“heat exchanger performance and fan motor optimizing is the core function of Controls. Güntner Controls provide reliability and stable operation while meeting the specific customer needs, which results in high energy efficiency”.

Juan Carlos Izasmendi, Manager of Controls division
In addition to manufacturing high-quality heat exchangers, our core competence lies in the development and production of control components and panels for heat exchangers. We deliver excellent controllers and control panels, tailored to the functions of Güntner equipment, as well as the heat exchanger, associated fans, and the system as a whole.

Customer needs are our primary concern. Güntner equipment is designed to be user friendly and simple maintenance. All control components are automatically configured and dimensioned to harmonize with the heat exchanger, thereby providing you with a fully configured plug-and-play device customized for your application.

Our customer needs coupled with optimized production processes and future-oriented development ensures excellent quality and maximum performance.
Advantages of the GMM System

The advantages of the Güntner Motor Management (GMM) system can be implemented in nearly all applications. The GMM systems ensure the following:

Optimal heat exchanger energy usage

The GMM is available for AC and EC fans. The GMM achieves the best possible level of effectiveness for heat transfer and consequently increases the cost-effectiveness of the cooling system.

Maximum fan service life

The sophisticated control technology enables a uniform operation of the fans, which reduces wear and tear using special control algorithms and specialized filter technology, coupled with quality power electronics.

Plug-and-play

The plug-and-play feature allows for simple handling during commissioning and system operation. The fans and power components are already fully configured with the GMM. The GMM’s clear text display allows for transparent and simple operation of the various functions and displays operational and error signal messages. The signal-display language can be selected in the controller.
Operational Features of the GMM System

The GMM system specially developed for the Güntner heat exchangers is designed to achieve a high level of effectiveness for heat dissipation. Therefore, increasing the cost-effectiveness of the cooling system.

The technology used for the control and power components contributes to increase the service life of heat exchanger and fans.

The GMM automatically sets the parameters for the fans and power components, thereby enabling plug-and-play operation.

Güntner bus technology used in all GMM systems enables the GMM to perform the three main functions of System Manager, Information Manager and Process Controller.

### System Manager

The GMM manages the EC fans during commissioning, system operation and servicing. If a power component or an EC fan has to be replaced during servicing, all parameters are automatically programmed. This plug-and-play-capable system automatically executes all programming according to the respective design point of the heat exchanger and displays detailed information in real time.

### Information Manager

GMM’s Information Manager function offers communication interfaces to superordinate control systems and subordinate power units (e.g. frequency converters, EC fans, etc.).

It shows all key operation-related information on the display and makes it available to superordinate systems via a bus system or standard interface. This makes remote maintenance easy and makes it possible to get information about operating signals at any time.

### Process Controller

The GMM adjusts the speed of fans according to pressure or temperature, controls processes and creates a heat exchanger system optimal in energy efficiency.

The refrigerant can be selected in the display for pressure control. Condensing pressure and temperature are also shown in the display. Other settings, such as the type of refrigerant or set points, can be selected through the clear text display.
Güntner Motor Management
Operating Modes

There are five different operating modes for GMM systems, allowing a high flexibility for all applications. The GMM functionality goes from automatic control, specified setpoints, slave signal taken over from a superordinate control system, to a controller-inherent proportional-integral control.

Slave Mode
Slave Signal from a Superordinate Controller:

1. Slave external analogue:
   No internal control system is active – the control value that is pre-defined via analogue input is communicated directly to the fans.

2. Slave external BUS:
   No internal control system is active – the control value that is pre-defined via BUS is communicated directly to the fans (slave signal).

Auto Mode
Automatic Control of GMM with PID*:

1. Auto internal:
   Automatic control to internally defined setpoint.

2. Auto external analogue:
   Automatic control to setpoint that is pre-defined externally via analogue input.

3. Auto external BUS:
   Automatic control to setpoint that is pre-defined externally via BUS.

* PID: Proportional-Integral-Differential
Unique Functions for Cooling Technology

The Motor Management system developed by Güntner offers a range of special functions for cooling technology.

**Integration**
GMM can easily be integrated into the customer’s system. There are five different operating modes: Three automatic internal control modes and two slave modes.

**External control signal**
In slave mode the control signal is supported through a superordinate control system.

**Bypass function**
Serves to switch the fans from automatic to emergency operating mode when malfunctions of the controller occur in order to ensure continued operation of the unit.

**Setpoint shifting**
The setpoint can be shifted in relation to the external temperature to ensure an operation energetically optimal.

**Cleaning cycle**
During the cleaning cycle, the fans are operated in the reverse direction for a short time to remove small ice formations from the fan nozzle. Ask our representatives for this option.

