Product Manual of 3KW FM 6-Channel Multiplexer

1. Overview and features of complete machine

3KW FM 6-channel combiner is a high-power FM combiner of new generation initially developed by Beijing Duoyang Gigamega Technology Co., Ltd. by applying passive radio frequency technology. It is a new product developed, standardized and serialized in its appearance and structure as well as artistic and practical. It is equipped with stable and reliable performance, advanced technology, simple operation and convenient maintenance.

Features:

- Red copper, silvered brass and high-quality aluminum alloy have been adopted as materials of the cavity and tuning device;
- Low insertion loss and reflection and high standing-wave ratio;
- According to interval between frequencies, it is formed by combination of three-cavity or four-cavity filter and electrical bridge, and is of compact structure;
- The overall structure is of modular design, providing upgrading space for later system expansion;
- High isolation design, star-shape or bridge type or star + bridge structure is adopted as combination mode;
- Anti-frequency temperature excursion design is adopted and all tuning devices are equipped with lock fasteners to prevent parameters from changing in transport and installation process;
- Flat steel is adopted as support for overall outer frame for the convenience of transport and installation.

2. Equipment unpacking and installation

2.1 Equipment unpacking

2.1.1 Main parts of cargo

- Filter: 5 groups;
- Electrical bridge: 8 pieces;

- Absorbing load: 4 pieces;
- 1 set of connecting feeder pipe and accessories;
- 1 specification (including test report);
- Several connecting bolts for frames.

2.1.2 Cargo unpacking and storage

- Open the pack, place the filter groups at specified location according to their label order first. Ground shall be flat, space around for air convection and heat dissipation shall be reserved, and no occlusion is in the input and output interfaces;
- Open the packing box of bridge and put bridges into interfaces of corresponding filters according to their labels;
- Open the packing box for installing feed pipe accessories and put them into corresponding filter output (input) interface according to their labels;
- Connect interface of antenna&feeder to the general RF output interface of multiplexer;
- Make sure the flat steel support of filter groups is in a horizontal condition.

2.2 Field installation procedures

2.2.1 Preparations before installation

- Multiplexer is a central part for connection in transmission system. After connecting antenna&feeder, multiplexer shall be adjusted slightly to modify standing waves at input interface. Therefore, installation of multiplexer equipment shall be after the installation of antenna&feeder cable;
- Determine the installation location of transmitter;
- In general, combiner shall be slightly adjusted on site, which requires vector network analyzer and relevant accessories.

2.2.2 Selection of installation location

- Multiplexer shall be placed near transmitter and interface location of antenna&feeder shall be taken into consideration. The general principle is to reduce the length of feeder cable, save costs and reduce losses. But space for maintenance and test shall be considered to be reserved;
- Multiplexer shall be put at places with good ventilation. It shall not be placed close to the wall, which will block air flow and affect heat dissipation;
- Multiplexer can be placed behind or on the side of transmitter. It should be placed on the ground. If the site conditions permit, it can be placed on stable frame to shorten the length of feeder can be and improve heat dissipation effects;
- Multiplexer shall be away from in flammables, explosives, corrosives and liquid pipelines.

2.2.3 Installation of the host of Multiplexer

- After selecting the installation location of multiplexer, the equipment can be placed in targeted location. Placing process shall be carefully carried out to protect external interface of multiplexer and avoid dusts and other dirt falling into the interface;
- Check whether the equipment is fixed after placing it.

2.2.4 Installation of absorbing load

- Take out absorbing load and successively install them on the load interface of multiplexer ;
- Check whether the load connection is firm after installation is completed.

2.2.5 Standing wave test of antenna&feeder

- In order to accurately evaluate antenna&feeder's effect on multiplexer parameters,

standing waves of antenna&feeder shall be measured and recorded before it is connected to multiplexer;

- Due to the particularity of antenna&feeder, there is a difference between measuring antenna&feeder standing waves and measuring ordinary passive component standing waves. More attention shall be paid to the protection of network analyzer.

