

Cable and Wire Conversion

Busway is quick and easy to install. Using busway can save up to 30% of the total cost of using cable. And it takes approximately half the time to install compared with cable.

High overload capacity: All insulation materials used in busway is Class B (130°C) while cable is generally rated at 95°C and 105°C. Therefore, the overload capacity of the busway is much higher than that of cables.

WavePro LT has good heat dissipation performance; Insulating layers of cables (core insulation and outer insulation) are insulating electrically as well as thermally, while the busway disperses heat through convection and radiates heat through the tightly connected housing. Busway has superior heat dissipation performance compared with cable.

WavePro LT busway weight

weight: (kg/m)

| Rated current (A) | Copper busbar 4W | Copper busbar 5W | Aluminium busbar 4W | Aluminium busbar 5W |
|-------------------|------------------|------------------|---------------------|---------------------|
| 100 | ~ | ~ | 8.8 | 9.2 |
| 160 | ~ | ~ | 8.8 | 9.2 |
| 200 | ~ | ~ | 8.8 | 9.2 |
| 250 | 12.5 | 13.4 | 8.8 | 9.2 |
| 400 | 12.5 | 13.4 | 9.9 | 10.3 |
| 500 | ~ | ~ | 11.0 | 11.5 |
| 630 | 14.8 | 15.9 | 12.0 | 12.7 |
| 800 | 17.4 | 18.8 | 14.1 | 15.0 |
| 1000 | 21.5 | 23.3 | 15.8 | 16.8 |
| 1250 | 26.6 | 29.0 | 18.9 | 20.1 |
| 1350 | 27.9 | 30.5 | 20.5 | 22.0 |
| 1600 | 34.4 | 37.8 | 22.7 | 24.3 |
| 2000 | 43.6 | 48.0 | 26.9 | 29.0 |
| 2500 | 59.3 | 65.5 | 32.2 | 34.9 |
| 3150 | 72.6 | 80.2 | 48.0 | 51.9 |
| 3800 | 85.7 | 94.8 | 57.9 | 62.8 |
| 4000 | 91.0 | 100.6 | 62.3 | 67.6 |
| 4500 | 114.6 | 126.9 | ~ | ~ |
| 5000 | 125.1 | 138.6 | ~ | ~ |

2000A, 3P4W

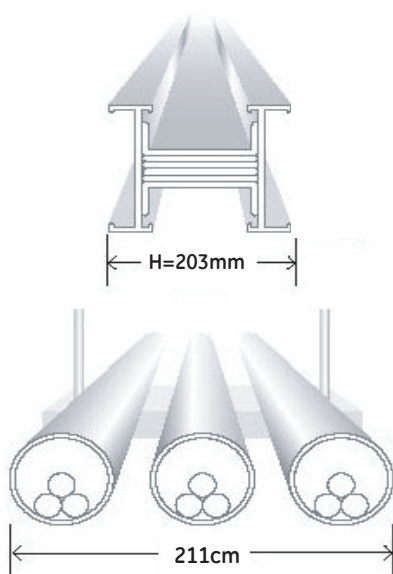


fig.8-1

WavePro LT busway dimension

Size: mm

| Rated current (A) | Copper busbar (H) | Aluminium busbar (H) |
|-------------------|-------------------|----------------------|
| 100 | ~ | 88 |
| 160 | ~ | 88 |
| 200 | ~ | 88 |
| 250 | 90 | 88 |
| 400 | 90 | 98 |
| 500 | ~ | 108 |
| 630 | 93 | 118 |
| 800 | 103 | 138 |
| 1000 | 131 | 153 |
| 1250 | 138 | 183 |
| 1350 | 143 | 198 |
| 1600 | 168 | 218 |
| 2000 | 203 | 258 |
| 2500 | 263 | 308 |
| 3150 | 340 | 460 |
| 3800 | 390 | 550 |
| 4000 | 410 | 590 |
| 4500 | 500 | ~ |
| 5000 | 540 | ~ |

table.8-2

Typical application of Cable and Busway system

Below are the drawings to show the differences of typical application between cable and busway system. Cable system requires one separate cable for each power terminal. Busway system uses a main power supply busway and separate the current close to the power terminal. It saves installation space and make the whole system more safe.

