All DC Inverter Multi VRF
In 2012, Gree highly promoted GMV5 All DC Inverter Multi VRF

New breakthrough in comfort ability, intelligent control and design.
Eight prominent advantages

More powerful product series

More excellent energy-saving effect
More comfortable air quality
More convenient project installation
Safer operation
More intelligent management
Smarter network control
All DC Inverter Multi VRF

8 10 12 14 16 HP_combination 18 ~ 64 HP
64HP big capacity

1. Module 8~16HP

2. Module 18~32HP

3. Module 34~48HP

4. Module 50~64HP
64HP Wide Capacity Range

1 Module  8~16HP

3 Modules  34~48HP

2 Modules  18~32HP

4 Modules  50~64HP

Max Capacity

Wide Capacity Range
11 kinds of indoor units for various places.
Eight prominent advantages:

- More powerful product series
- More excellent energy-saving effect
- More comfortable air quality
- More reliable performance
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- Safer operation
- More intelligent management
- Smarter network control
System energy efficiency

Exceed national grade 1 energy efficiency standard; energy-saving up to 59%
High-efficiency DC inverter compressor

64HP
DC inverter compressor control technology

**Graph:**
- **Y-axis:** Output torque (N.m)
- **X-axis:** Current of compressor (A)
- **Legend:**
  - Red line: traditional torque control
  - Blue line: GMV5 torque control

- **备注:**
  - Max. output
  - Moment is not enough

**GMV5 torque control**

**Traditional torque control**
DC inverter fan control technology

Efficiency is improved greatly

Before

Now

Adopt DC inverter motor to realize 5Hz~65Hz stepless speed adjustment. Compared with common DC inverter motor, operation current and motor input power are much lower, while efficiency is improved greatly.
DC Inverter Fan Control Technology

- **GMV5 DC inverter fan motor**
- **Capacity output of inverter compressor**
- **Inverter fan’s frequency**

### Traditional Notch Adjustment vs. GMV5 Stepless Speed Adjustment

- **Traditional Notch Adjustment**
  - Low efficiency
  - Big noise
  - Bad reliability

- **GMV5 Stepless Speed Adjustment**
  - High efficiency
  - Low noise
  - Good reliability
Indoor unit adopts DC brushless motor

- Efficiency is increased above 30% by using DC brushless motor
- Stable operation; low noise;
- Lowest speed can reach 100 r/min.
Intelligent defrosting technology

When there's frost detected by system, intelligent defrosting will be started up automatically.
When frost is over, the system will stop defrosting automatically.

Traditional defrosting mode
--- timer mode

Less comfortable! Low energy efficiency!

Intelligent defrosting mode

More comfortable! Specification is promoted!
Fan linkage control technology

Normal multi VRF

Unbalanced fan operation method; low energy efficiency

GMV5 multi VRF

Air volume is much even; high energy efficiency
Energy-saving operation control

No need to connect remote control monitor system. During electricity limiting period, the unit provided two kinds of energy-saving mode.
Eight prominent advantages

- More powerful product series
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- Smarter network control
Comfortable temperature

After reaching to set temperature, compressor will adjust the output according to indoor load to let indoor temperature stay at relative stable status and let you feel more comfortable.
When using traditional air conditioner for cooling, temperature at different places in the room is the same, which let you feel uncomfortable the moment you enter the room.
Gree inverter air conditioner can adjust indoor temperature automatically according to ambient temperature for comfortable feeling.
Low noise control technology

Quiet function for night; 9 modes for selection

Day—outdoor temperature is high

Night—operate at low load

Operate at rated load

Low load operation; low noise

45dB (A)
Quiet control technology

Compulsory quiet function, as low as **45dB (A)**
Drying and reheating function

When air conditioner operates under drying mode in wet seasons, air outlet temperature can be as low as below 10°C. At that time, after starting up the electric heater, air outlet temperature can be increased to more than 10°C.
Fresh Function

Fresh outdoor air flows through fresh indoor unit’s heat exchanger, and comes into indoor rooms after being treated into proper status. Temperature will reached to design requirement, while it won’t affect air quality.
Reminding function for cleaning filter

Indoor unit is with reminding function for cleaning filter. According to different operation environments, you can set different clean period.
Eight prominent advantages:

- More powerful product series
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- More comfortable air quality
- Safer operation
- More reliable performance
- More intelligent management
- Smarter network control
- More reliable performance
Refrigeration oil circulating control technology—two-stage oil-dispersing control technology

First-class oil separator
Adopt filter expansion valve
Separating efficiency reaches to 98%

Second-class oil separator
Separating the remaining 2% refrigeration oil;
Separating efficiency reaches to 95%

Total oil-dispersing efficiency
99%

Patent (201120003910.7)
Refrigeration oil circulating control technology—oil return control technology

During oil-retuning operation, pressure is taken into consideration, which can improve the service life of compressor.

