

Our Trends for Mobile Genset

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Abstract

More than 90% of Meiden's mobile genset is delivered to power utilities. Since the Great East Japan Earthquake in 2011, however, these mobile gensets have been delivered increasingly to government and public offices and private enterprises in order to enable them to secure the Business Continuity Plan (BCP). There are several variants to meet the requirements on end-users. Such various offering are a marked difference from our identical model for power utilities.

Our unique supply of first models includes the trailer type mobile genset, mobile genset (under 5t vehicle total weight) driven with an ordinary driver's license, and a dual-voltage mobile genset (dual-voltage is a fairly common demand from an end-user).

1 Preface

When government and public offices and private enterprises introduce power generating facilities in order to realize a Business Continuity Plan (BCP), it is common to choose stationary gensets. In cases when these government and public offices and private enterprises have multiple power generating facilities, there are, however, increased cases of choosing mobile gensets since the genset can go anywhere that is accessible using public roads.

We have manufactured various unique mobile gensets to meet the various end-user's requirements. For example, these include a dual-voltage mobile genset to be commonly used for multiple different facilities, a mobile genset under 5 tons vehicle total weight for use with an ordinary driver's license, end-user such generators that are of the dual-voltage output type that can be used in common at multiple locations, generators with a gross vehicle weight of less than 5 tons that can be operated by any driver with an ordinary driver's license, and a trailer type mobile genset which can be transported to other locations by a truck when such need dictates.

Fig. 1 shows an external appearance of a trailer type mobile genset. This paper introduces the features of our mobile genset.

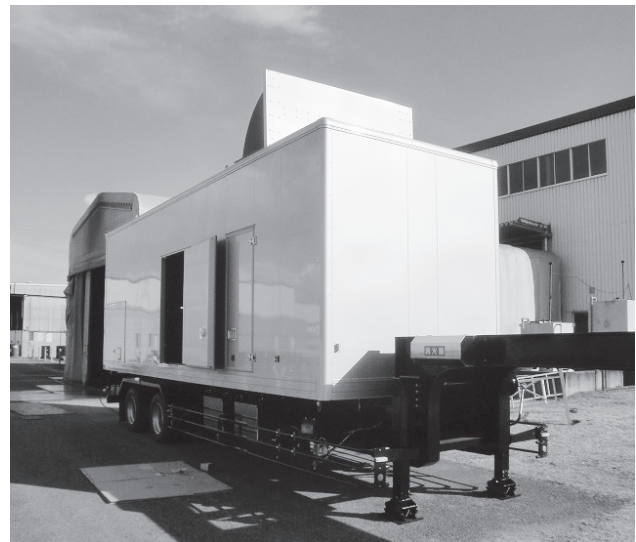


Fig. 1 Trailer Type Mobile Genset

In 2013, we released a trailer type mobile genset which was our first model.

2 Dual-Voltage Genset

The power distribution voltage can be different in various facilities such as in facilities of sewage water pumping stations in Japan, for example, where motor voltages are 400V or 200V. When a mobile genset has to be used for both voltages, the voltage switching generator is applied. For more than 20 years, we have manufactured voltage switching

