GENTEC UNIVERSAL MONITORING, ALARM AND CONTROL SYSTEM™

AREA ALARM

USER'S MANUAL
FILED INSTALLATION GUIDE
TECHNICAL INFORMATION

GUMACSBAA20120918

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Revision History

Version	Document Serial Number	Release Date	Remark
1	GUMACSBAA20101118	November 18, 2010	First Release
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GENERAL INFORMATION

WARRANTY

- Gentec Systems Corporation (the company) warrants that the product manufactured by the company and delivered hereunder will be free of defects in material and workmanship for a period of twelve months from the date of receiving the product by the purchaser.
- The purchaser shall promptly report in writing any failure to conform to this warranty to the company within said period. The company will, at its options, repair the defective item or provide a replacement free of charge upon receiving the returned item, provided that it has not been mishandled in its storage, installation, maintenance, and operation after being received by the purchaser. The purchaser shall ship the defective product back to the company only after receiving a written authorization of the company.
- The equipment should not be repaired or altered without prior written or verbal approval of the company or its authorized distributors. Failure to comply will void all warranty on the product.
- The effects of corrosion, erosion and normal wear and tear are specifically excluded from this warranty.
- THE COMPANY MAKES NO OTHER, EXPRESSED OR IMPLIED, WARRANTY OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

SAFETY

General safety precautions:

1. Only trained personnel certified by Gentec Systems Corporation shall be permitted to adjust or repair the equipment.
2. Read all instructions carefully before operating the equipment.
3. Do not connect the equipment to an electrical supply of incorrect voltage and/or frequency.
4. Switch off the main power supply before opening the case front panel to do wiring inside the equipment unless otherwise instructed.
5. Do not short any signal wires at both ends of the transmitting cable.
6. Do not use the equipment outside the specified ambient temperature and humidity ranges. Do not operate the equipment when it is considered defective. Otherwise, it may not reliably deliver its expected functions.
7. The equipment is not intended to be and must not be used in potentially explosive atmospheres. Do not install the equipment at or close to locations where there is any actual or foreseeable risk of hazardous levels of flammable gases or vapors.

The following symbols are used throughout this documentation for different safety related messages:

Statements and hints that relate directly or indirectly to the safety of personnel or the protection of the equipment and other connected devices.

Denotes practices or steps which can prevent damages to equipment and other connected devices.

Denotes practices or procedures that can prevent electrical shock to the equipment and other connected devices, or prevent injury to the operator.

PART 1

USER'S MANUAL

There are no user serviceable parts inside the alarm enclosure. Hence, there should be no reason for the operator or attendant to open the front panel of the alarm during its normal operation.

Only trained, certified personnel shall be permitted to adjust or repair the equipment. Tampering by unauthorized individuals with the internal wiring and AC-to-DC power converter may damage the alarm and other connected devices and may cause electrical shock to the individuals.

1.1 INTRODUCTION

Gentec Universal Monitoring, Alarm, and Control System™ consists of totally modularized hardware and open-structured firmware and software.

The system building blocks were designed with advanced technologies in electronics and software development. Functionality, scalability, expandability, and exchangeability were addressed in every design stage. All major modules have built-in communication ports with essential communication functions integrated into their firmware.

With these versatile modules and accessories, virtually unlimited possible configurations can be implemented to meet different monitoring and control needs. In addition to system implementation flexibility and future expandability, the modularized design also reduces the risk of a total system breakdown.

The main purpose of **Gentec Area Alarms** is to provide means for monitoring key process parameters, including, for example, the supply mainline pressures of oxygen, compressed air, and vacuum in a critical area at the user end. When any of the parameter is not within the proper operating range, the alarm will issue audible and visual warnings so that the field personnel can take necessary measures for the situations.

One of the targeted applications of **Gentec Area Alarms** is to ensure the safe and efficient operation of medical gases pipeline system (MGPS) for the following three purposes (reasons):

A. to indicate normal function of the pipeline system by means of visual indicators;
B. to warn by visual and audible indication that routine replacement of cylinders or other engineering actions are required;
C. to inform the attendant on duty by visual and audible emergency alarms that abnormal conditions which require urgent action have occurred. These alarm conditions generally require rapid, coordinated responses by staff of various departments.

NOTICE All Gentec GUMACS alarms are pre-assembled and pre-programmed based on the application specifications before delivery for field installation. There are no user serviceable parts inside the alarm enclosure.

