GMV5 DC INVERTER

GMV5 DC Inverter Multi VRF System with its high-efficient inverter compressors have four exciting features which are different from those found on traditional inverter air conditioners: more energy-saving and comfortable, more reliable and more precise operation, providing users with the best air conditioning experience.

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HIGH-EFFICIENT DC INVERTER CONTROL TECHNOLOGY

Thanks to the all DC inverter technology, the optimized system design and the precise intelligent control technology, GMV5 system operates with outstanding efficiency.

All DC Inverter Compressor
- Only DC inverter compressor is used in this system. It can directly intake gas to reduce loss of overheat and improve efficiency.

High-efficient permasyn motors are installed, giving better performance than traditional D.C. inverter compressors.

Technology of maximum torque control with minimum current
- It can reduce energy loss caused by device winding so as to realize higher efficiency.

Low-frequency torque control
- It can directly control motor torque, through which fan motor can run at a low speed. Users will feel more comfortable while requirements of the system are also met.

180° Sine Wave DC Speed Varying Technology
- It can satisfy various places’ demands for different temperature and is able to save a great deal of electricity and provide users with utmost comfort at the same time.

Sensorless D.C. Inverter Fan Motor
- Sensorless control technology guarantees lower noise, less vibration and steadier operation.

New Energy-saving Control Technology
- The GMV5 System has 2 modes for energy saving which can be chosen to meet different electricity demands.
  - Mode 1: In auto energy saving mode, system will self-adjust parameters according to the operation status, thus to lower the cost of electricity. Up to 15% of energy can be saved.
  - Mode 2: In compulsory energy saving mode, system will limit power output forcibly. Up to 20% of energy can be saved.

Energy Auto Allocation Technology
- When total load demands more than 75% of a running unit’s capacity, one more unit will automatically start;
- When total load demands less than 40% of a running unit’s capacity, one unit will automatically turn off;
- Therefore, each unit shares 40%-75% of the total load.
- Experiments show that an air conditioner costs the least energy when it’s operating within 40%-75% of its capacity.
COMFORTABLE DESIGN FOR BETTER LIFE

The GMV5 System has a wider range of working conditions. Whether it’s in cool winter or hot summer, normal operation is guaranteed with the least noise, making users feel more comfortable.

Outdoor Unit Quiet Mode

- Quiet at Night
  System can remember the highest temperature outdoors. When night comes, system will automatically turn to quiet mode. There are 9 quiet modes which can be set according to actual needs.

- Quite in Compulsion
  System can also be set in this mode to ensure low noise as long as unit is operating. The minimum of low noise degree is 45dBA.

Indoor Unit Quiet Mode

The indoor unit of the GMV5 system also adopts DC Inverter motors to realize stepless regulation. According to indoor temperature or people’s actual needs, users can set this mode through the indoor wire control. The minimum of low noise degree is 25dBA.

Heating Fast Technology

DC Compressor is first started to avoid too much electric current. When inverter compressor is on, system can be operating under high frequency to produce more heat.

Quiet Control Design

- Optimized Bossing Design
  After many times of CFD tests, a new fan bossing structure has been developed to reduce vibration of fan running. Low noise degree can drop 3dBA.

- Aerodynamics 3-dimensional Axial Fan
  Compared to normal fan, it can increase 12% of wind flow, improving efficiency as well as lowering noise.

Wide Range of Working Condition

- The GMV5 system has improved its outdoor operation temperature range to -10°C—50°C (for cooling) and -20°C—27°C (for heating).

Wide Range of Voltage

The GMV5 system has improved its working voltage range to 320V-460V, which surpasses the national standard of 342V-420V. For places with unstable voltage, this system can still be running well.
INTELLIGENT OPERATION
Gree GMVS intelligent operation is user-friendly for its capability to meet people's different needs.

Season Setting
The cooling or heating mode can be deactivated during a certain season to avoid the mode conflict in case of misoperation.

Emergency Auto-off Control
The outdoor unit can be linked with a fire alarm signal. In case of emergency, unit can automatically turn off to avoid risk or further loss.

Electricity Shortage Identification
The outdoor unit can receive a power signal of electricity shortage. In some places like first-class hotels, diesel generator may sometimes be used to provide electricity. In this case, this signal will be received and only VIP rooms can be provided with air conditioning service.

Indoor Unit Repairs
When a certain indoor unit needs to be repaired, it can be power off without any interruption to the system's operation.

EXCELLENT PERFORMANCE WITH ADVANCED TECHNOLOGY
Through 10 years' of study and experiments, Gree GMVS has further upgraded to a higher level, from parts and components, controlling technology to communication technology.