**Setpoint switchover**
Two setpoints can be defined, for example, to switch over between summer and winter operation.

**Alarm Management**
All messages are stored consistently in the alarm buffer and can be read out at any time via the clear text display with date and time.

**External predefined setpoint**
An external setpoint can be predefined from the superordinate control system via analogue inputs or the bus system.

**Night limit**
The night limit acts as sound reduction. The fan speed is reduced through an external signal or the internal time programme. Ask our representatives for this option.

**Maintenance cycle**
During prolonged downtimes, the fans are operated at short pre-set intervals (maintenance cycle) to keep operability and prevent malfunctions.

**Extended threshold value function**
Special functions can be activated by defining a threshold value.

**Refrigerant input**
The refrigerant can be selected from the clear text display. Based on the measured pressure, the GMM translates the data to the appropriate condensing temperature.

**Setpoint switchover**
Two setpoints can be defined, for example, to switch over between summer and winter operation.

**Manual mode**
To maintain heat dissipation even during malfunctions, the GMM is equipped with a hand-operated emergency operating mode.

**Heating/cooling switchover**
For the heat pump operating mode, the GMM systems also include an option of switching the internal control from heating to cooling mode.
## GMM – Energy-Efficient Intelligence for Different Applications

The GMM system is available for AC or EC fans.

### AC fans

The following controls are available for AC fans to cover all application possibilities.

<table>
<thead>
<tr>
<th>Energy efficiency</th>
<th>Control</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling circuit</td>
<td>Precision</td>
<td>Investment costs</td>
</tr>
<tr>
<td>Step controller</td>
<td>Sound</td>
<td>Service life</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GMM step</th>
<th>GMM f-drive</th>
<th>GMM sincon®</th>
<th>GMM EC</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
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</tbody>
</table>

### EC fans

Maximum efficiency with EC fans and the GMM EC.

<table>
<thead>
<tr>
<th>Energy efficiency</th>
<th>Control</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling circuit</td>
<td>Precision</td>
<td>Investment costs</td>
</tr>
<tr>
<td>Speed controller</td>
<td>Sound</td>
<td>Service life</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GMM EC</th>
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<tr>
<td><img src="image5.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>
## GHM – Higher Performance, Higher Capacity

The GHM spray control system results in a better performance on the heat exchanger. It is available for AC or EC fans in three different technologies: GHM spray basic, GHM spray professional and GHM pad.

### Spraying / Humidifying

A spraying system or a humidifying system can be used to increase heat exchanger performance.

<table>
<thead>
<tr>
<th></th>
<th>GHM spray basic</th>
<th>GHM spray professional</th>
<th>GHM pad</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy efficiency</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cooling circuit</td>
<td>★★★★</td>
<td>★★★★</td>
<td>★★★★</td>
</tr>
<tr>
<td>Speed controller</td>
<td>★★★</td>
<td>★★★★★</td>
<td>★★★</td>
</tr>
<tr>
<td><strong>Control</strong></td>
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<tr>
<td>Precision</td>
<td>★★★★</td>
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<td>Sound</td>
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<td><strong>Investment</strong></td>
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<tr>
<td>Investment costs</td>
<td>★★★★</td>
<td>★★★★</td>
<td>★★★</td>
</tr>
<tr>
<td>Service life</td>
<td>★★</td>
<td>★★★★★</td>
<td>★★★</td>
</tr>
</tbody>
</table>
**GMM Step**

The GMM step is a step control system for AC external rotor or standard motors. This system is available with an add-on of up to nine steps. To ensure uniform use of the fans, there is a special “fan cycling” function, where the fan which has the fewest operating hours is actuated. This enhances the operational reliability and service life of the fans. Switch hysteresis is also a function.

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**GMM step Professional (1 – 9 steps)**

![Diagram of GMM step Professional](image-url)
GMM F-Drive

The GMM f-drive is a speed controller for standard motors with a frequency converter as the power unit. The f-drive can also be specified for noise-sensitive applications since it does not cause any control-related noise. Up to nine power units can be used. This product is also supplied with hardware and software bypass functions, which ensure operation even if a power unit fails. The power units are monitored by the controller module.

Frequency Converter

- **Low load current peaks**
  Inrush current limiters, which are prescribed by power supply companies for larger equipment, are already standard with the GMM sincon®.

- **Cos f always > 0.95 with public utility mains**
  The GMM sincon® achieves Cos f > 0.95. This means minimum idle power is generated and additional idle power compensation is not required.