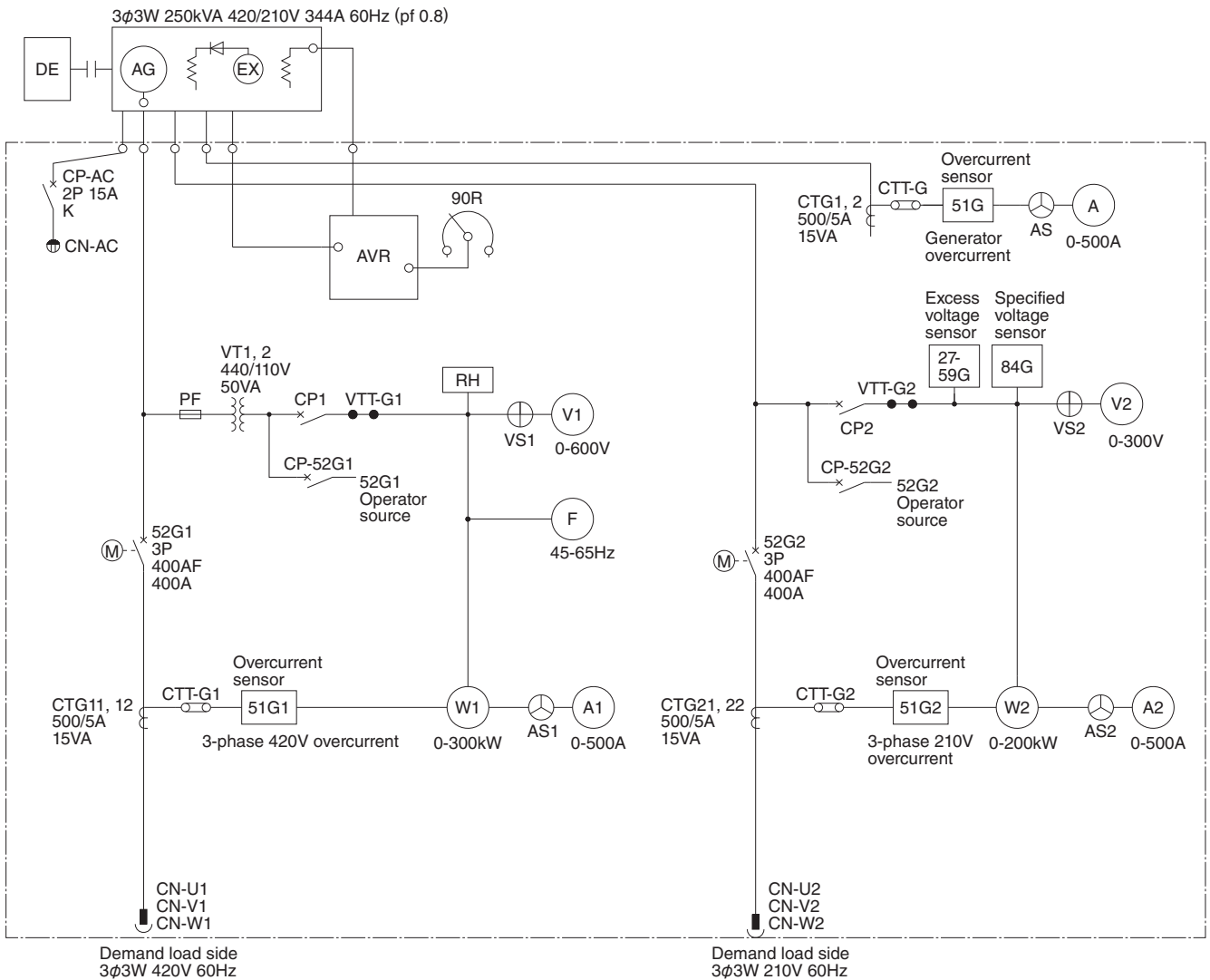


Fig. 2 Single Line Diagram of 420/210V Double Output Type Mobile Genset

Since 420V and 210V outputs are generated at the same time, each output comes with a circuit breaker and a metering circuit.

generators, such as 3300/6600V or 420/210V, etc. For these generators, connecting bars are rearranged in the generator terminal box in order to change connections of generator armature windings from series to parallel and vice versa.

For this system, it is necessary to carry out connection changeovers in the terminal box and also metering circuit changeovers on the generator control panel side. In short, operation becomes complicated. For improvements, we have adopted another system where all actions for a connection changeover can be accomplished on the switchboard side only, with the use of switches. Such an application is for the first time, for medium voltage facilities.

Another example of a dual-voltage application is when, in order to feed power to a facility having multiple feeder voltages, a single generator is devised to feed power at 420V and 210V at the same time. Generally, a transformer is used to take out power at different voltages. If such a transformer is loaded on the vehicle, however, the total weight is inevitably increased. To avoid such difficulty, the generator itself is designed to generate 420V and 210V outputs available at the same time. **Fig. 2** shows the single-line diagram of the 420V and 210V double output type mobile genset.

It is, however, impossible to generate the rated output at 420V and 210V simultaneously. **Fig. 3** shows the output characteristics.