Two-grades Oil Separation Control Technology (Patented)
First-grade oil separator has a filtered expansion valve with a 98% of separation efficiency; Second-grade oil separation will separate the remained 2% refrigerant oil with 95% of separation efficiency. General Efficiency is 99.9%.

Modular Operating
- Modules 12h rotation operating
  The operating priority sequence of the outdoor unit modules will be changed without restart when the system accumulatively operates for 12 hours, which can maximize the service life of the system.

- Emergency operation
  Each module is an independent sub-system, and the whole system won't fail down even if partial malfunction. Upon malfunction of any one of the modules, emergency operation can be performed after simply manual set up on the outdoor PCB switches.
Refrigerant Storage and Distribution Technology

The GMV5 system is designed without liquid receiver and the excess refrigerant is stored in the piping, which can minimize the refrigerant charging volume and enhance the control accuracy of the refrigerant.

Oil Balance Control Technology

- **Oil Balance between Compressors**
  Refrigerant is taken into a compressor by an intake pipe and then runs through the cooling system. It can control oil level and the minimum oil each compressor needs and therefore realize oil balance.

- **Oil Balance Control**
  Based on the actual status of each unit and compressor, system can regulate compressor's operation and realize oil balance.

Subcooling Control

- **Subcooling Circuit**
  The GMV5 system can control the first subcooling process of heat exchanger. Subcooling degree can reach 11°C.

- **Subcooling Circuit**
  1. Subcooling circuit can realize 9°C second subcooling to guarantee cooling and heating performance.

Intelligent Checking Control

- **Pressure Sensor Checking Control**
  It can precisely check out unit's high pressure and low pressure and control the output of fan and compressor so as to make sure the system can work under the most energy-saving pressure condition.

- **Temperature Sensor Checking Control**
  Various temperature sensors are equipped to check out ambient temperature, indoor temperature and refrigerant's evaporating temperature, from which the operating condition can be measured.

Multi Electronic Expansion Valve Control

Electronic expansion valve is one of the four basic components in an air conditioner. Besides controlling the current, it can regulate the flow of refrigerant into an evaporator.

- **Outdoor Unit**
  Dual electronic expansion valve with its 960 grades of regulation can precisely regulate refrigerant’s flow between outdoor unit and indoor unit.

- **Indoor Unit**
  2000 pulses electronic expansion valve can maintain the indoor temperature as it is set with a deviation of 0.3°C above or below.

Energy-saving Output

The best heating or cooling performance can be realized in the most energy-saving way. DC inverter compressor and D.C. inverter fan will also be operating in this way to ensure high efficiency.

Emergency Operation Function

- **Emergency Function**
  The GMV5 system can realize a combination of 4 outdoor unit modules. When error is occurred to one of the modules, the others will perform the emergency operation to sustain the air conditioning.

- **Emergency Operation of Compressor**
  All the compressors in each single module are DC Inverter based, when one compressor has error, others will perform the emergency operation.

- **Emergency Operation of Fan**
  Double-fan design ensures that one fan can still work even if the other one has error.
EASY INSTALLATION FOR VARIOUS KINDS OF CONSTRUCTION

ODU High Static Pressure Design
System has 4 levels of static pressure that can be set. Up to 80Pa pressure can be set for an outdoor unit. This design is especially useful when an outdoor unit needs to be placed indoors.

Wider Choices of Location
GMV5 can realize a combination of 4 models and connect as many as 80 indoor units. It’s especially applicable for business buildings or hotels.

1000m Pipe design, Simple Installation
The GMV5 System can be applied in different types of building construction. One of the advantages of multi VRF system is the simple pipe design, which can reduce the cost of installation and make installation much simpler.

Max. Total piping length -- 1000m*1
Max. Actual piping length -- 165m
Max. height difference between indoor units -- 15m
Max. height difference between indoor units -- 90m*2
Max. piping length from first indoor branch to the farthest indoor unit -- 40m

*1 With limited conditions, please refer to the service manual for detail.
*2 This value is based on the outdoor unit is located above the indoor unit. If the outdoor unit is located underneath the indoor unit, the value is 90m.

Intelligent Debugging, Faster Construction
GMV5 has 5 auto debugging features:
- Automatically allocates ODU and IDU addresses.
- Automatically calculates numbers of ODU and IDU.
- Automatically detects errors.
- Automatically starts debugging.
- Real-time check of pipe errors.

Series Connection of Power Cords
Outdoor units are equipped with high-cap wiring boards. Power cords can be connected in series, which can make construction more convenient and also lower the cost.