- **Low noise emissions**
  Due to the power unit’s high clock frequency (16 kHz), GMM sincon® does not produce control-related noise emissions. Whistling noises are minimized.
The GMM sincon® is a speed controller for external rotor motors with a frequency converter as the power unit. The main feature is the downstream all-pole sine filter, which is an important requirement for external rotor motors. The GMM sincon® can also be recommended for noise-sensitive applications because it does not cause any control-related noise. Up to nine power units can be used. This product is also supplied with hardware and software bypass functions, which ensures operation even if a power unit fails. The power units are monitored by the controller module.

Use of the GMM sincon® ensures that compared with mains operation, the same or longer service life can be achieved for the fans' motor winding insulation and bearings.
Sincon® technology

Heat exchangers usually have several fan motors that are driven by one inverter. This multiple-motor operation (parallel circuiting) with one frequency converter always poses a high risk potential for the fan motor. The bearings can be damaged by fault currents and winding, by voltage peaks. The GMM sincon® reduces these bearing currents and voltage peaks, thereby ensuring reliable system operation.

Sine Filter

Radial fan runout
The sine-form motor voltage enables excellent synchronization of the motors. As a result, the load on the bearings is minimal.

Very low speeds (from 0.5 Hz)
This consistent sine voltage allows the motors to build up enough torque in the lower speed range. Control is maintained even when the load requirements for the heat exchanger are very low.

Low emitted interference
The GMM sincon® also has a very low emitted interference due to its sine-form output voltage. This means that cables without any special shielding can be used. The cable lengths can also be longer than with frequency converters without sine filters. All EMC (= electromagnetic compatibility) requirements are also met without shielded cables.

Eliminates motor overheat
No additional motor overheating with non-sine form voltage parts, which increases the service life of the motor.

Barrier relief
There are no voltage peaks, as is the case with frequency converters without all-pole sine filters. This means that the service life of the motor is significantly reduced due to flashovers in the motor winding.

Maximum bearing service life motor
Maximum service life of the motor bearings is achieved by keeping the bearing currents to a minimum.

All-Pole Sine Filter

Unlike most sine filters available on the market, the sincon® filter is supplied with an all-pole filter function. This important filter function is active on both, between phases and between phase and ground. This filter function is necessary to prevent damage to external rotor motors and to achieve the longest possible service life.

Frequency Converter

Low load current peaks
Inrush current limiters are standard with the GMM sincon.

Cos f always > 0.95 with public utility mains
The GMM sincon® achieves Cos f > 0.95. This means minimum idle power is generated and additional idle power compensation is not required.

Low noise emissions
Whistling noises are minimised with the GMM sincon due to the power unit’s high clock frequency (16 kHz).
The combination of GMM EC with highly efficient EC fans offers an ideal solution to energy efficiency and noise emissions. The GMM EC also provides other functions, such as Low Capacity Motor Management, automatic parametrization, motor jogging function and selective fan shutdown.

The low Capacity Motor Management (LCMM) the system can be operated efficiently during low partial load conditions. EC fans have a minimal speed, between 8% and 12% of the full load. The LCMM makes control easy within the lower capacity range (e.g. 5%) of the heat exchanger. The GMM has a function whereby the control signal is recalculated as appropriate for the number of fans and their minimum speeds, and subsequently sent to the individual fans. To avoid frequent fan cycling, a hysteresis function can be activated. Based on a comparison of the fans' operating hours, the GMM decides which fan is to be activated.

There is no required software to start-up the system due to the automatic parameterization. Fans are automatically set to the values entered in the system, regardless of whether this was at initial start-up or when a fan needs replacing. The usage limits of the fans are clearly defined and, as a result, adherence to the required heat exchanger capacity and the maximum permissible sound levels is ensured. The thermal resistance of the power electronics in each motor is also guaranteed.

Another feature for increased operational reliability is the motor jogging function. If a fan is blocked by ice, movement can be restored by repeatedly running the fan clockwise and counterclockwise with increasing torque. This function can be set via the GMM; if it is in operation, a confirmation message appears.

Pre-selected fans can be shut down using the selective fan shutdown function via a digital input signal (customer signal). This function is available in all operating modes: in control and slave mode. It is particularly useful for systems with two heat exchanger coils and for partial-load operation.
With the GMM EC RD, the display may be installed at a distance of up to 200 m (656 ft) from the unit.
Güntner Hydro Management
GHM Spray*

The controller GHM spray controls the water spraying depending on the performance required of the heat exchanger and the measured ambient temperature and fluid temperature. As a result, the capacity of the heat exchanger increases. The necessary information (e.g. fan speed) are read out by the speed controller via the bus communication. If a non-Güntner speed controller is used, the speed data can be transmitted via a digital signal. There are two systems:

Basic System:

The basic GHM spray system has one spray step. This system sprays the heat exchanger depending on various parameters (such as pressure or temperature) to attain an increase in capacity in the peak load range.
Professional System:

In addition to the basic system, up to 9 sections can be selected for spraying using the Professional system. This means that only individual sections of the heat exchanger are sprayed, thus achieving significant water savings. In addition, the service life of the heat exchanger is maximized by means of the section-cycling function, whereby the respective fin section with the fewest spraying hours is selected for spraying.

