# MITSUBISHI ELECTRIC
## INVERTER TECHNICAL NEWS

**NAGOYA WORKS**

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**MODEL: FR-A800**

**TITLE: REGARDING THE AMOUNT OF HEAT GENERATED IN THE FR-A800 SERIES INVERTER**

1.The amount of heat generated by the FR-A800 series inverter is shown in the following tables.

200 V Class

| Model FR-A820-[ ] | | Amount of Heat Generated (W) | | | |
|---|---|---|---|---|---|
| | | SLD | LD | ND | HD |
| 0.4K | 00046 | 60 | 55 | 40 | 30 |
| 0.75K | 00077 | 95 | 85 | 60 | 40 |
| 1.5K | 00105 | 140 | 130 | 110 | 70 |
| 2.2K | 00167 | 200 | 185 | 130 | 100 |
| 3.7K | 00250 | 310 | 285 | 190 | 135 |
| 5.5K | 00340 | 355 | 320 | 240 | 160 |
| 7.5K | 00490 | 525 | 480 | 350 | 230 |
| 11K | 00630 | 570 | 515 | 370 | 280 |
| 15K | 00770 | 770 | 700 | 590 | 450 |
| 18.5K | 00930 | 950 | 850 | 720 | 600 |
| 22K | 01250 | 1000 | 950 | 880 | 840 |
| 30K | 01540 | 1450 | 1300 | 1050 | 880 |
| 37K | 01870 | 1650 | 1480 | 1270 | 1050 |
| 45K | 02330 | 2120 | 1900 | 1610 | 1300 |
| 55K | 03160 | 2750 | 2450 | 1830 | 1450 |
| 75K | 03800 | 3020 | 2710 | 2180 | 1700 |
| 90K | 04750 | 3960 | 3530 | 2700 | 2220 |

*The amount of heat generated shown assumes the following conditions:
Output current: Inverter rated current
Power supply voltage: 220V (200V class)
Carrier frequency: 2 kHz

**MODEL: FR-A800**

400 V Class

| Inverter capacity [kW] | Amount of Heat Generated (W) | | | | | |
|---|---|---|---|---|---|---|
| | FR-A840 | | | | FR-A846 (IP55) | |
| | SLD | LD | ND | HD | LD | ND |
| 0.4K | 55 | 50 | 30 | 40 | 50 | 40 |
| 0.75K | 75 | 70 | 55 | 40 | 70 | 55 |
| 1.5K | 85 | 80 | 70 | 50 | 80 | 70 |
| 2.2K | 130 | 120 | 100 | 75 | 120 | 100 |
| 3.7K | 175 | 160 | 130 | 90 | 160 | 130 |
| 5.5K | 245 | 230 | 170 | 135 | 230 | 170 |
| 7.5K | 345 | 315 | 220 | 165 | 325 | 230 |
| 11K | 370 | 345 | 280 | 210 | 370 | 295 |
| 15K | 450 | 415 | 390 | 285 | 440 | 400 |
| 18.5K | 565 | 520 | 450 | 385 | 530 | 460 |
| 22K | 740 | 675 | 520 | 450 | 700 | 545 |
| 30K | 930 | 825 | 690 | 560 | 840 | 705 |
| 37K | 1110 | 1020 | 840 | 700 | 1060 | 880 |
| 45K | 1340 | 1220 | 1020 | 860 | 1260 | 1060 |
| 55K | 2000 | 1640 | 1290 | 1060 | 1750 | 1300 |
| 75K | 2520 | 2100 | 1790 | 1350 | 2210 | 1800 |
| 90K | 3150 | 2575 | 2200 | 1770 | 2700 | 2250 |
| 110K | 3600 | 2800 | 2300 | 1850 | 2900 | 2400 |
| 132K | 4050 | 3600 | 2800 | 2250 | 3700 | 2900 |
| 160K | 4650 | 3800 | 3450 | 2650 | | |
| 185K | 5300 | 4650 | 3850 | 3400 | | |
| 220K | 5850 | 5100 | 4550 | 3700 | | |
| 250K | 6650 | 5850 | 5100 | 4500 | | |
| 280K | 7550 | 6600 | 5900 | 5050 | | |

*The amount of heat generated shown assumes the following conditions:
Output current: Inverter rated current
Power supply voltage: 440V (400V class)
Carrier frequency: 2 kHz

**MODEL: FR-A800**

The 315K or above inverter models are the separated converter type. The amount of heat generated by the inverter unit and converter unit is shown in the following tables.

