MEDICAL MONITORING, ALARM AND CONTROL SYSTEMS

Technology for a Better Future
Genstar Technologies Company, Inc. (GENTEC®), founded in 1969, is a global industry leader in the manufacturing of welding apparatus, pressure regulators, and gas control systems.

It is GENTEC®’s mission to provide customers with high quality, value-added products and services that surpass the strictest safety standards. All GENTEC® products are manufactured in an ISO 9001 and ISO 13485 certified facility by our experienced and dedicated workforce, using exquisite craftsmanship in conjunction with computerized automation, stringent quality control, and advanced test equipment.

Additionally, as a total system solution provider, GENTEC® offers technical support, on-site evaluation, and design/implementation. GENTEC® engineers examine all customer requirements in order to develop and recommend the best customer-specific solutions.

The company takes great pride in fostering a strong relationship with each and every customer. Today, GENTEC® sells its products through a vast distribution network which extends to thousands of customers worldwide.
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MEDICAL GAS FLOW SOLUTIONS

System Diagram

Patient Room
- Respiratory Products
- Pendant
- Pressure Detecting Point
- Gas Control Panel
- Area Alarm
- Zone Valve Box
- Gentec Universal Monitoring Center

Operation Room
- Air Compressor
- Cryogenic Tank
- Manifold System
- Vacuum Pump
- Master Alarm

Equipment Room
GUMACS™ Overview

Gentec Universal Monitoring, Alarm and Control System™ is a highly modular system utilizing the most advanced technologies in electronics and software. The modular design can implement limitless configurations to meet different monitoring/control requirements. Future expansion can be achieved through upgradable firmware, software, and additional panels.

GUMACS™ alarm series complies with the latest edition of NFPA 99 and optionally for HTM 02-01. GUMACS™ alarm series have built-in networking capability and can be implemented to standard RS-485 and Ethernet network systems.

Furthermore, GUMACS™ alarm series accept all 4-20 mA and voltage signals, and can monitor customized readings or alarm conditions such as humidity, temperature, concentration levels, and flow rates in addition to typical pressure readings. With these versatilities, GUMACS™ alarm series are often applied to industrial, laboratories, and other applications.

Customized Software

Implementation of an intelligent monitoring system with networking capability like the GUMACS™ is made easy with Object Visual Lab®, the interactive software generating package. Having a strong working relationship with Object Visual Lab®, Gentec is able to provide customized software to complement GUMACS™ alarm systems when advanced monitoring/control requirements are involved. In addition, trend data can be collected and saved for later analysis to help facilitating future projects.
GUMACSTM Series Medical Gas Area Alarm

GUMACSTM Series Area Alarm is CE marked and NFPA 99 compliant. Designed to accept a variety of input signals, GUMACSTM Series Area Alarm is often used to monitor pressure, flow rate, temperature, humidity, concentration, and other safety indexes. If needed, GUMACSTM Series Area Alarm can also offer relay switch output control capability.

Built-in RS485 communication port allows each GUMACSTM Series alarm to be networked for remote monitoring. The physical data will be processed and displayed on site by the area alarms. In addition, GUMACSTM System Console can request data from the slave modules, the area alarms and master alarms.

Key Features

• Modular system configuration
• 1 to 16 input channels available
• Pressure units are customizable (Psig, kPa, Bar, MPa, inHg, and mmHg)
• Can be used to monitor pressure, flow rate, temperature, humidity, concentration, and other safety indexes
• High/low alarm limits and silence time are customizable
• Built-in RS-485 communication port for networking
• Accept 4-20 mA current inputs and single-ended voltage signals
• One contact switch output per input channel
• Displays error message when pressure transducer is not connected
• Compact size with large four-digit LED numerical displays
• Dual color LEDs for system statuses
• All parameters can be field adjustable
• Labels can be customized upon request
• Alarm volume is adjustable
### Electrical and Physical Specifications

#### Mechanical

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Panel</td>
<td>Injection Molded Plastic (PCABS, V0 Flame Rated)</td>
</tr>
<tr>
<td>Case Body</td>
<td>Metal Alloy</td>
</tr>
<tr>
<td>Physical Dimension</td>
<td></td>
</tr>
<tr>
<td>(Width x Height x Depth)</td>
<td>Overall: 1~4 Channel: 300mm x 135mm x 107mm</td>
</tr>
<tr>
<td></td>
<td>5~6 Channel: 300mm x 175mm x 107mm</td>
</tr>
<tr>
<td></td>
<td>7~8 Channel: 300mm x 215mm x 107mm</td>
</tr>
<tr>
<td>Wall Opening</td>
<td>(Depth beneath the wall is 95mm)</td>
</tr>
<tr>
<td>(Width x Height)</td>
<td>1~4 Channel: 272mm x 125mm</td>
</tr>
<tr>
<td></td>
<td>5~6 Channel: 272mm x 165mm</td>
</tr>
<tr>
<td></td>
<td>7~8 Channel: 272mm x 205mm</td>
</tr>
</tbody>
</table>