2.2.6 Connecting with antenna&feeder

- Measure the distance between antenna&feeder interface and the multiplexer interace labeled with “Output”, or “Antenna”, ,and then calculate the length of feed pipe for connection.
- After antenna&feeder is connected, check whether the connection is firm. If it needs reinforcement or body-weight support, reinforce it or make a body-weight support for it.

2.2.7 Test with antenna&feeder

- After the output interface of multiplexer is connected to antenna&feeder, standing waves at the input interface of multiplexer usually deteriorates due to the effect of antenna&feeder standing waves . In order to guarantee the stable operation of transmitter, multiplexer shall be tested with antenna&feeder after it is connected to antenna&feeder;
- After the test is completed, if the parameters conform to the requirements, customer representative shall sign to confirm. Meanwhile, parameters of test with antenna&feeder shall be recorded for reference in the future. If parameters do not conform to requirements, it shall be slightly adjusted onsite.

2.2.8 Slight adjustment with antenna&feeder

- If the parameters of test with antenna&feeder are not satisfying, fine adjustment

with antenna&feeder shall be carried out;

- After the fine adjustment is completed, redo the test with antenna&feeder. Redo these two procedures until the parameters are satisfying or they cannot be further optimized.

2.2.9 Connecting with transmitter

- Measure the distance between transmitter output interface and input interface of multiplexer and calculate quantity and length required of rigid feed;
- After the connection is completed, check whether the connection is firm. If it needs reinforcement or body-weight support, reinforce it or make a body-weight support for it.

2.2.10 First powered-on

- After confirming the connection is correct and electrical connection is reliable, increase the power of all transmitters successively from small to big until it is increased to rated power;
- Observe the power, temperature changes and indicator of transmitter SWR. If any abnormality happens, shut down the transmitter, find out the cause immediately and restart it after problem is resolved;
- Observe temperature changes of absorbing load and multiplexer filter . If any abnormality happens, shut down the transmitter, find out the cause immediately and restart it after problem is resolved.

2.2.11 Continuous operation of equipment

- After the first powered-on succeeds, generally the equipment shall operate continuously for more than 24 hours. If no problem occurs in continuous operation, it can be regarded as installed successfully;
- First 8 hours of continuous operation shall be monitored by on-duty staff

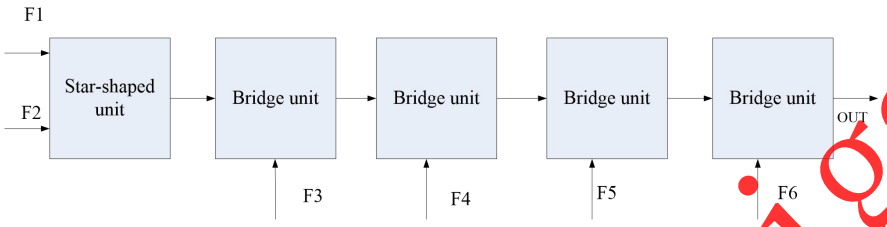
constantly observing transmitter SWR indication and temperature changes. If any abnormality happens, shut down the transmitter, find out the cause immediately and restart it after the problem is resolved.