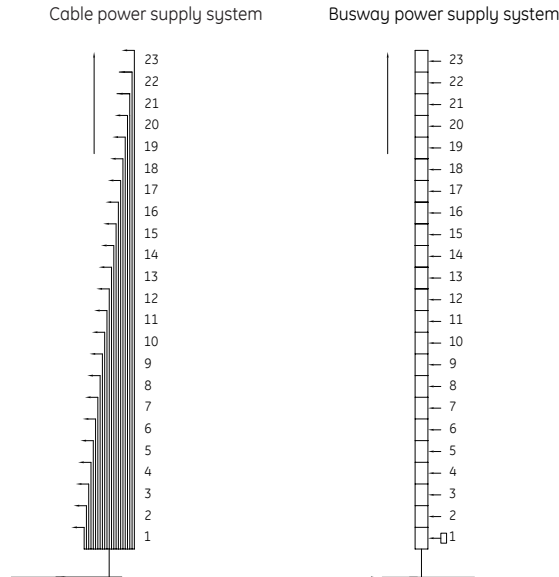


fig.9-1

| Item | Busway | Cable |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| From transformer to incoming cubicle | Max current of busway is up to 5000A, and can match transformers upto 2.5MVA. Busway is 100% load rated and in its own housing, with ground. | Higher currents require additional cables per phase, installed in separate housings and derating. Additional cable ground is required. |
| Power supply control of multistage buildings | Riser busways for distributed power to each floor enables reduced switchboard sizing | Multiple circuits are required to each floor requiring larger riser space and multiple MCCB's in the main switchboard |

table.9-1

Performance and price comparison of busway, cable

| Item | Description | Busway | Cable |
|------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| 1 | Long-term investment cost | Less than cable 50~60%, less than branch cable 60~70%. | Higher than bus 50~60% |
| 2 | Depreciation Rate (Annually) | 2% | 5~8% |
| 3 | Life | 50 years | 15~20 years |
| 4 | Insulation performance | $\geq 20M\Omega$ | $\geq 5M\Omega$ |
| 5 | Alteration loss rate | 10~20% | 70~80% |
| 6 | Occupying area | reduced size | large cable tray sizing |
| 7 | Current carrying capacity | Large current up to 5000A, applicable for many circumstances. | Multiple cables per phase to suit current required, up to 1600A, poor application range. |
| 8 | Mechanical strength | Strong mechanical strength, high protection degree, applicable for large span installation. | Cable tray must be added. |
| 9 | Feature and dimension | Customized color, small volume, sandwich configuration. | Large volume |
| 10 | Current branch | Offering multi plug outlets for plug to increase branch circuits without disconnecting power supply, easy installation. | Main power supply and cable must be disconnected. |
| 11 | Over loading capacity | Maximum temperature of insulation material is 130°C, short time over load capacity, excellent heat dissipation. | Maximum operation temperature of insulation lagging and outer coating 105°C, poor over loading capacity. |
| 12 | Installation and maintenance | Easy installation and disassembly, Positive to do electric check for branch circuit without disconnecting main power supply. | The main power supply has to be disconnected down when checking either of the branch circuit. |
| 13 | Maintenance | Easy maintenance, without maintenance degradation. | Difficult maintenance, with maintenance degradation. |
| 14 | Flexibility | Spare circuit bus plug helps recover power supply during system error, steady power supply system, flexible for extension and upgrade. | Negative to do electric check during accident, delayed power recovery. |

table.9-2

Electrical Characteristics

WavePro LT busway's all-aluminum and aluminum alloy housing provides an extremely low impedance ground path with small resistance (reduce watt losts) for both copper and aluminum systems.

Plug-in outlet grounding is supplied with tin-plated copper tabs bolted to the plug in box housing for superior continuity through standard bus plug ground stabs. Optional internal ground busbar (50% or 100% capacity) is also available to provide a complete system.