#### Electrical

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Requirements</td>
<td>Input: 100~240 VAC, 0.5 A Maximum</td>
</tr>
<tr>
<td>Analog Input</td>
<td>Input Type: (1) Single-ended, voltage</td>
</tr>
<tr>
<td></td>
<td>(2) Differential, voltage</td>
</tr>
<tr>
<td></td>
<td>(3) 4~20 mA current supplying 15 VDC</td>
</tr>
<tr>
<td></td>
<td>(4) 4~20 mA current not supplying 15 VDC</td>
</tr>
<tr>
<td></td>
<td>Working Range: ±10 VDC/4~20 mA</td>
</tr>
<tr>
<td></td>
<td>Safe Range: ±14 VDC/0~28 mA Maximum</td>
</tr>
<tr>
<td></td>
<td>Resolution: 14 bit or 1% of sensor full range</td>
</tr>
<tr>
<td>Relay Output</td>
<td>Channels: 1 output per 1 input channel</td>
</tr>
<tr>
<td></td>
<td>Range: 0.15 A at 48 VDC/1 A at 30 VDC/0.5 A at 120 VAC</td>
</tr>
<tr>
<td>Buzzer</td>
<td>Adjustable Intensity</td>
</tr>
</tbody>
</table>

#### Communication

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-485 Port</td>
<td>9600/19200 baud, standard (8-bit data, no parity, 1 stop bit)</td>
</tr>
</tbody>
</table>

#### Dimensions

![Dimensions Diagram]

#### Ordering Information

<table>
<thead>
<tr>
<th>BAA</th>
<th>R</th>
<th>03</th>
<th>OVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Alarm</td>
<td>Sensor Type</td>
<td>Number of Numerical Channels</td>
<td>Gas Type</td>
</tr>
<tr>
<td>L: Local Sensor</td>
<td>R: Remote Sensor</td>
<td>(01 to 16 Normally)</td>
<td>O: Oxygen</td>
</tr>
<tr>
<td>V: Vacuum</td>
<td>A: Medical Air</td>
<td>I: Instrument Air</td>
<td>N: Nitrogen</td>
</tr>
<tr>
<td>2: Nitrous Oxide</td>
<td>C: Carbon Dioxide</td>
<td>W: WAGD Vacuum</td>
<td></td>
</tr>
</tbody>
</table>

**Example:**

BAA - R - 03 - OVA indicates an area alarm (remote sensor) for oxygen, vacuum, and medical air.
GUMACS™ Series Master Alarm is CE marked and NFPA 99 compliant. It is used to monitor the operation conditions of source equipments such as air compressors, vacuum pumps, and/or manifold systems, etc. GUMACS™ Series Master Alarm can also offer relay switch output control capability when required.

Built-in RS485 communication port allows each GUMACS™ Series alarm to be networked for remote monitoring. The physical data will be processed and displayed on site by the master alarm. In addition, GUMACS™ System Console can request data from the slave modules, the area alarms and master alarms.

Although not done conventionally, GUMACS™ Series Master Alarm can be used as an Area Alarms Monitoring Center. When connected, the working conditions of the area alarms will be displayed on the Area Alarms Monitoring Center. This would be a good solution for a medium-sized central monitoring project.

Key Features
- Can expand up to 64 TTL or contact switch inputs
- Can offer up to 48 switch output capability
- Built-in RS-485 communication port for networking
- Can be upgraded to a combination alarm if numerical displays are required
- Accept both normally open (N/O) and normally closed (N/C) switches
- High/low alarm limits and silence time are customizable
- Can be used to monitor the conditions of area alarms
- Labels can be customized upon request
- Alarm volume is adjustable
Electrical and Physical Specifications

**Mechanical**

<table>
<thead>
<tr>
<th>Front Panel</th>
<th>Injection Molded Plastic (PCABS, V0 Flame Rated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Body</td>
<td>Metal Alloy</td>
</tr>
</tbody>
</table>

