

# Reference

Jan 2021



## More than Energy Saving: Güntner Dry Cooler with EC fan + GMM Controller

"Minimize induction loss, high efficiency, low noise, ..." are the most prominent advantages that spring to mind when it comes to Electronically Commutated fans (EC fan). In most practical applications, overall energy efficiency is an important factor when it comes to condensers (for refrigeration systems) and dry coolers (for generators and process systems), therefore, when selecting a heat exchanger, choosing EC fans would be vital if one is to realize the energy-saving objectives of such systems.

EC fans having adopted permanent magnet and several other technology features, greatly increases its motor efficiency when compared to AC motor (See Figure 1). But apart from those advantages, having a control system will be essential to optimize the full energy saving potential of using these EC fans.

Güntner developed and over the years made significant enhancements to its EC fan controller, the Güntner Motor Management (GMM). The GMM provides full control of the EC fans as well as monitoring of key parameters of Güntner's condenser and dry cooler units.

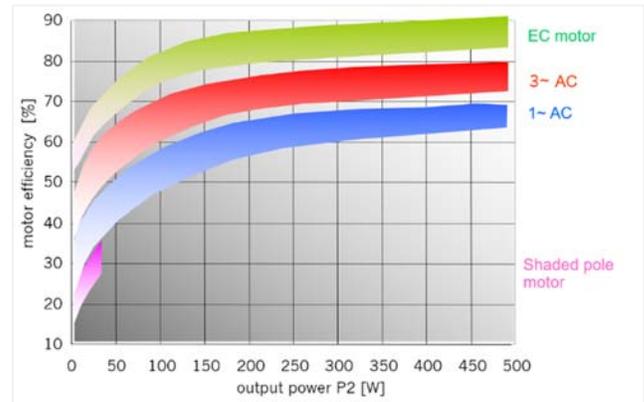


Figure 1. Efficiency comparison: EC motor, AC motor, etc.

To further elaborate, we would like to share with you some success stories from our customers.

### Reduced Power Consumption by 74%

Back in 2018, Qinshui Jinmei Gas Power Generation ("Qinshui Jinmei") wanted to retrofit two radiators of its 104# gen set. This retrofit was brought about due to noticeable year-on-year decreasing of heating dissipation of these old radiators (HT-jacket water, LT-aftercooler water). These 2 old radiators were fitted with AC fans and they no longer could deliver the required capacity even at full load. Qinshui Jinmei decided to replace these inefficient radiators and they selected Güntner to provide two highly efficient radiators using EC fan and GMM EC fan controller.



In June 2018, the retrofit was completed successfully, a before/after analysis was done and it showed that the new Güntner radiators was better. The main thermodynamic conditions had remained the same (e.g. heat dissipation consumption of the gen set, ambient air temperature, and inlet and outlet water



temperatures), but the new Güntner radiators was designed with a larger heat exchange surface and lower air volume, this helped to reduce noise emission significantly (by 30 dB(A), Figure 2).

To have a clearer view of how the new Güntner radiators performed in reality, in July 2018, two electricity meters were installed on both the new and old radiators (New: 104# gen set, Old: 105# gen set). Based on two years data collected, the analysis clearly showed that the new Güntner radiators had demonstrated excellent power consumption savings of 74% (See Figure 3)

Parameters	Before (Old)		After (New)	
	HT radiator	LT radiator	HT radiator	LT radiator
Heat dissipation consumption of gen set 104# (KW)	184	1,360	184	1,360
Inlet air temperature (°C)	40	43.2	43	43
Outlet air temperature (°C)	43.1	67.7	46	69
Inlet water temperature (°C)	60.8	92.1	60.7	92
Outlet water temperature	54	82	54	82
Media volume flow (L/s)	450	2,200	450	2,200
Air volume flow (m³/s)	55		16	41
Noise level (dB (A) @ 10m)	80+2		50	50
Effective heat dissipation surface (m²)	410.3	1,230.81	723.2	1,439

Figure 2. Key parameters analysis through a Before/After comparison in Jun 2018

Duration	New Güntner Radiators 104# (kWh)	Old Radiators 105# (kWh)	Radiators 104# vs 105# Saving (kWh)	Radiators 104# vs 105# Saving (%)
Jul – Dec 2018	12,780	55,984	43,204	77%
Jan – Dec 2019	29,108	93,764	64,656	69%
Jan – Jun 2020	7,796	38,448	30,652	80%
Total	49,684	188,196	138,512	74%

Figure 3. New radiators for 104# gen set saved power consumption by 74% during Jul 2018 – Jun 2020



Figure 4. Real time monitoring of operational status of new radiators in Qinshui Jinmei



A snapshot taken in Jan 2021 (See Figure 4), showed real-time operational status of the new Güntner radiators. At full load (2000 kW) with an inlet air temperature of 3°C, the new Güntner radiators power consumption for LT radiator and HT radiator were 0.093 kW and 0.296 kW respectively, the self-consumption ratio of the gas generator unit was less than 0.2 ‰ ( $0.389 / 2000 \approx 0.2 \text{ ‰}$ ). This part load scenario clearly showed that at low speed, the new Güntner radiator is still delivering the required capacity, but with a lower fan speed, the power consumption is significantly lower, thereby achieving big operation cost savings.