Grounding bar resistance of WavePro LT busway system (Temperature=20°C):

**DC resistance Copper bar
(Internal 50% ground bus)**

| No. | Rated current (A) | Resistance ($10^{-6}\Omega/m$) |
|-----|-------------------|----------------------------------|
| 1 | 250 | 234.1 |
| 2 | 400 | 234.1 |
| 3 | 630 | 179.1 |
| 4 | 800 | 151.9 |
| 5 | 1000 | 106.6 |
| 6 | 1250 | 82.4 |
| 7 | 1350 | 81.0 |
| 8 | 1600 | 69.2 |
| 9 | 2000 | 50.0 |
| 10 | 2500 | 40.5 |
| 11 | 3150 | 28.9 |
| 12 | 3800 | 24.8 |
| 13 | 4000 | 23.3 |
| 14 | 4500 | 18.8 |
| 15 | 5000 | 17.4 |

table.10-1

**DC resistance Copper bar
(Internal 50% ground bus + Integrated housing ground)**

| No. | Rated current (A) | Resistance ($10^{-6}\Omega/m$) |
|-----|-------------------|----------------------------------|
| 1 | 250 | 117.1 |
| 2 | 400 | 117.1 |
| 3 | 630 | 89.6 |
| 4 | 800 | 76.0 |
| 5 | 1000 | 53.3 |
| 6 | 1250 | 41.2 |
| 7 | 1350 | 40.5 |
| 8 | 1600 | 34.6 |
| 9 | 2000 | 25.0 |
| 10 | 2500 | 20.3 |
| 11 | 3150 | 14.4 |
| 12 | 3800 | 12.4 |
| 13 | 4000 | 11.7 |
| 14 | 4500 | 9.4 |
| 15 | 5000 | 8.7 |

table.10-2

**DC resistance Aluminium bar
(Internal 50% ground bus)**

| No. | Rated current (A) | Resistance ($10^{-6}\Omega/m$) |
|-----|-------------------|----------------------------------|
| 1 | 100 | 342.7 |
| 2 | 160 | 342.7 |
| 3 | 200 | 342.7 |
| 4 | 250 | 342.7 |
| 5 | 400 | 259.8 |
| 6 | 500 | 210.7 |
| 7 | 630 | 178.1 |
| 8 | 800 | 138.0 |
| 9 | 1000 | 119.4 |
| 10 | 1250 | 102.9 |
| 11 | 1350 | 86.1 |
| 12 | 1600 | 76.9 |
| 13 | 2000 | 63.3 |
| 14 | 2300 | 56.4 |
| 15 | 2500 | 52.7 |
| 16 | 3150 | 35.0 |
| 17 | 3800 | 28.6 |
| 18 | 4000 | 25.2 |

table.10-3

**DC resistance Aluminium bar
(Internal 50% ground bus + Integrated housing ground)**

| No. | Rated current (A) | Resistance ($10^{-6}\Omega/m$) |
|-----|-------------------|----------------------------------|
| 1 | 100 | 171.3 |
| 2 | 160 | 171.3 |
| 3 | 200 | 171.3 |
| 4 | 250 | 171.3 |
| 5 | 400 | 129.9 |
| 6 | 500 | 105.3 |
| 7 | 630 | 89.0 |
| 8 | 800 | 69.0 |
| 9 | 1000 | 59.7 |
| 10 | 1250 | 51.4 |
| 11 | 1350 | 43.0 |
| 12 | 1600 | 38.5 |
| 13 | 2000 | 31.7 |
| 14 | 2300 | 28.2 |
| 15 | 2500 | 26.3 |
| 16 | 3150 | 17.5 |
| 17 | 3800 | 14.3 |
| 18 | 4000 | 12.6 |

table.10-4

Short-circuit current ratings

The WavePro LT busway provides predictable, consistent strength and high short-circuit ratings.

WavePro busway is third party certified by KEMA to be in compliance with IEC60439-1 and-2 short circuit withstand test for 1 second.