All Gentec alarm modules are designed to comply with NFPA 99 and HTM 02. Most, if not all, of the alarm's functions are self-explanatory. Minimal training is required for the operators and would-be attendants. Normally, sections 1.2 and 1.3 alone should be sufficient to serve the purpose.

Please refer also to section 1.4 for comments on safe and sound operational management practices of gases and vacuum supply systems to make best use of Gentec alarms.

1.2 SYSTEM DESCRIPTION

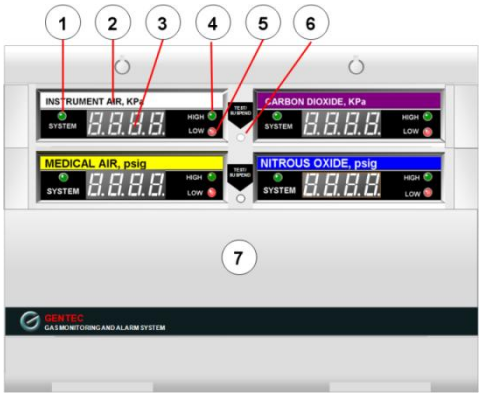


Figure 1-1 Front view of a Gentec four-gas area alarm (GUMACS-BAA-L-4) with extra internal space for housing sensors or other accessories, where

(1) Channel Status LED Indicator
(2) Channel Identification Label
(3) Numerical Display
(4) Signal Too High LED Indicator
(5) Signal Too Low LED Indicator
(6) Test/Suspend Button
(7) Optional full-height (8 cm high) or half-height (4 cm high) vacant compartment(s) to provide extra internal space

Figure 1-2 Front view of a Gentec four gas area alarm (GUMACS-BAA-R-4)

1. Gentec area alarms consist of one to several data processing and display modules, identified as g-SMART DATA DISPLAY ENHANCED™ modules or g-SDDEs hereafter. There are two data channels per g-SDDE module. The number of modules depends on the number of signals to monitor.

2. Unused channels are disabled and their display windows are normally covered with opaque labels to avoid confusion.

3. As shown in Figures 1.1 and 1.2, each data channel is provided with
   (1) three LED indicators,
   (2) one four-digit numerical data display, and
   (3) one channel identification label.

4. Each data channel has one relay with both "normally open" and "normally closed" outputs available for controlling other external devices. The relay can be programmed to charge (activate) its coil in response to alarms due to read-in data too high, too low, or both (see Section 2.5 of Part 2)..

5. Each g-SDDE module has one TEST/ SUSPEND button.

6. The height of the alarm can be expanded incrementally if more space is needed inside the alarm box to house additional sensing or other electronic components..

1.3 FUNCTION DESCRIPTION

The functions of the panel components shown in Figures 1.1 and 1.2 are explained below:

1. **Channel Status LED Indicator:**
   The three-colored LED will present different colors to reflect the status of the data channel as follows:

   Green: the read-in data is within the normal range
   Red: the read-in data is higher than the alarm high limit or lower than the alarm lower limit.
   Yellow: the read-in data is within 5% of the alarm high or low limit.

   When the channel status LED indicator is off, the LED may be defective if other indicators and displays of the same module function normally. Otherwise, the whole g-SDDE module may have lost its power or become defective.

2. **Channel Identification Label:**
   The label is used to identify the data channel as well as the unit in use.

3. **Numerical Data Display:**
   It shows the physical value of the read-in data. If the sensor is defective or there is a problem with the signal transmitting cable, the display will become nOCh (= no valid channel signal).

4. **High LED Indicator:**
   The red LED is normally off. It will be turned on If the read-in data is higher than the alarm high limit.

5. **Low LED Indicator:**
   The red LED is normally off. It will be turned on If the read-in data is lower than the alarm low limit

6. **TEST/SUSPEND Button:**
   The button has the following three functions:

   (1) **Self-testing:**
   During the alarm's normal operation (e.g. with no pending alarm condition), press the button for more than 3 seconds, the buzzer will be turned on with all the LED indicators blinking for about 5 seconds after the button is released. The numbers displayed by LED indicators are in the following cycling sequence:

   Black out →8888 (all on)→Alarm High Limit → Alarm Low Limit → Black out → … .

   The self-testing is not needed during normal operation of the alarm. It is recommended only when the alarm module seems to become defective and unreliable.

   (2) **Buzzer Silencing:**
   The alarm module will turn on its buzzer when read-in data of any of the two input channels becomes abnormally high or low.