After seeing the big success of using Güntner's energy efficient radiators, Qinshui Jinmei started to upgrade other old radiators to Güntner using high-quality EC fans (made in Europe) and energy efficient GMM EC controller. Güntner's solution played an important role in providing a complete energy saving solution to Qinshui Jinmei and demonstrated high quality standards of Güntner products.

### **Güntner EC Fan Controller: Empowering the Operation of Dry Cooler**

Güntner developed the GMM controller specially for Güntner dry coolers and condensers with EC fan. The GMM is a fully standalone controller managing process control, information management and system management. The key benefits are to deliver autonomous control of the unit as well as achieving operation efficiency by reducing energy consumption, improve system transparency and ensure operation reliability for the entire system. With more than ten years field implementations in the Asia Pacific region, Güntner has successfully applied the GMM and EC solution benefitting numerous end user in achieving energy savings.



#### **Process Control: Reduce Energy Consumption and Sound Control**

At low ambient temperatures, the capacity of the unit can still be delivered with a reduced airflow. To achieve this, the GMM controller constantly modulates the fan's speed according to dynamic load, this allows the system to function as it should while reducing power consumption by lowering of the fan speed (air volume). This very operation feature was again verified in Qinshui Jinmei project with a significant energy saving of 74%.

Typically, night time is where people are sensitive to sound emissions, especially on equipment. The GMM controller has a build-in Night Setback function, where noise emissions are limited so that the EC fan will not cause disturbance during night time. This function can be activated via internal time program or by activating a dry contact.



### **Information Management: Transparency Improvement**

The GMM controller features a display which offers real time operation status of the system. This information is particularly useful during testing/commissioning and troubleshooting at site. The information offers true status of the unit and gives the user data for future system optimization and preventive maintenance.

While different kinds of parameters are being monitored constantly (e.g. fan energy consumption, inlet water temperature of a gen set, air temperature, fan speed, etc.), the information management task of the controller also visualizes these data in various ways. Parameter information of the dry cooler can be read at any time on an LCD display on the controller, a mobile APP linked via WiFi, or a computer terminal connected by industrial ethernet.

### **System Management: Operational Reliability Ensuring**

To ensure the system operates reliably, a dry cooler should operate continuously, and downtime should be minimized.

Therefore, a system management controls the entire life cycle of the dry cooler (start-up, operation and servicing). All key operation-relevant components in the dry cooler are monitored and suboptimal operation alerts are sent out immediately to enable prompt intervention. Alarm and error messages are stored in the controller, making fault analysis and diagnosis much easier.

Once a fault occurs, the GMM controller will activate a bypass function so that the EC fan will run at full speed (speed changeable) in order to maintain the operation reliability of the unit.

There are also other functions where the controller will help shorten the unit's downtime.

No programming/settings are required during an EC fan replacement, the parameters are automatically loaded into the fan by the GMM controller, the users only need to change the fans and wire up the terminals.



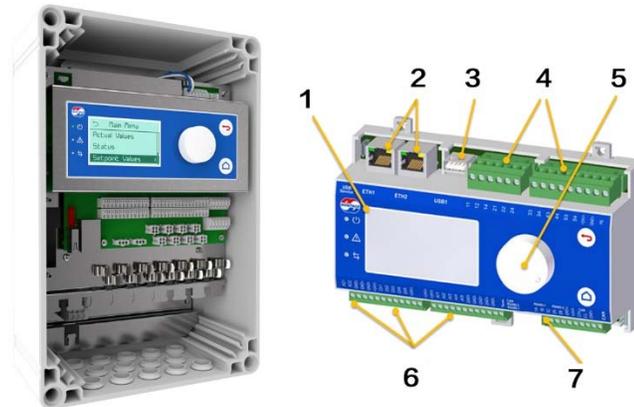
## **The new generation EC motor controller, GMMnext**

Starting January 2021, the Güntner Motor Management next generation (GMMnext) controller, GMMnext is available to customer of Asia Pacific region.

Various new features are available on GMMnext:

- Super large display with intuitive navigation/structure
- Rotating knob for navigation
- USB port for firmware update
- Modbus TCP integrated as standard for easy integration to 3<sup>rd</sup> party systems

- More configurable I/O ports for better system extensibility
- More control applications (2 circuit, bypass valve, etc.)



*GMMNext controller (1. Graphic display 2. Ethernet 3. USB 4. Digital Outputs 5. Turn/Push button 6. IOs 7. RS485 interface)*

## About Güntner

Based in Fürstentfeldbruck near Munich, Germany, Güntner GmbH & Co. KG is a world leader in the manufacture of refrigeration and air conditioning equipment components. With approx. 3,600 employees worldwide and production sites in Germany, Hungary, Romania, Indonesia, Mexico, Brazil and Russia, the company shows a strong presence for their partners in all markets. Decades of experience in the industry and the consistent integration of the latest technologies and research findings ensure the high-quality standard of Güntner solutions. The international areas of application comprise energy & process cooling projects, industrial and commercial applications in the field of food production and storage as well as HVAC applications for buildings and specific applications such as server room cooling.

In Asia ([www.guentner.asia](http://www.guentner.asia)), with offices located in Singapore (head office), China, Indonesia, Thailand, Vietnam and Japan and production site in Indonesia, the company shows a strong presence for their partners