Copper conductor

| Rated current (A) | Rated short-time withstand current (kA) | Rated peak withstand current (kA) |
|-------------------|-----------------------------------------|-----------------------------------|
| 250~800 | 30 | 63 |
| 1000~1600 | 50 | 105 |
| 2000~2500 | 65 | 143 |
| 3150~5000 | 100 | 220 |

table.11-1

lcw@1s

Aluminium conductor

| Rated current (A) | Rated short-time withstand current (kA) | Rated peak withstand current (kA) |
|-------------------|-----------------------------------------|-----------------------------------|
| 100~250 | 10 | 17 |
| 400~500 | 20 | 40 |
| 630~800 | 30 | 63 |
| 1000~2500 | 50 | 105 |
| 3150~4000 | 80 | 176 |

table.11-2

lcw@1s

Ambient temperature's influence on application

Within the ambient temperature of 40°C, WavePro LT busway system can continuously operate at rated current while the maximum housing temperature rise won't exceed 55 K.

If the busway continuously operated at higher ambient temperature, it should be derated first, i.e. the busway current-carrying capacity = rated current x de-rating factor. (As shown in tables)

| Ambient temperature (°C) | Factor |
|--------------------------|--------|
| 40 | 1.00 |
| 45 | 0.95 |
| 50 | 0.90 |
| 55 | 0.85 |
| 60 | 0.80 |
| 65 | 0.74 |
| 70 | 0.67 |

table.11-3

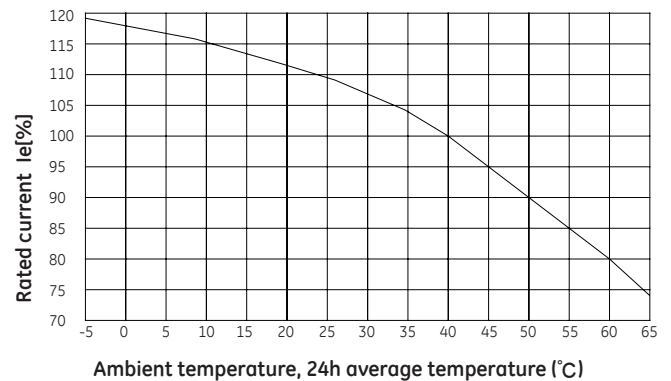


table.11-4

Electrical Characteristics

Resistance, reactance, impedance and voltage drop

WavePro LT busway has low voltage-drop values. Minimum reactance (X) is due to very close bar spacings (sandwiched construction) and a non-magnetic housing. Values shown are identical for plug-in and feeder.

50 Hz values shown. For 60 Hz, multiply reactance (X) by 1.2048 and resistance values do not change. For 400 Hz, multiply reactance by 4.6988 and multiply resistance by 1.4. Calculate new voltage drop $V_d = \text{amps load} \times \sqrt{3} (R \cos Q + X \sin Q) \text{ m}$, where $\cos Q = \text{Power Factor}$. Contact your local GE representative for help with electrical calculations.

Copper busbar (50 Hz, temperature=20°C)

| Rated current (A) | Resistance | Reactance (10 ⁻⁶ Ω/m) | Impedance | Voltage drop (V/m) | | | | |
|-------------------|------------|-------------------------------------|-----------|--------------------|-------|-------|-------|-------|
| | | | | Power factor cos φ | | | | |
| | | | | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| 250 | 122.0 | 22.4 | 124.0 | 0.039 | 0.044 | 0.048 | 0.052 | 0.053 |
| 400 | 122.0 | 22.4 | 124.0 | 0.063 | 0.070 | 0.077 | 0.083 | 0.084 |
| 630 | 89.6 | 32.1 | 95.1 | 0.087 | 0.093 | 0.099 | 0.103 | 0.098 |
| 800 | 70.5 | 27.4 | 75.7 | 0.089 | 0.095 | 0.101 | 0.105 | 0.098 |
| 1000 | 55.5 | 18.1 | 58.4 | 0.083 | 0.090 | 0.096 | 0.100 | 0.096 |
| 1250 | 41.2 | 20.7 | 46.1 | 0.089 | 0.094 | 0.098 | 0.100 | 0.089 |
| 1350 | 40.5 | 18.3 | 44.4 | 0.091 | 0.097 | 0.101 | 0.104 | 0.095 |
| 1600 | 32.1 | 16.6 | 36.2 | 0.090 | 0.095 | 0.099 | 0.100 | 0.089 |
| 2000 | 25.0 | 14.2 | 28.8 | 0.091 | 0.096 | 0.099 | 0.100 | 0.087 |
| 2500 | 18.8 | 10.7 | 21.6 | 0.086 | 0.090 | 0.093 | 0.094 | 0.081 |
| 3150 | 14.4 | 9.5 | 17.3 | 0.089 | 0.092 | 0.094 | 0.094 | 0.079 |
| 3800 | 12.4 | 6.5 | 14.0 | 0.083 | 0.087 | 0.091 | 0.092 | 0.082 |
| 4000 | 11.7 | 6.3 | 13.3 | 0.083 | 0.088 | 0.091 | 0.092 | 0.081 |
| 4500 | 9.4 | 5.4 | 10.8 | 0.078 | 0.081 | 0.084 | 0.084 | 0.073 |
| 5000 | 8.7 | 5.0 | 10.0 | 0.080 | 0.084 | 0.086 | 0.087 | 0.075 |