Before oil-retuning

During oil-returning...
Refrigeration oil circulating control technology—module oil-balancing control technology

Judge operation status of module and compressor intelligently, calculate oil-storage volume of compressor and adjust operation status of compressor to realize the oil balance among modules.
Refrigeration oil circulating control technology—compressor oil-balancing control technology

Control the oil level in oil pool and distribute the redundant oil in compressor to other compressors.
Refrigeration oil circulating control technology—oil-storage control technology

Due to the oil-storing technology of compressor, the lowest oil level for operating the compressor can be controlled by judging parameters.
Subcooling technology—first class subcooling technology

Adopt high-efficiency heat exchange loop to realize first class subcooling control for heat exchanger. Degree of subcooling can reached 11°C.
Subcooling technology—second class subcooling control

Realize second times subcooling for 9°C by adopting overcooled loop
Eight prominent advantages

More powerful product series
More excellent energy-saving effect
More comfortable air quality
More reliable performance
More convenient project installation
Smarter network control
More intelligent management
Safe operation
Super long piping, no space-limiting

- Max total piping length—1000m (3280ft)
- Max actual piping length—165m (540ft)
- Max height difference between ODU and IDU—90m (300ft)
- Max piping length from first branch to the farthest IDU—40m (130ft)
Super high static pressure, no installation position limiting

Outdoors : 0Pa

Mechanical floor : 80Pa

4 kinds of static pressure optional

0, 30, 50, 80Pa

For complicated construction structure requirement

Note: The ex-factory defaulted static pressure is 0Pa
Super large capacity, no construction area limiting

Application combination of module can reach to 4 modules at the most; selectivity of 180kW capacity is much big, which can satisfy all kinds construction design requirement.
Super long distance communication, no distance limiting

MAX 1000m
Common multi VRF

MAX 1500m
The debugging software can be connected into the outdoor unit or the indoor unit via Gree USB data converter.

The debugging is simple and convenient.

Portable computer

USB data converter

Connected to ODU

Connected to IDU

CAN bus line
Intelligent debugging for saving time

6 functions

Auto debugging

- Detect IDU and ODU quantity automatically
- Start running debugging automatically
- Judge the abnormality of pipeline
- Assign IDU and ODU address automatically
- Charging automatically
The wiring is simple and convenient.
Maintenance window
Eight prominent advantages

- More powerful product series
- More excellent energy-saving effect
- More comfortable air quality
- More reliable performance
- More convenient project installation
- More intelligent management
- Smarter network control

Safer operation
Distinguish emergent shutdown and insufficient power supply

Emergent shutdown
ODU can be connected to fire alarm linkage signal, which can make the unit shut down in emergency.

Distinguish insufficient power supply
When the power is supplied by dynamotor temporarily, the ODU will send insufficient power supply signal to IDU. At that time, air conditioning is only available for VIP rooms.
Operation in emergency

The module is operating in emergency ......

【Basic modules in emergency】 (18HP-64HP)

When one of the basic modules is in malfunction, other basic modules can still operate in emergency, which greatly reduces the affect of malfunction.
When one of the compressors is in malfunction, other compressors and systems in this basic module can still operate in emergency.
The fan motor is operating in emergency ......

【Fan motor in emergency】(Double fan motors)

Some basic modules are designed with two fan motors. Gree unique control logic and optimized system design can make sure that the other fan motor can run in emergency when there is malfunction in one fan motor.
ODU modules “installed without sequence”

36HP is taken for example

- Do not distinguish master unit and slave unit
- Do not distinguish big and small
- Do not distinguish position
ODU operates circularly

Operate in modules, operate evenly and prolong lifespan
Wide operation range in high temp or low temp

Solve heat island problem of concentrated installation of ODU

-10°C → 55°C
-20°C → 27°C

Solve high temp problem of ODU in built-in installation or concentrated installation
Eight prominent advantages

- More powerful product series
- More excellent energy-saving effect
- More comfortable air quality
- More reliable performance
- More convenient project installation
- Safer operation
- Smarter network control
- More intelligent management
Gate control function

The unit works when inserting the card and stops when pulling out the card. When the unit stops, the unit records the running status and stops running; when inserting the card, the unit will run according to the memorized status, in stand-by status or in the running mode before pulling out the card.
One indoor unit with several control points

The indoor unit can be connected to several wired controllers, which can achieve controlling one indoor unit in different control point.
Central control of several indoor units

Several indoor units can be connected to one wired controller to realize centralized control, maximum 16 indoor units.
Controlled by remote controller and wired controller at the same time.