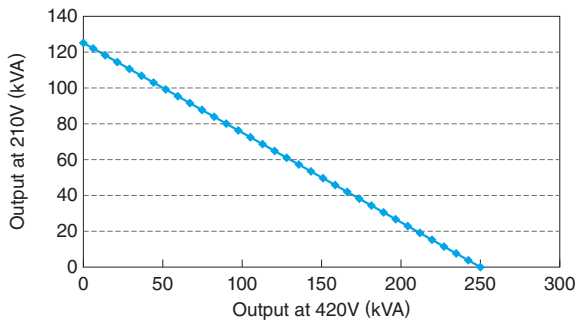


Fig. 3 Output Characteristics of 420V/210V Double Output Type Mobile Genset

At a 210V power supply, even at the maximum, the available power output is half that of the power output at 420V.



Fig. 4 Mobile Genset with Total Vehicle Weight of Less than 5 tons

This is a mobile genset for Meiden Engineering Corporation in Japan. This model can be driven by anyone with an ordinary driver's license.

3 Mobile Power Genset with Total Vehicle Weight of less than 5 tons

Fig. 4 shows an external appearance of this type of mobile genset. Formerly here in Japan, a driver with an ordinary driver's license could drive a car with a total weight not exceeding 8 tons. The license system, however, was modified on 2 June 2007, and the regulatory vehicle weight level was changed from 8 tons to 5 tons. As such, the demand has been stronger for mobile genset with total vehicle weight of less than 5 tons.

In this connection, we have improved the 80/100kVA (50/60Hz) mobile power genset to reduce one ton from the conventional model's total weight because such weight level is most popular among our customers and this capacity is our high production volume range. We realized a total vehicle weight of less than 5 tons. Key design factors to realize the lightweight design are as follows:

- (1) Compact enclosure design was realized.
- (2) Large volume of aluminum in the structural elements was used.
- (3) Cable drum was removed.

3.1 Specifications of Major Equipment

Major equipment specifications are as follows:

- (1) Generator
 - (a) Type: IP20, free-ventilation, rotating-field salient pole type
 - (b) Rated output: 80/100kVA
 - (c) Rated voltage: 210V
 - (d) Rated frequency: 50/60Hz
 - (e) No. of phases: 3
 - (f) Power factor: 80% (lagging)
 - (g) Excitation system: Self-excitation brushless type
 - (h) Parallel running: Not permissible
- (2) Prime mover (Diesel engine)
 - (a) Type: 4-cycle water-cooled with supercharger
 - (b) Rated output: 104/120kW
 - (c) Starter: Electrical
 - (d) Applicable fuel: Light oil (used in common with vehicle)
 - (e) Fuel consumption: Approx. 21L/h
 - (f) Revolving speed: 1500/1800min⁻¹
- (3) Vehicle
 - (a) Major dimensions: W4850 × H2550 × D1810mm
 - (b) Fuel tank: 150L
 - (c) Noise: 75dB or below (A) 1 meter from machine side (average in 4 positions)

4 Trailer Type Mobile Genset

In 2013, we delivered our first model, a trailer type. The delivered mobile genset is intended for use only within the premise of the end-user. It has almost no way of traveling any public roads. Even on premises, it will rarely travel; therefore, it is not economical to put the equipment on a truck platform. As such, we selected a platform without a truck. Since a trailer has no prime mover, it is very easy to carry out maintenance and inspection.