* Consult with our Sales representatives for product availability.
Güntner Hydro Management
GHM Pad*

The ACS wetting controller monitors the water applied to the wetting mats in the air inlet of the heat exchanger. It regulates the amount of water applied as a function of the load requirement (fan speed) of the heat exchanger, as well as the measured ambient temperature and air humidity.

As a result, the capacity of the heat exchanger increases. The necessary information (e.g. fan speed) are read out by the speed controller via the bus communication. If a non-Güntner speed controller is used, the speed data can be transmitted via a 0 – 10 volt signal.

Efficiency Mode

The GHM pad is able to check operating costs. This acts as an internal cost-management function which continuously decides whether applying water or increasing fan speed is the more cost-effective option and therefore, the most efficient operating mode. To this purpose, the water consumption is constantly recorded in the system.

The amount of water here is supplied seamlessly controlled, unlike the GHM spray system. As a result, uniform heat dissipation is ensured.
Options

Güntner Communication Module GCM

The GMM systems are communicative: the Güntner Communication Modules (GCM) are available as an option for all GMM systems. They can also be retrofitted. This communication module is used to transmit the data via standard bus systems for integration into the superordinate control system.

Sensors

There are various types of sensors available (pressure, temperature, humidity) for specific applications.

GMM COM Software

All GMM systems can get the latest innovations with software updates. Previously unavailable functions can be made available with software updates. The GMM COM software is used for this purpose. The software is installed on a PC or laptop. The appropriate firmware can be selected by means of a dialogue box and can be transferred to the GMM/GHM system.
UL Panel Shop
Güntner Control Panels

Güntner offers standard GCP Güntner Control Panels and customized control panels. All control panels are designed, built and tested in-house at Güntner’s Controls division, enabling us to collaborate with you on creating and offering a customized panel and control concept.

These control panel concepts are optimally designed for the heat exchangers’ set-up, capacity, energy efficiency and service life requirements, or, depending on the size, can be added on directly on the unit. Should an add-on not be possible, the control panels can be delivered with the unit. Güntner also offers on-site connection and start-up upon request.

Our panel shop is certified by “UL 508A Industrial Control Panels”.
# GMM Controller Functions

<table>
<thead>
<tr>
<th>Function</th>
<th>GMM step</th>
<th>GMM f-drive / sincon®</th>
<th>GMM EC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>External predefined setpoint</td>
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<td>X</td>
</tr>
<tr>
<td>External control signal</td>
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</tr>
<tr>
<td>Night limit</td>
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<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Bypass function</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Maintenance cycle*</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Setpoint shifting</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Extended threshold value function</td>
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<td>X</td>
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</tr>
<tr>
<td>Cleaning cycle*</td>
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<td></td>
<td>X</td>
</tr>
<tr>
<td>Refrigerant input</td>
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</tr>
<tr>
<td>Two setpoints with switchover</td>
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<td>X</td>
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<tr>
<td>Manual mode</td>
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<tr>
<td>Alarm management</td>
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</tr>
<tr>
<td>Heating/cooling switchover</td>
<td>X</td>
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<td>X</td>
</tr>
<tr>
<td>Bus slave operation with backup control system</td>
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</tr>
<tr>
<td>Plug-and-play</td>
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<tr>
<td>External BUS communication</td>
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</tr>
<tr>
<td>Maximum selection for analogue signals (pressure and temperature signals)</td>
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<tr>
<td>International operating convenience</td>
<td>X</td>
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<tr>
<td>Integrated PID controller with default parameters</td>
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<tr>
<td>Low Capacity Motor Management (LCMM)</td>
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<tr>
<td>Motor jogging function*</td>
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<td>Selective fan shutdown</td>
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<tr>
<td>Fan cycling</td>
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</table>

* currently being developed
Global Presence

Güntner Group

Being your partner, we are committed to offering you global support. You will find us in all major trade centers in the Americas, Europe and Asia. We speak the language of your market and understand your local requirements and regulations.

Güntner is a leading provider of heat exchange products for the following industry segments:

- Industrial Refrigeration
- Commercial Refrigeration
- Air Conditioning
- Energy & Process Cooling

A Global Community of Experts