   After acknowledging the warning, the operator can temporally turn off the buzzer by pressing this button. The warning LED indicator will then become blinking.

   The buzzer will be turned on again after a specified silencing time is up or if a new alarm condition arises. The buzzer will be turned off only if either all alarm conditions are removed or all alarming channels are in the silencing state.

   (3) **Module Reboot:**
   Press down the button for more than 10 seconds, the module will reboot itself after the button is released.

Per NFPA 99 and HTM 02, all Gentec area alarms will restart automatically after a power loss (for 10 seconds or more) without giving false signals or requiring manual reset.

Furthermore, the activities of a Gentec area alarms are continuously supervised by the "watchdog" mechanism of its microprocessor. If the firmware somehow stalls, the alarm will reset itself automatically and resume its normal operation.

1.4 CUSTOMER RESPONSIBILITY

It is the responsibility of the customer to ensure that .

(1) Proper SOPs detailing the personnel responsibilities and actions to take under different alarm conditions are in place and well comprehended by all involved departments.;

(2) The alarm is so installed that it will be attended all the time; and

(3) In addition to on-duty operators, all other potential alarm attendants, including nurses, safety guards, etc., are familiar with the functions of the alarm and the actions to take under different alarm conditions.

(4) If applicable, please refer to NFPA99, HTM-02, or other pertinent regulatory guidelines for AC power requirement for MGPS alarms..

(5) If applicable, please refer to NFPA99, HTM-02, or other pertinent regulatory guidelines for setting up proper management policy to ensure the safe operation and use of your medical gases and vacuum systems.

1.5 NORMAL MAINTENANCE

Exterior cleaning is the only maintenance needed for the alarm during its normal use. Remove dust off the panel using a soft duster or slightly damped non-abrasive tissue paper or cloth. Mild detergents may be used, but strong acid or basic agents should be avoided. Solvents that can dissolve paints or plastic are strictly prohibited.

1.6 REPLACEMENT OF THE DC POWER SUPPLY FUSE

WARNING Fuse replacement shall be done only by a certified electrician without interfering with other normal operations and activities of the site.

REPLACEMENT PROCEDURES:

1. Carefully detach two screw caps at the top edge of the system (see Figures 1.1 and 1.2). Remove the fastening screws and swing down the module assembly to its horizontal position.

2. Locate the DC power supply and its fuse box.

3. **WARNING** Push the knob of the switch of the DC power supply to its OFF position.

4. **WARNING** Replace the burnt fuse with a new one. The replacement must be of the **same voltage and current rating** as the original one.

5. Turn on the DC power supply. Wait for a few seconds for the system to reboot.

6. Swing up the module assembly and secure it to the metal case using the original screws and, at last, snap in the screw caps.

PART 2

INSTALLATION GUIDE

Only trained, certified personnel shall be permitted to perform the hardware installation and firmware setup of this product. Tampering by unauthorized individuals with the internal wiring and AC-to-DC power converter may damage the alarm and other connected devices and cause electrical shock to the individuals.

The illustrations used in this section are for the demonstration purpose only. The actual number of modules and parts in the alarm varies from system to system.

2.1 UNPACKING THE PACKAGE

All Gentec alarm modules and systems have been fully tested during and after their assembling in our factory. However, upon receiving the packages, please:

(1) Examine the packaging boxes for any damage. If there is evidence of abnormal abuses or handling during shipment, please do not open the boxes. Confirm the mishandling with the carrier and contact our Customer Services Department immediately;

(2) Carefully open the boxes and remove the contents out. Again, if there is any apparent damage or defect by visual inspection, please do not proceed with the installation and contact our Customer Services Department immediately;

(3) Check the contents against the attached packing list. If there is any question, please contact our Customer Services Department immediately.

2.2 PACKAGE CONTENTS

For every system, the following three items should be included in the package:

- **a module assembly**,
- **a case assembly**, and
- **an accessory pack**.

2.2.1 MODULE ASSEMBLY

Depending on the requirements of the application (or the number of data channels), the pre-assembled module assembly of a Gentec area alarm should contain an upper panel trim, a lower panel trim, and from one to several **g-Smart Data Display Enhanced™** modules (see, for example, Figure 2.1 below)

Figure 2.1 Front and Rear Views of Typical 8-gas Gentec Area Alarm Module Assembly

2.2.2 CASE ASSEMBLY:

The dimensions of the metal case (or rough-in box as it is sometimes called) are:

Width: 27 cm
Height: 4.5 cm +
4 cm x Number of g-SDDE Modules +
8 cm x Optional Number of Full-height Vacant Compartments +
4 cm x Optional Number of Vacant Half-height Compartments
Depth: <8.5 cm

The punch-through holes on the case top and bottom covers are 2.0 cm (3/4 inch) in diameter.

