
			75% <lo≦100%< td=""><td>90</td><td>83</td></lo≦100%<>	90	83			
		E	25% <lo≦75%< td=""><td>90</td><td>84</td></lo≦75%<>	90	84			
			lo≦25%	90	83			
Forood cir	12 - 48V	A,B,C,	70% <lo≦100%< td=""><td>75</td><td>75</td></lo≦100%<>	75	75			
Forced air	12 - 48V	D,E,F	lo≦70%	75	75			

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

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

Cooling	Mounting		Average ambient	Life expectancy	
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
	3.3 - 12V		Ta=30℃ or less	10years or more	7years
Convection	5.5 - 12V	A,B,C,	Ta=40℃	10years or more	3years
COnvection	15. 24V	D,E	Ta=30℃ or less	10years or more	10years or more
	10, 24 V		Ta=40℃	10years or more	7years
Forced air	3.3 - 24V	A,B,C,	Ta=40℃ or less	5years	5years
FUICED all	J.J - 24V	D,E,F	Ta=50℃	5years	3years

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

Cooling	Voltage	Mounting	Average ambient	Life exp	ectancy			
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>			
		A,C,D	Ta=30℃ or less	10years or more	10years or more			
	3.3, 12,	A,C,D	Ta=40℃	10years or more	6years			
	24, 36,	В	Ta=25℃ or less	10years or more	10years or more			
	24, 30, 48V	D	Ta=35℃	10years or more	10years or more			
	40 V	Е	Ta=20℃ or less	10years or more	10years or more			
Convection			Ta=30℃	10years or more	8years			
COnvection			Ta=25℃ or less	10years or more	10years or more			
		A,B,D	Ta=35℃	10years or more	5years			
	5, 15V	С	Ta=30℃ or less	10years or more	10years or more			
	5, 150	5, ISV	5, 15V	5, 150	C	Ta=40℃	10years or more	6years
		E	Ta=20℃ or less	10years or more	10years or more			
		E	Ta=30℃	10years or more	10years or more			
Forced air	3.3 - 48V	A,B,C,	Ta=40℃ or less	5years	5years			
I UICEU all	J.J - 40V	D,E,F	Ta=50℃	5years	3years			

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

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

#### Table 6.16 Life expectancy (LHA100F--SN)

					,
Cooling	Voltage	Mounting Average ambier		Life expectancy	
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
	5V	A,B,C,	Ta=20℃ or less	10years or more	7years
	οv	D,E	Ta=30°C	8years	3years
0	12 - 48V	A,B,	Ta=25℃ or less	10years or more	10years or more
Convection		C,E	Ta=35℃	9years	5years
	12 - 40V	D	Ta=15℃ or less	10years or more	10years or more
		D	Ta=25℃	10years or more	10years or more
Forced air	5 - 48V	A,B,C,	Ta=40℃ or less	5years	5years
I UICEU all	J-40V	D,E,F	Ta=50℃	5years	3years

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

Ta=60℃ or less

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

Mounting Average ambient

Method temperature (year)