Easier for Maintenance
Inspection panel is available for quick checking of system operation status.
MULTIPLE INTELLIGENT CONTROLS MANAGEMENT

Gree GMV5S provides multiple intelligent controls in order to satisfy all demands. It can control both a room and a building at the same time.

Various Controls, More Flexible

There are two kinds of controllers: wired controller and remote controller. System has various controls for users, such as cooling, heating, dehumidifying and fan only.

<table>
<thead>
<tr>
<th>Name</th>
<th>Outlook</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wired Controller</td>
<td>Liquid crystal display with black background and white words, touch pads</td>
<td>24 hours time setting for on/off, display of precise ambient temperature, 5 levels of fan speed, sleeping mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cooling, dehumidifying, fan only, heating and so on.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ventilation,质押放speed/light, energy-saving, cleaning, auxiliary heating, drying, memory</td>
</tr>
<tr>
<td>Remote Controller</td>
<td></td>
<td>5 modes: auto, cooling, dehumidifying, fan only and heating, 5 levels of fan speed, and other functions: strong, drying, auxiliary heating, healthy, ventilation, energy-saving, sleeping mode and delay timing. Fan direction can be switched to up/down, left/right, 2 quiet modes and a light control</td>
</tr>
</tbody>
</table>

- **Single control of one unit**
  Each indoor unit has an independent controller.

- **Multiple control of one unit**
  One indoor unit can be controlled by several wired controllers at different places.

- **Central control of several indoor units**
  One wired controller can control as many as 16 indoor units.

- **Joint control of remote controller and wired controller**
  Users can control one unit with two types of controllers: a remote controller which is convenient and flexible, or a wired controller which includes every function of an air conditioner.

New CAN Network Control, Better Network Performance

<table>
<thead>
<tr>
<th>Performance Index</th>
<th>Ordinary Multi VRF Network</th>
<th>GMV5 S-CAN Inverter CAN Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>Software check</td>
<td>Hardware check, more reliable</td>
</tr>
<tr>
<td></td>
<td>One unit’s communication error may lead to a breakdown of the whole network</td>
<td>If one unit has errors, it will not form the network without any influence to other units.</td>
</tr>
<tr>
<td>Communication Efficiency</td>
<td>Low utilization</td>
<td>High utilization</td>
</tr>
<tr>
<td></td>
<td>Communication speed is about 10Kbps.</td>
<td>Communication speed is 20Kbps.</td>
</tr>
<tr>
<td>Compatibility</td>
<td>One main network, difficult to add new equipment.</td>
<td>Multiple main networks, easy to add new equipment.</td>
</tr>
<tr>
<td>Communication Distance</td>
<td>1000m</td>
<td>1500m</td>
</tr>
</tbody>
</table>

Wired Controllers for Hotel Management

Unit can turn on or off by inserting or removing a card. When the card is removed from a wired controller, system can remember all the setting and stop working, when the card is inserted back, system will stand by or restart in the setting last used. It will be especially useful for the service industry, like hotels and restaurants.

Remote Controlling System

- **Everyday Management**
  - Setting for daily operation
    - Management in days/weeks/months/years
    - Management in each unit
    - Simple display for management
  - Other functions
    - Power on/off, modes, humidity, fan speed
    - Waste of energy that may be caused by forgetting to turn off the air conditioner can be avoided.
Visualized Management
- System has a map that can display air conditioners’ locations in rooms and buildings.
- System is able to measure the status and number of air conditioners in different levels.

Group Management
- Central management in groups
  a. Free choices of dividing groups
  b. Central control over power on/off
  c. Central control over temperature
  d. Central control over modes
  e. Central control over user authority

Authority Management
- Only for indoor units
  a. Limited control over power on/off
  b. Limited control over temperature
  c. Limited control over modes

Calculating Cost of Electricity
Auto calculation according to users
- a. According to the operating time, modes, flow of refrigerant, humidity and other factors, system can calculate the cost of electricity for users in different locations.
- b. Detailed information of bills and operation can be provided.

Energy Management
Analysis of energy cost
- a. Air conditioners that cost much energy
- b. Air conditioners that are set in low temperature
- c. Air conditioners with bad cooling performance

Ways to save energy based on the following aspects:
- a. Operating time
- b. Unit is on too early
- c. Unit is off too late
- d. Comfort
- e. Cost of electricity/cost of electricity per square

Energy-saving
Limits on electricity
- a. Analysis on the cost of electricity
- b. Set the maximum cost of electricity and unit will be operating in limited conditions when the maximum number is reached.
- c. System can remind users the cost of electricity during operation and give suggestions on energy saving.

Economic operation
System is able to operate under an energy-saving condition

VIP Management
System can provide independent and unique service to VIP users.