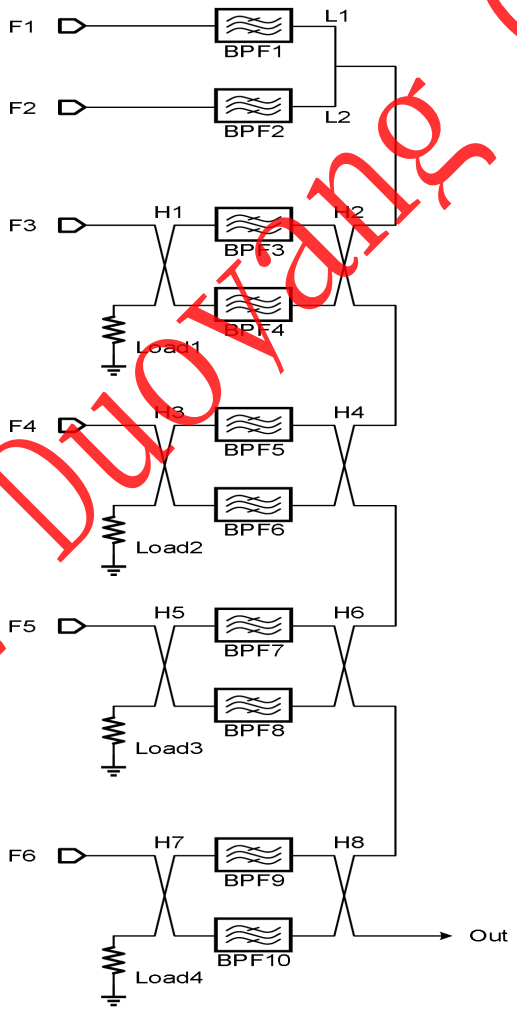
2.3 Quick operation guideline

- Confirm RF output interface of transmitter is correctly connected to the input interface of multiplexer;
- Confirm output interface of multiplexer is correctly connected to feeder cable or dummy load;
- Confirm the absorbing loads are correctly connected to their corresponding interfaces;
- Gradually increase the output power of transmitter and observe transmitter SWR indication in the first operation;
- It is suggested to observe surface temperature when the power is increased to 50% of rated power in the first operation;
- After all transmitters operate with full power for a while, observe whether the temperature of multiplexer is abnormal;
- After it is confirmed SWR is normal and temperature of multiplexer is normal in the first startup, the equipment can be used directly in the future. Pay attention that no cover shall be on the multiplexer surface when it is operating, which will affect heat dissipation.

3. Technical manual of multiplexer

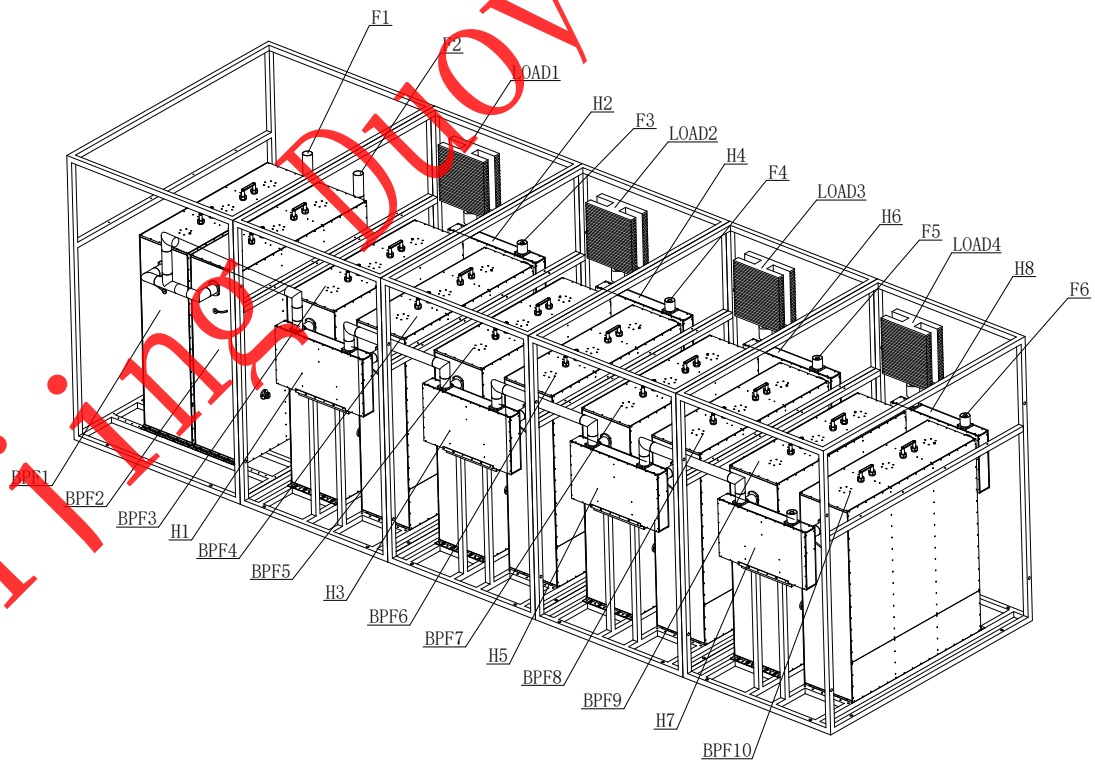
3.1 Multiplexer composition and theory diagram