Ta=45℃

Ta=50℃

Ta=55℃

Ta=55℃

Ta=70℃

A,C

B,D,E

A,C,E

B,D

A,B,C,

D,E,F

Life expectancy

75%<lo≦100%

6years

3years

6years

3years

9years

4years

6years

5years

3years

lo≦75%

5years

5years

6years

Ta=45℃ or less 10years or more 10years or more

7years

5years

5years

Ta=35℃ or less 10years or more

Ta=40℃ or less 10years or more

Ta=45℃ or less 10years or more

Voltaga	Mounting	Average ambient	Life exp	ectancy
vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
	ACE	Ta=35℃ or less	10years or more	7years
2 2 101/	A,C,E	Ta=45℃	7years	3years
3.3 - 12V	вD	Ta=40℃ or less	10years or more	8years
	в,0	Ta=50℃	8years	4years
	A,C,E	Ta=40℃ or less	10years or more	10years or more
15 241/		Ta=50℃	10years or more	6years
13, 24 V		Ta=45℃ or less	10years or more	10years or more
	D,D	Ta=55℃	10years or more	8years
22 241/	A,B,C,	Ta=60℃ or less	5years	5years
3.3 - 24 V	D,E,F	Ta=70℃	5years	3years
	Voltage 3.3 - 12V 15, 24V 3.3 - 24V	Voltage         Method           3.3 - 12V         A,C,E           3.3 - 12V         B,D           15, 24V         B,D           3.3 - 24V         A,B,C,E	Voltage         Method         temperature (year)           3.3 - 12V         A,C,E         Ta=35°C or less Ta=45°C           B,D         Ta=40°C or less Ta=50°C           A,C,E         Ta=40°C or less Ta=50°C           B,D         Ta=40°C or less Ta=50°C           B,D         Ta=45°C or less Ta=55°C           3.3 - 24V         A,B,C,         Ta=60°C or less	

■Life expectancy

Voltage

3.3 - 12V

15, 24V

3.3 - 24V

Cooling

Method

Convection

Forced air



Cooling	Voltage	Mounting	Average ambient	Life exp	ectancy
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C	Ta=20℃ or less	10years or more	10years or more
		A,D,C	Ta=30℃	10years or more	3years
	12V	D	Ta=10℃ or less	10years or more	10years or more
	IZV	D	Ta=20℃	10years or more	10years or more
		Е	Ta=15℃ or less	10years or more	9years
Convection		E	Ta=25℃	9years	4years
Convection		A,B,C	Ta=25℃ or less	10years or more	9years
			Ta=35℃	9years	4years
	24 - 48V	D	Ta=10℃ or less	10years or more	10years or more
	24 - 40V		Ta=20℃	10years or more	10years or more
		Е	Ta=20℃ or less	10years or more	10years or more
		E	Ta=30°C	10years or more	7years
Forced air	10 401/	A,B,C,	Ta=40℃ or less	5years	5years
FUICED all	12 - 48V	D,E,F	Ta=50℃	5years	3years

#### Table 6.17 Life expectancy (LHA150F--SN)

#### Table 6.18 Life expectancy (LHA300F--SNY)

Cooling	Voltage	Mounting Average ambient		Life expectancy				
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>			
			Ta=10℃ or less	10years or more	9years			
	12V	A,B,C,D	Ta=20°C	10years or more	4years			
	121	E	Ta=5℃ or less	10years or more	9years			
Convection		E	Ta=15℃	10years or more	4years			
Convection	04 4014	A,B,C	Ta=25℃ or less	10years or more	6years			
			Ta=35℃	6years	3years			
	24, 48V		Ta=15℃ or less	10years or more	10years or more			
		D,E	Ta=25℃	10years or more	5years			
Forced air	12 - 48V	A,B,C,	Ta=40℃ or less	5years	5years			
FUICED all	12 - 40V	D,E,F	Ta=50℃	5years	3years			

#### ■Warranty

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

Cooling	Vallage	Mounting	Average ambient	War	ranty
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,C	Ta=35℃ or less	5years	5years
	3.3 - 12V	A,C	Ta=45℃	5years	3years
Convection	5.5 - 120	B,D,E	Ta=40℃ or less	5years	5years
Convection			Ta=50℃	5years	3years
	15, 24V	A,B,C,	Ta=45℃ or less	5years	5years
		D,E	Ta=55℃	5years	3years
	22 241/	A,B,C,	Ta=60℃ or less	5years	5years
Forced air	3.3 - 24V	D,E,F	Ta=70℃	5years	3years

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

		M	A	14/	, 
Cooling	Voltage	Mounting	Average ambient	vvar	ranty
Method	voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,C,E	Ta=35℃ or less	5years	5years
	3.3 - 12V	A,C,E	Ta=45℃	5years	3years
	3.3 - 120	B,D	Ta=40℃ or less	5years	5years
Convection		ь,0	Ta=50℃	5years	3years
COnvection	15, 24V	A,C,E	Ta=40℃ or less	5years	5years
			Ta=50℃	5years	3years
	13, 24 v	ВD	Ta=45℃ or less	5years	5years
		B,D	Ta=55℃	5years	3years
Earoad air	22 241/	A,B,C,	Ta=60℃ or less	5years	5years
Forced air	3.3 - 24V	D,E,F	Ta=70℃	5years	3years