table.12-1

Aluminium busbar (50 Hz, temperature=20°C)

| Rated current (A) | Resistance | Reactance (10 ⁻⁶ Ω/m) | Impedance | Voltage drop (V/m) | | | | |
|-------------------|------------|-------------------------------------|-----------|--------------------|-------|-------|-------|-------|
| | | | | Power factor cos φ | | | | |
| | | | | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 |
| 100 | 171.3 | 35.3 | 174.9 | 0.023 | 0.025 | 0.027 | 0.029 | 0.03 |
| 160 | 171.3 | 35.3 | 174.9 | 0.036 | 0.04 | 0.044 | 0.047 | 0.047 |
| 200 | 171.3 | 35.3 | 174.9 | 0.045 | 0.05 | 0.055 | 0.059 | 0.059 |
| 250 | 171.3 | 35.3 | 174.9 | 0.057 | 0.063 | 0.069 | 0.073 | 0.074 |
| 400 | 129.9 | 29.5 | 133.2 | 0.07 | 0.078 | 0.084 | 0.09 | 0.09 |
| 500 | 105.3 | 25.6 | 108.4 | 0.072 | 0.08 | 0.086 | 0.092 | 0.091 |
| 630 | 89 | 22.8 | 91.9 | 0.078 | 0.086 | 0.093 | 0.098 | 0.097 |
| 800 | 69 | 19.1 | 71.6 | 0.079 | 0.086 | 0.092 | 0.098 | 0.096 |
| 1000 | 59.7 | 17.1 | 62.1 | 0.086 | 0.093 | 0.1 | 0.106 | 0.103 |
| 1250 | 47.6 | 14.5 | 49.8 | 0.087 | 0.094 | 0.101 | 0.107 | 0.103 |
| 1350 | 43 | 13.6 | 45.1 | 0.086 | 0.093 | 0.1 | 0.105 | 0.101 |
| 1600 | 38.5 | 12.5 | 40.4 | 0.092 | 0.099 | 0.106 | 0.111 | 0.107 |
| 2000 | 31.7 | 10.9 | 33.5 | 0.096 | 0.104 | 0.11 | 0.115 | 0.11 |
| 2500 | 26.3 | 9.5 | 28 | 0.101 | 0.109 | 0.116 | 0.121 | 0.114 |
| 3150 | 17.5 | 5.8 | 18.5 | 0.083 | 0.089 | 0.095 | 0.1 | 0.096 |
| 3800 | 14.3 | 5 | 15.2 | 0.083 | 0.089 | 0.095 | 0.099 | 0.094 |
| 4000 | 12.6 | 4.8 | 13.5 | 0.079 | 0.085 | 0.09 | 0.093 | 0.087 |

table.12-2

Note:
 ① Actual voltage drop = V_d (from Table) $\times \frac{\text{actual load}}{\text{rated load}}$
 ② 1 feet = 0.3048m
 Get the data/feet, please multiply the data with 0.3048.