**Physical Dimension (Width x Height x Depth)**

<table>
<thead>
<tr>
<th>Channel Range</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1~16 Channel</td>
<td>Overall: 300mm x 135mm x 107mm</td>
</tr>
<tr>
<td>33~48 Channel</td>
<td>300mm x 295mm x 107mm</td>
</tr>
<tr>
<td>17~32 Channel</td>
<td>300mm x 215mm x 107mm</td>
</tr>
<tr>
<td>49~64 Channel</td>
<td>300mm x 375mm x 107mm</td>
</tr>
</tbody>
</table>

**Wall Opening (Width x Height)**

<table>
<thead>
<tr>
<th>Channel Range</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1~16 Channel</td>
<td>Overall: 272mm x 125mm</td>
</tr>
<tr>
<td>33~48 Channel</td>
<td>300mm x 285mm</td>
</tr>
<tr>
<td>17~32 Channel</td>
<td>272mm x 205mm</td>
</tr>
<tr>
<td>49~64 Channel</td>
<td>300mm x 365mm</td>
</tr>
</tbody>
</table>

**Electrical**

- **Power Requirements**
  - Input: 100~240 VAC, 0.5 A Maximum

- **Analog Input (for first module)**
  - Input Type:
    1. Single-ended, voltage
    2. Differential, voltage
    3. 4~20 mA current supplying 15 VDC
    4. 4~20 mA current not supplying 15 VDC
  - Working Range: ±10 VDC/4~20 mA
  - Channels: 16 Maximum
  - Safe Range: ±14 VDC/0~28 mA Maximum
  - Resolution: 14 bit or 1% of sensor full range

- **Digital Output (for one expansion module)**
  - 5 VDC, -2.6 mA per Channel Maximum
  - Number of Channels: 16 Maximum
  - Omron G2R-1, G2R-14, G2R-1A, G2R1A4 or Grayhill 70-OAC5, 70-ODC5, and Compatibles

- **Digital Input (for one expansion module)**
  - 5 VDC, 24 mA per Channel Maximum
  - Number of Channels: 16 Maximum
  - Grayhill: 70-IAC5, 70IDC5, and Compatibles

- **Numerical Display**
  - Resolution: Large 7-segment, four-digits LED

**Communication**

- RS-485 and RS-232 Port
  - 9600/19200 baud, standard (8-bit data, no parity, 1 stop bit)

**Dimensions**

![Diagram of dimensions]

**Ordering Information**

**BMA**

- **Master Alarm**
- **Number of Digital Input**
  - 01: 1~16 Digital Inputs
  - 02: 17~32 Digital Inputs
  - 03: 33~48 Digital Inputs
  - 04: 49~64 Digital Inputs

- **Number of Digital Output**
  - 00: 0 Digital Outputs
  - 01: 1~16 Digital Outputs
  - 02: 17~32 Digital Outputs
  - 03: 33~48 Digital Outputs

**Example:**

BMA - 01 - 00 indicates a master alarm for 1~16 input channels.
GUMACS™ Series Combination Alarm is CE marked and NFPA 99 compliant. Integrating the numerical display functions and master alarm functions, the combination alarm is sometimes more preferable. It can be used to monitor the operational conditions of source equipment and other numerical safety indexes. GUMACS™ Series Combination Alarm can also offer relay switch output control capability when required.

Built-in RS485 communication port allows each GUMACS™ Series alarm to be networked for remote monitoring. The physical data will be processed and displayed on site by the combination alarm. In addition, GUMACS™ System Console can request data from the slave modules, area alarms and master alarms.

**Key Features**

- Can be expanded to handle up to 64 TTL or contact switch inputs and 48 TTL or relay (contact switch) outputs
- Built-in RS-485 communication port for networking
- High/low alarm limits and silence time are customizable
- Relative positions of modules can be adjusted to meet the space requirements or limitations
- Displays error message when pressure transducer is not connected
- Labels can be customized upon request
- Alarm volume is adjustable
## Electrical and Physical Specifications

### Mechanical
- **Front Panel**: Injection Molded Plastic (PCABS, V0 Flame Rated)
- **Case Body**: Metal Alloy
- **Physical Dimension**: Customized
- **Wall Mounting Hole**: Customized

### Electrical
- **Power Requirements**: Input: 100~240 VAC, 0.5 A Maximum

### Analog Input (for first module)
- **Input Type**: (1) Single-ended, voltage
- **(2) Differential, voltage**
- **(3) 4~20 mA current supplying 15 VDC**
- **(4) 4~20 mA current not supplying 15 VDC**