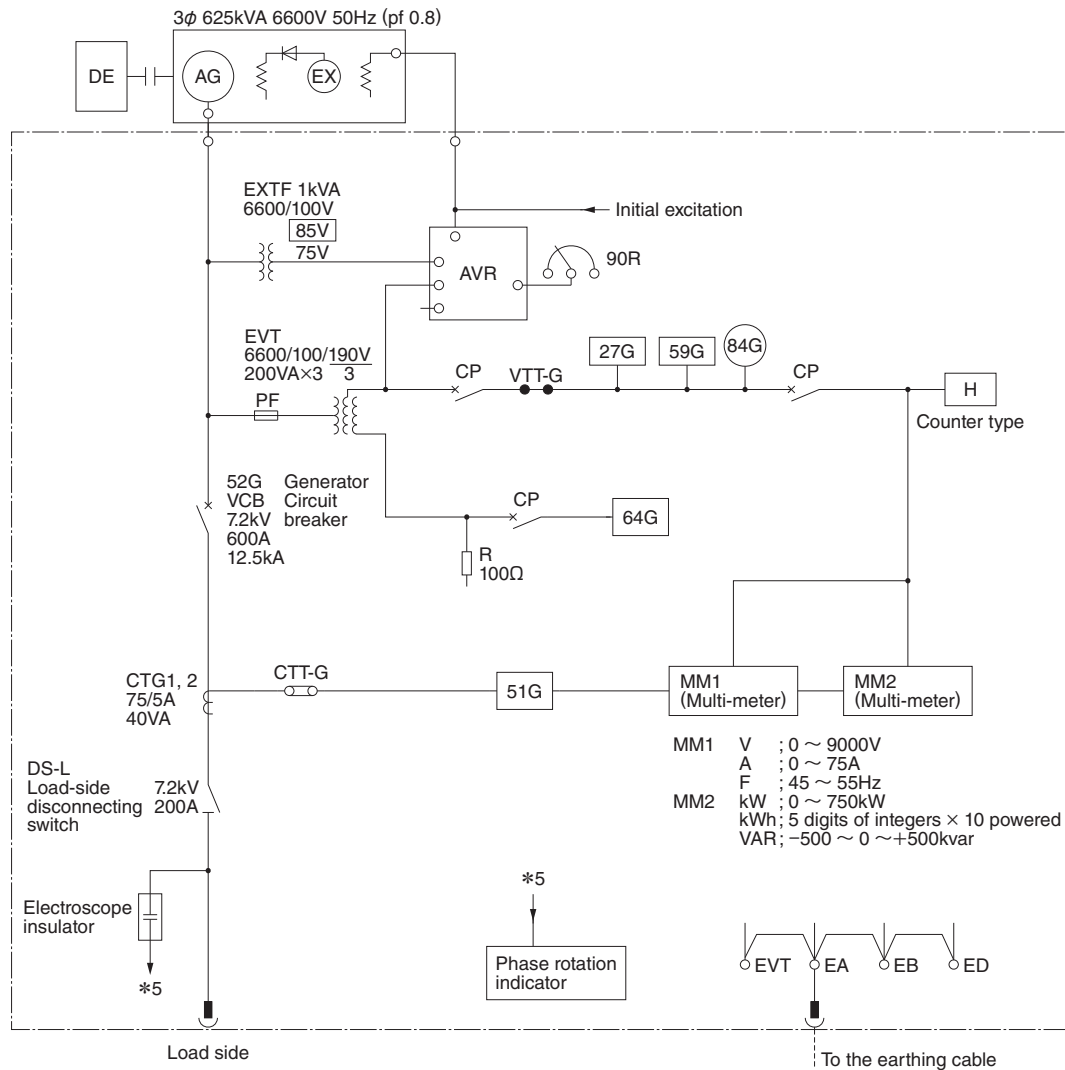


Fig. 5 Single Line Diagram of Trailer Mobile Genset

This is a single line diagram of a mobile Genset specified for a medium voltage application.

When revolution is required, a tractor can be hired. Due to this arrangement, no driver is needed in daily operation.

Fig. 5 shows a single-line diagram and **Fig. 6** shows an exterior view of trailer type mobile genset.

4.1 Specifications of Major Equipment

The major specifications for the equipment are as follows:

(1) Generator

- (a) Type: IP20, free-ventilation, rotating-field salient pole type
- (b) Rated output: 625kVA
- (c) Rated voltage: 6600V
- (d) Rated frequency: 50Hz
- (e) No. of phases: 3
- (f) Power factor: 80% (lagging)

(g) Excitation system: Self-excitation brushless type

(h) Parallel running: Not permissible

(2) Prime mover (Diesel engine)

- (a) Type: 4-cycle water-cooled with air-cooled supercharger
- (b) Rated output: 660kW
- (c) Starter: Electrical
- (d) Applicable fuel: Light oil (used exclusively for the generator)
- (e) Fuel consumption: Approx. 145L/h
- (f) Revolving speed: 1500min⁻¹

(3) Vehicle

- (a) Major dimensions: W10,785 × H3720 × D2490mm
- (b) Fuel tank: 500L
- (c) Noise: 85dB or below (A) 1 meter from machine side (average in 6 positions)