400 V Class

| Converter Model FR-CC2-H[ ] | Amount of Heat Generated (W) |
|---|---|
| 315K | 2350 |
| 355K | 2600 |
| 400K | 3050 |
| 450K | 3400 |
| 500K | 3800 |

| Inverter Model FR-A842-[ ] | | Amount of Heat Generated (W) | | | |
|---|---|---|---|---|---|
| | | SLD | LD | ND | HD |
| 315K | 07700 | 5800 | 5050 | 4450 | 3900 |
| 355K | 08660 | 6690 | 5800 | 5100 | 4410 |
| 400K | 09620 | 7370 | 6480 | 5650 | 4930 |
| 450K | 10940 | 8600 | 7340 | 6500 | 5650 |
| 500K | 12120 | 9810 | 8630 | 7400 | 6490 |

*The amount of heat generated shown assumes the following conditions:
Output current: Inverter rated current
Power supply voltage: 440V (400V class)
Carrier frequency: 2 kHz

The amount of heat generated in the above table is the amount of heat generated when the inverter is operated at its rated current.
The amount of heat generated will decrease according to motor load and usage (duty).

**1) Decreasing the load factor of the motor**

The decrease rate when using a light-load compared to the rated output current of the inverter is shown in Figure 1 below.

**2) Decrease by usage (duty) rate**

Figure 2 shows the decrease by usage (duty) rate when cyclic operation is performed with five minute cycles (operation time duration of five minutes).

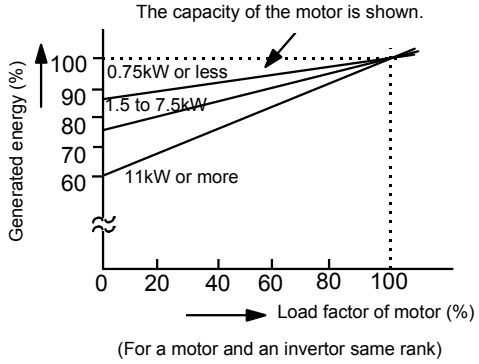


Figure 1:Load factor and generated energy

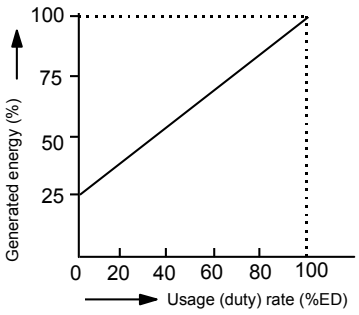


Figure 2:Usage (duty) rate and generated energy

**MODEL: FR-A800**

2. The amount of heat generated by the heatsink protrusion type inverter

When encasing an inverter to an enclosure, the heat generated in the enclosure can be greatly reduced by protruding the heatsink of the inverter outside the enclosure. When installing the inverter in a compact enclosure, etc., this installation method is recommended.
(For the detail, refer to the catalog and the Instruction Manual.)

- For the FR-A820-1.5K to 90K and the FR-A840-0.4K to 132K, the heatsink can be protruded from the enclosure using a heatsink protrusion attachment (FR-A8CN).

- For the160K or higher models, the heatsink can be protruded from the enclosure without using a heatsink protrusion attachment.

- For the 315K or above inverter models (separated converter type), protrude the heatsink from the enclosure for each of the converter and inverter units.

200 V Class

| Model FR-A820-[] | Amount of Heat Generated (W) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Heatsink Section (Outside of Enclosure) | | | | Control Section (Inside of Enclosure) | | | |
| | SLD | LD | ND | HD | SLD | LD | ND | HD |
| 1.5K | 104 | 95 | 77 | 40 | 36 | 35 | 33 | 30 |
| 2.2K | 161 | 147 | 95 | 70 | 39 | 38 | 35 | 30 |
| 3.7K | 263 | 240 | 155 | 103 | 47 | 45 | 35 | 32 |
| 5.5K | 265 | 235 | 174 | 110 | 90 | 85 | 66 | 50 |
| 7.5K | 375 | 340 | 244 | 155 | 150 | 140 | 106 | 75 |
| 11K | 405 | 365 | 261 | 190 | 165 | 150 | 109 | 90 |
| 15K | 555 | 500 | 421 | 315 | 215 | 200 | 169 | 135 |
| 18.5K | 690 | 615 | 520 | 430 | 260 | 235 | 200 | 170 |
| 22K | 700 | 665 | 620 | 595 | 300 | 285 | 260 | 245 |
| 30K | 1035 | 925 | 745 | 615 | 415 | 375 | 305 | 265 |
| 37K | 1170 | 1040 | 895 | 735 | 480 | 440 | 375 | 315 |
| 45K | 1520 | 1360 | 1150 | 920 | 600 | 540 | 460 | 380 |
| 55K | 1960 | 1740 | 1280 | 1000 | 790 | 710 | 550 | 450 |
| 75K | 2165 | 1930 | 1530 | 1180 | 855 | 780 | 650 | 520 |
| 90K | 2860 | 2530 | 1925 | 1560 | 1100 | 1000 | 775 | 660 |