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

			,		
Cooling	Voltage	Mounting	Average ambient	Warı	anty
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
Convection	3.3 - 48V	A,B,C,	Ta=30℃ or less	5years	5years
Convection	3.3 - 40V	D,E	Ta=40℃	5years	3years
Forced air	3.3 - 48V	A,B,C,	Ta=40℃ or less	5years	5years
Forced all		D,E,F	Ta=50℃	5years	3years

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

Cooling	Valtara	Mounting	Average ambient	War	ranty
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,C,D	Ta=30℃ or less	5years	5years
	3.3, 12,	A,C,D	Ta=40℃	5years	3years
	24, 36,	В	Ta=25℃ or less	5years	5years
	24, 30, 48V	D	Ta=35℃	5years	3years
	40 V	E	Ta=20℃ or less	5years	5years
Convection		E	Ta=30℃	5years	3years
Convection		A,B,D C	Ta=25℃ or less	5years	5years
			Ta=35℃	5years	3years
	5, 15V		Ta=30℃ or less	5years	5years
	5, 150		Ta=40℃	5years	3years
		E	Ta=20℃ or less	5years	5years
			Ta=30℃	5years	3years
Forced air	22 401/	A,B,C,	Ta=40℃ or less	5years	5years
	3.3 - 48V	D,E,F	Ta=50℃	5years	3years

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

Cooling	Valtaga	Mounting	Average ambient	Warı	ranty
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C	Ta=20℃ or less	5years	5years
	3.3, 5V	A,D,C	Ta=30℃	5years	3years
	3.3, 5V	D,E	Ta=15℃ or less	5years	5years
		D,E	Ta=25℃	5years	3years
Convection	12 - 48V	A,B	Ta=30℃ or less	5years	5years
Convection		А,Б	Ta=40℃	5years	3years
		C,E	Ta=25℃ or less	5years	5years
	12 - 40V	U,E	Ta=35℃	5years	3years
		D	Ta=15℃ or less	5years	5years
			Ta=25℃	5years	3years
Forced air	3.3 - 48V	A,B,C,	Ta=40℃ or less	5years	5years
	3.3 - 48V	D,E,F	Ta=50℃	5years	3years

#### Table 6.24 Warranty (LHA100F--SN)

			• •	,	
Cooling	Valtana	Mounting	Average ambient	War	ranty
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
	5V	A,B,C,	Ta=20℃ or less	5years	5years
	50	D,E	Ta=30℃	5years	3years
Convection	12 - 48V	A,B,	Ta=25℃ or less	5years	5years
COnvection		C,E	Ta=35℃	5years	3years
		D	Ta=15℃ or less	5years	5years
			Ta=25℃	5years	3years
Forced air	E 40\/	A,B,C,	Ta=40°C or less	5years	5years
Forced air	5 - 48V	D,E,F	Ta=50℃	5years	3years



Cooling	Voltage	Mounting	Average ambient	Wari	ranty
Method	vollage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>
		A,B,C	Ta=20℃ or less	5years	5years
		A,D,C	Ta=30℃	5years	3years
	12V	D	Ta=10℃ or less	5years	5years
	12.0		Ta=20℃	5years	3years
		Е	Ta=15℃ or less	5years	5years
Convection		E	Ta=25℃	5years	3years
COnvection		A,B,C	Ta=25℃ or less	5years	5years
			Ta=35℃	5years	3years
	24 - 48V		Ta=10℃ or less	5years	5years
	24 - 40 V	D	Ta=20℃	5years	3years
		Е	Ta=20℃ or less	5years	5years
		E	Ta=30℃	5years	3years
Forced air	10 401/	A,B,C,	Ta=40℃ or less	5years	5years
	12 - 48V	/ D,E,F	Ta=50℃	5years	3years

#### Table 6.25 Warranty (LHA150F--SN)

#### Table 6.26 Warranty (LHA300F--SNY)

Cooling	Voltogo	Mounting	Average ambient	Warranty		
Method	Voltage	Method	temperature (year)	lo≦75%	75% <lo≦100%< td=""></lo≦100%<>	
		A,B,C,D	Ta=10℃ or less	5years	5years	
	12V		Ta=20℃	5years	3years	
		E	Ta=5℃ or less	5years	5years	
0			Ta=15℃	5years	3years	
Convection		A,B,C	Ta=25℃ or less	5years	5years	
		A,B,C	Ta=35℃	5years	3years	
		24, 48V	24, 40V	<b>D F</b>	Ta=15℃ or less	5years
		D,E	Ta=25℃	5years	3years	
Forced air	12 - 48V	air 12 - 48V	A,B,C,	Ta=40℃ or less	5years	5years
Forced all			D,E,F	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.