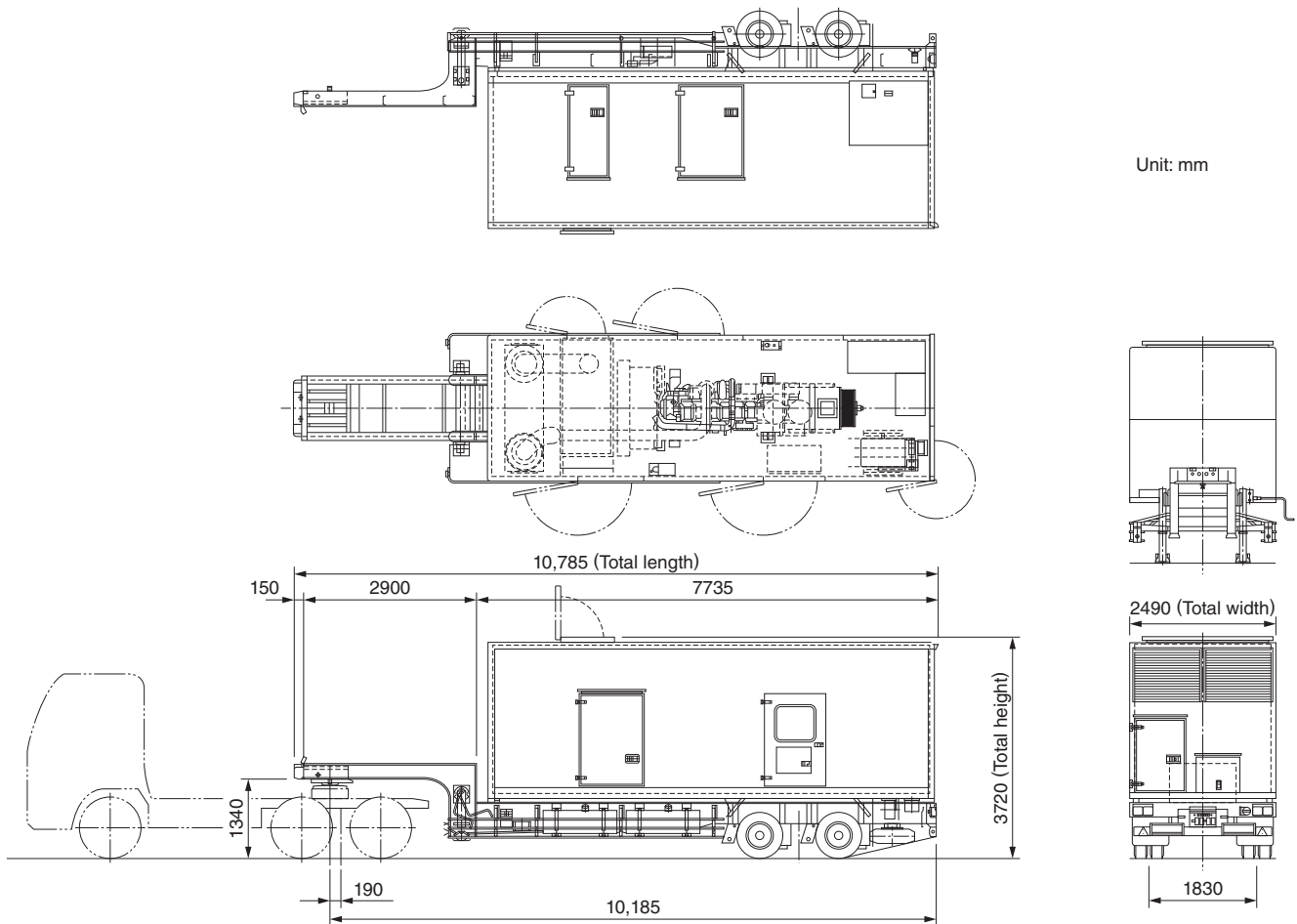


Fig. 6 Exterior View of Trailer Type Mobile Genset

An exterior view of the trailer type mobile genset is shown.

5 Postscript

This paper introduced some case studies of our recent unique mobile genset models. Going forward, we will continue to make every effort to provide the models for the best product experience.

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