* The amount of heat generated shown assumes the following conditions:
Output current: Inverter rated current
Power supply voltage: 220V (200V class)
Carrier frequency: 2 kHz

**MODEL: FR-A800**

400 V Class

| Model FR-A840-[] | Amount of Heat Generated (W) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Heatsink Section (Outside of Enclosure) | | | | Control Section (Inside of Enclosure) | | | |
| | SLD | LD | ND | HD | SLD | LD | ND | HD |
| 0.4K | 20 | 18 | 12 | 6 | 35 | 32 | 28 | 24 |
| 0.75K | 36 | 32 | 23 | 12 | 39 | 38 | 32 | 28 |
| 1.5K | 42 | 39 | 33 | 19 | 43 | 41 | 37 | 31 |
| 2.2K | 77 | 71 | 57 | 38 | 53 | 49 | 43 | 37 |
| 3.7K | 120 | 109 | 86 | 53 | 55 | 51 | 44 | 37 |
| 5.5K | 180 | 170 | 120 | 90 | 65 | 60 | 50 | 45 |
| 7.5K | 260 | 235 | 160 | 115 | 85 | 80 | 60 | 50 |
| 11K | 260 | 245 | 195 | 145 | 110 | 100 | 85 | 65 |
| 15K | 315 | 290 | 275 | 200 | 135 | 125 | 115 | 85 |
| 18.5K | 395 | 360 | 310 | 265 | 170 | 160 | 140 | 120 |
| 22K | 510 | 465 | 360 | 305 | 230 | 210 | 160 | 145 |
| 30K | 655 | 575 | 480 | 385 | 275 | 250 | 210 | 175 |
| 37K | 780 | 720 | 590 | 485 | 330 | 300 | 250 | 215 |
| 45K | 970 | 880 | 740 | 610 | 370 | 340 | 280 | 250 |
| 55K | 1400 | 1140 | 890 | 730 | 600 | 500 | 400 | 330 |
| 75K | 1780 | 1470 | 1250 | 925 | 740 | 630 | 540 | 425 |
| 90K | 2235 | 1820 | 1540 | 1230 | 915 | 755 | 660 | 540 |
| 110K | 2540 | 1960 | 1590 | 1260 | 1060 | 840 | 710 | 590 |
| 132K | 2830 | 2500 | 1950 | 1570 | 1220 | 1100 | 850 | 680 |
| 160K | 3250 | 2660 | 2410 | 1850 | 1400 | 1140 | 1040 | 800 |
| 185K | 3700 | 3250 | 2690 | 2380 | 1600 | 1400 | 1160 | 1020 |
| 220K | 4090 | 3570 | 3180 | 2590 | 1760 | 1530 | 1370 | 1110 |
| 250K | 4650 | 4090 | 3570 | 3150 | 2000 | 1760 | 1530 | 1350 |
| 280K | 5280 | 4620 | 4130 | 3530 | 2270 | 1980 | 1770 | 1520 |

* The amount of heat generated shown assumes the following conditions:
  Output current: Inverter rated current
  Power supply voltage: 440V (400V class)
  Carrier frequency: 2 kHz

**MODEL: FR-A800**

The 315K or above inverter models are the separated converter type.
The amount of heat generated by the inverter unit and converter unit is shown in the following tables.

Converter Unit

| Converter Model FR-CC2-H[] | Amount of Heat Generated (W) | |
|---|---|---|
| | Heatsink Section (Outside of Enclosure) | Control Section (Inside of Enclosure) |
| 315K | 1640 | 710 |
| 355K | 1820 | 780 |
| 400K | 2130 | 920 |
| 450K | 2380 | 1020 |
| 500K | 2660 | 1140 |

Inverter Unit

| Inverter Model FR-A842-[] | Amount of Heat Generated (W) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Heatsink Section (Outside of Enclosure) | | | | Control Section (Inside of Enclosure) | | | |
| | SLD | LD | ND | HD | SLD | LD | ND | HD |
| 315K | 4060 | 3530 | 3110 | 2730 | 1740 | 1520 | 1340 | 1170 |
| 355K | 4680 | 4060 | 3570 | 3080 | 2010 | 1740 | 1530 | 1330 |
| 400K | 5160 | 4530 | 3950 | 3450 | 2210 | 1950 | 1700 | 1480 |
| 450K | 6020 | 5140 | 4550 | 3950 | 2580 | 2200 | 1950 | 1700 |
| 500K | 6860 | 6040 | 5180 | 4540 | 2950 | 2590 | 2220 | 1950 |

* The amount of heat generated shown assumes the following conditions:
  Output current: Inverter rated current
  Power supply voltage: 440V (for 400V class)
  Carrier frequency: 2 kHz