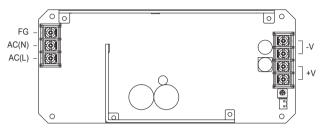


Fig.6.3 Example of option -T

### -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.

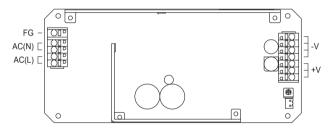


Fig.6.4 Example of option -T4

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

Туре	Manufacturer	Wire size	Model	Crimp tool
		AWG 16	AI1.5-10BK	CRIMPFOX
Square type	Phoenix Contact	AWG 18	AI1-10RD	
		AWG 20	AI0.5-10WH	UD6
		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.

# AC-DC Power Supplies Open Frame Instruction Manual

 $\cdot$  How to connect the Ferrule terminals and the solid wire

COSEL

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.

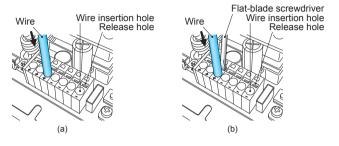


Fig.6.5 Connecting method of Ferrule terminal and Solid wire

· 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 flatblade 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.

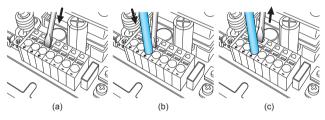


Fig.6.6 Connecting method of Stranded wire

- 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).)

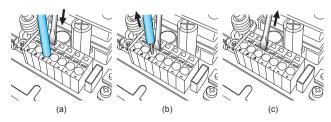
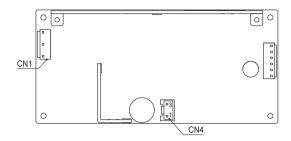


Fig.6.7 Releasing method of Ferrule terminal, Solid wire and Stranded wire

### -U1 (LHA150F,LHA300F)

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



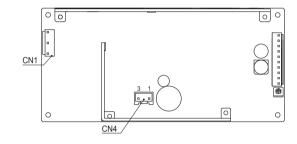


Fig.6.9 CN4 location (LHA300F---U1Y)

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

CNA

	Pir	۱ No.	Funct	ion	
	1		VC(-)		
		2			
	3		VC(	+)	
onnector		Ma conn	ting ector		Termin
				01	0) // 1

 
 Connector
 Mating connector
 Terminal

 CN4
 BH2P3-VH-1
 VHR-3N
 Chain : SVH-21T-P1.1

 Loose : BVH-21T-P1.1
 Loose : BVH-21T-P1.1
 (Mfr. J.S.T.)

Connection method

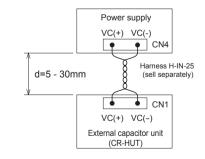
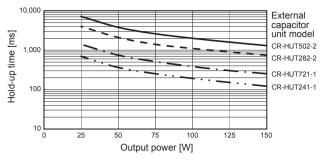
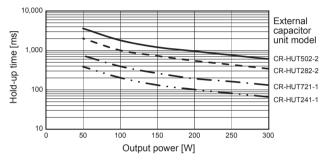


Fig.6.10 Connection method







#### 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 <b>*</b> 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 <b>*</b> 2	32.4 to 39.6
48V <b>*</b> 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.

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(LHA50F, LHA75F, LHA100F)
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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 <b>*</b> 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

COSEL

- 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.

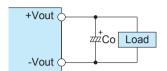


Fig.6.13 Output side external capacitor connection method

Table 6.32 Connectable External capacitor on the output side $[\mu F]$
(LHA10F, LHA15F, LHA30F, LHA50F)

Model				
	LHA10F	LHA15F	LHA30F	LHA50F
Output voltage				
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,	4 positions
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.