Remote controller is convenient and wired controller is with more functions. Gree unique control logic make it possible to control one IDU with remote controller and wired controller at the same time.

Turn off the air con by remote controller; no need to get up.
Eight prominent advantages

- More powerful product series
- More excellent energy-saving effect
- More comfortable air quality
- More reliable performance
- More convenient project installation
- Safer operation
- More intelligent management
- Smarter network control
The first to apply CAN network control technology in the industry

<table>
<thead>
<tr>
<th>Specification</th>
<th>Normal GMV network</th>
<th>GMV5 CAN network</th>
</tr>
</thead>
<tbody>
<tr>
<td>High reliability</td>
<td>Software verification</td>
<td>Hardware verification, high reliability</td>
</tr>
<tr>
<td></td>
<td>One of the indoor unit or outdoor unit is in communication malfunction, which may lead to crash of the whole network.</td>
<td>The malfunction IDU or ODU will exit communication automatically, which will not affect the whole network.</td>
</tr>
<tr>
<td>High communication efficiency</td>
<td>Master-slave communication method, which will affect the response efficiency of slave unit; the utilization of bus line is low</td>
<td>Multi master units communication way, the information of all units in the network will be fed back; the utilization of bus line is high</td>
</tr>
<tr>
<td></td>
<td>Communication efficiency is low, about 10Kbps</td>
<td>IDU and ODU communication efficiency can reach 20Kbps, which is improved by 100%; data exchange is more quickly.</td>
</tr>
<tr>
<td>High compatibility</td>
<td>Single master unit network, poor expansibility</td>
<td>Multi master units network, easy to extend new equipments, such as light, ventilation equipment, etc.</td>
</tr>
<tr>
<td>Long communication distance</td>
<td>1000m</td>
<td>1500m</td>
</tr>
</tbody>
</table>
Communication speed is more quickly and more accurate
High compatibility, leakage control of the building

◆ Support leakage control of other equipments
◆ Support leakage control of other air conditioning equipments
◆ Support control system of the building

Connect to control of the building
More visualized operation platform

The actual position of air con can be shown in the building, floor or room layout of the system interface, which can realize visualized management of the air con.
More visualized operation platform

In the visualized interface of each area of the building, the running quantity, stopping quantity and malfunction quantity, etc. of the air con in this area can be calculated.

Show the status of the concerned area

- Total air: 213
- Running qty: 180
- Stopping qty: 33
- Malfunction qty: 0
- Malfunction: 0
Multi management ways of air con

Help to use and manage the air reasonably

◆ Independent/centralized control:

The user can manage one or several equipments.
Multi management ways of air con

Independent monitoring and managing for VIP customers.
Flexible linkage control
Calendar management function

Year: 2012
Month: 04
Week: 18
Day: 00
Overtime management
Dining management
……

Calendar management function

- Overtime management
- Dining management
- ……

Calendar management of required time and area:
- Set timer on/off
- Set mode
- Set temperature
- Shielding
- ……

- Avoid waste of energy caused by forgetting turning of the air con
Multi energy-saving modes

◆ Electricity limit mode:
  • Calculate the electricity consumption;
  • Set the electricity consumption limit: when the electricity consumption reaches the set value, remind or automatically control the air con to run in low electricity consumption.

◆ Economical mode: according to the characteristics of GMV, control the output load of ODU to keep it running in low electricity consumption.
Energy visualized management function:

Too much electricity consumption
Too low set temp.

Not apparent cooling effect

Analysis of electricity consumption data

Service port

28°C

27°C
Energy visualized management function:

- Make out corresponding energy-saving policy according to the above situation.

Make out energy-saving policy and control of that policy.
Make out corresponding energy-saving policy according to the following situation

Running time: screen out long-running air con

Turn on the unit too early

Turn off the unit too late: too much energy consumption due to forgetting turning off the air con

Environment comfort: too much electricity consumption due to improper setting of temp.

Electricity consumption/unit area electricity consumption: screen out the air con which consumes too much electricity
Multi air conditioning management way

Adopt B/S system design to achieve powerful Web control function

- Management function of multi buildings
- Login function of multi users
- Monitoring function of Internet
Calculate the electricity automatically according to running time, mode, opening angle of electronic expansion valve, indoor ambient temperature, outdoor ambient temperature, etc.; provide detailed bill, running report and analysis report.
Calculate the electricity fee of each user reasonably to avoid disputes.
Thank you!