### Working Range**: ±10 VDC/4~20 mA

### Channels**: 16 Maximum

### Safe Range**: ±14 VDC/0~28 mA Maximum

### Resolution**: 14 bit or 1% of sensor full range

### Digital Output (for one expansion module)
- **VDC**: -2.6 mA per Channel Maximum
- **Number of Channels**: 16 Maximum

### Channels**: Omron G2R-1, G2R-14, G2R-1A, G2R1A4 or Grayhill 70-OAC5, 70-ODC5, and Compatibles

### Digital Input (for one expansion module)
- **VDC**: 24 mA per Channel Maximum
- **Number of Channels**: 16 Maximum

### Channels**: Grayhill: 70-IAC5, 70-IDC5, and Compatibles

### Numerical Display
- **Resolution**: Large 7-segment, four-digits LED

### Wiring
- **Termination**: Analog Input, I/O, and RS-485: PCB mounted screw terminal connections
- **AC Power**: 3 pin AC power connections

### Communication
- **RS-485 and RS-232 Port**: 9600/19200 baud, standard (8-bit data, no parity, 1 stop bit)

## Ordering Information

**EMA - R - 02 - OV - 01 - 00** indicates a combination alarm (remote sensor) with 2 numerical channels (oxygen, vacuum), 1~16 digital input channels, and 0 digital output.
GUMACSTM System Console

GUMACSTM System Console is a powerful industrial PC-based system. As a station host, Intelligent Alarm/Control Station (IACS) can be expanded to monitor a great number of analog/digital inputs and provide output control capabilities. With Gentec customized software, IACS can easily meet or exceed customer’s monitoring requirements. In addition, trend data can be collected and saved for later analysis to help facilitate future projects.

As a network master of Intelligent Alarm/Control Network (IACN), GUMACSTM System Console can manage a variety of GUMACSTM Series alarms and other devices. All digital and analog inputs are first processed locally and then sent to the System Console via the RS-485 network in order. More complicated computing, data logging, trend analyzing, and intelligent decision making tasks are carried out by the System Console. It is also possible to deliver the information to upper network.

SYSTEM SPECIFICATIONS:
• High performance industrial PC with flat panel display
• Analog and digital inputs
• Analog and digital output capabilities
• Built-in RS-485, RS-232, and Ethernet ports

EXPANSION OPTIONS:
• Touch panel, voice mail, fax transmission
• Additional digital and analog IO expansion modules
• Customized system software
• Connect to upper level hospital network and Internet
Gentec Central Monitoring System

- Quality control and quality assurance
- Trend data analyzing helps decision making, thus improving efficiency of operations management
- Can be integrated into existing hospital management system
e-Hospital Solution

- Hospital Server Database, HL7
- INTERNET
- Medical Gas Source Equipment Monitoring
- Medical Gas and Vacuum Monitoring
- Master Alarm
- Fax, Voicemail
- Area Alarm
- Nurse Call Monitoring
- Humidity and Temperature Monitoring
- Air Quality Monitoring
Medical Gas Alarm Systems Provides:

“Visual Indications” to indicate normal functions of the pipeline system.

“Visual Indications and Audible Indications” to WARN that the routine replacement of cylinders or other engineering action is required.

“Visual and Audible Emergency Alarms” to inform that abnormal conditions have occurred which may require urgent action by the user. This alarm condition will require a rapid response by the various departments’ staff.

(MHM 02-01)

**Master Alarms** shall monitor the operations and conditions of the supply source, the reserve source (if any), and the pressure in the main lines of each medical gas pipeline systems.

**Area Alarms** shall monitor all medical gas, vacuum, and piped WAGD systems in Level 1 and Level 2 health care facilities.

**Level 1 Medical Piped Gas and Vacuum Systems**

“Systems serving occupancies where interruption of the piped medical gas and vacuum system would place patients in imminent danger of morbidity or mortality.”

**Level 2 Medical Piped Gas and Vacuum Systems**

“Systems serving occupancies where interruption of the piped medical gas and vacuum system would place patients at manageable risk of morbidity or mortality.”

Medical gas alarms are required at Level 1 and Level 2 healthcare facilities.

(NFPA 99, 2005)

Related Regulations:

NFPA 99 (National Fire Protection Association)
HTM 2022, HTM02-01 (Health Technical Memorandum)
ISO 7396-1, ISO 7396-2