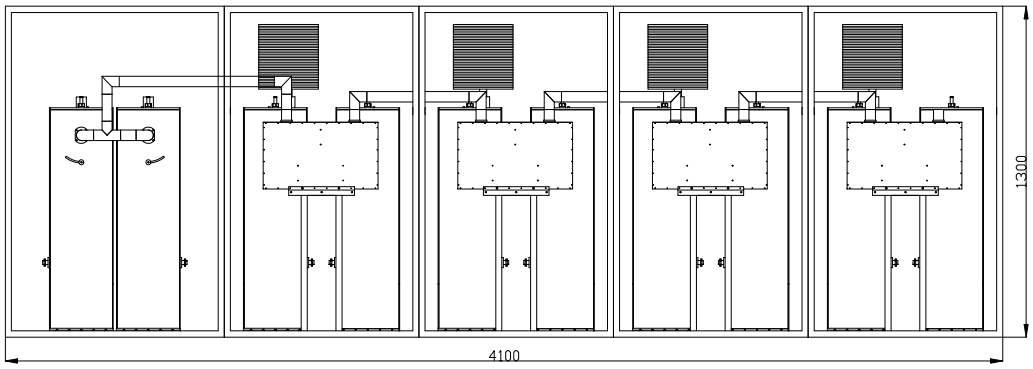


3.2 Outside view

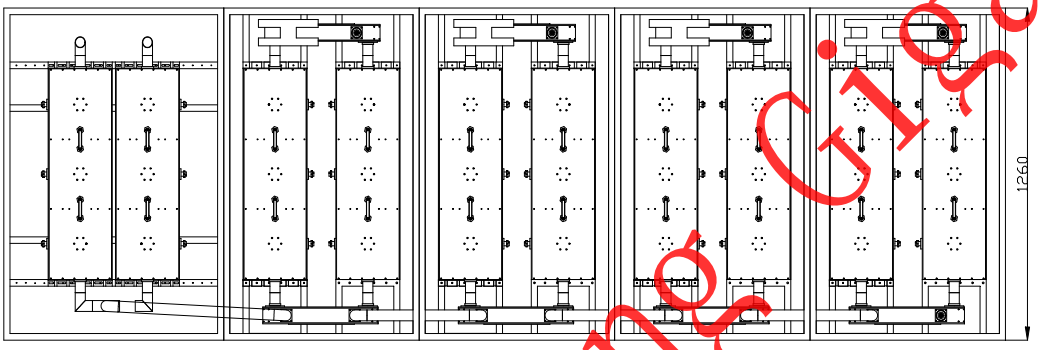
3.3 Structure diagram



Overall Outside View of FM 3KW 6-channel multiplexer



Side View of FM 3KW 6-channel multiplexer



Top View of FM 3KW 6-channel multiplexer

3.4 Technical specifications

3.5 Precautions in daily maintenance

- Multiplexer shall be in good natural cooling state all the time;
- Multiplexer shall not be exposed to high temperature, high humidity, dense dust and dense salt-spray environment;
- Severely shaking shall be avoided in operation;
- Closely monitor the power and temperature of absorbing load;
- Closely monitor the surface temperature of band-pass filter and bridge.

4. Common fault handling

4.1 Over temperature

- Check whether the connection is firm and reliable;

- If equipment temperature exceeds 55℃, please contact out company.

4.2 Transmitter output SWR too big, and alarming, cannot operate normally.

- Measure antenna technical specification first. If the antenna SWR is too big, eliminate the fault promptly;
- Eliminate the fault of transmitter itself;
- If the alarming is still on, and multiplexer needs to be adjusted, please contact our company.