A retaining string (for holding the module assembly in its horizontal position when opened) is normally attached to one side of the case. One or more DC power supplies are attached to the back plane of the case when delivered.

2.2.3 ACCESSORY PACK:

The accessory pack normally contains:

(1) Screw sets for mounting the case onto the walls of different types;
(2) A screw set for securing the hinges of the module assembly onto the case;
(3) Two screws for securing the module assembly onto the metal case at the top edge of the system;
(4) Two screw caps for concealing the screw heads at the top edge of front panel;
(5) Plastic tabs for securing the paper protective cover over the metal case;
(6) Module labels;
(7) A packing List; and
(8) This manual and other system-specific special instruction sheets.

2.3 WALL MOUNTING PROCEDURES

Step 1 Carefully move the module assembly and the metal case out of their shipping boxes. Examine all the parts thoroughly. If there are visible damages, abort the installation and contact our Customer Services Department at once.

Step 2 Prepare a wall opening of the following dimensions:

Width: 27 cm
Height: 4.5 cm +
4 cm x (Number of g-SDDE Modules) +
8 cm x Optional Number of Full-height Vacant Compartments +
4 cm x Optional Number of Half-height Vacant Compartments

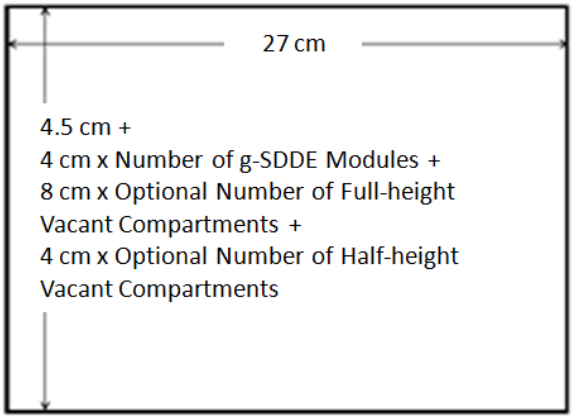


Figure 2.2 Wall Opening Dimensions

Step 3 Punch and remove as many as needed the removable pieces of the punch-through holes on the top and bottom sides of the metal case (see Figure 2.3).

CAUTION **Make sure that the DC power supply inside the metal case has been switched off now** (see Figure 2.4)**.**

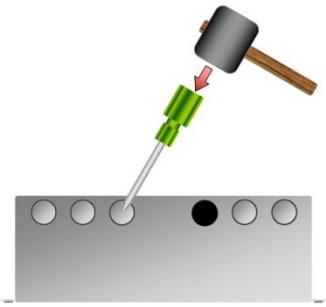


Figure 2.3 Punching out the removable pieces of the punch-through holes of the metal case.

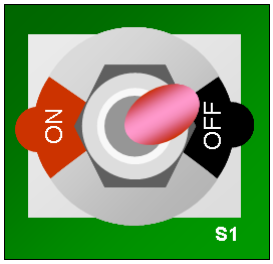


Figure 2.4 DC power supply in its off position.

Step 4 Slide the metal case into the wall opening. Make sure that four hinge screw holes are at the lower edge of the case.

Step 5 Pull all the in-coming and out-going power and signal cables and wires into the case through proper punch-through holes.

Step 6 Secure the metal case onto the wall using at least four screws. (Note that the distances between the wall-mounting screw holes on both sides of the metal case are fixed at 4 cm. It is normally not necessary to use all of the available wall-mounting screw holes.)

WARNING AC power can be connected to the DC power supply now. However, **be sure to first switch off the AC power and make sure that the DC power supply is in its off position**.

Step 7 Place the protective cover over the metal case, using four nylon tabs from the accessory pack. Do not remove it until the wall finishing is completed and ready to proceed with the next installation step.

Figure 2.5 Protective Cover

Step 8 If the gas pressure sensors are installed inside the alarm box, gas lines can connect to the sensor extension tubes now.

Step 9 Remove the protective cover and its plastic tabs from the metal case and secure the hinges of the module assembly onto the metal case. Swing the module assembly to its horizontal position and, then, attach it to the retaining string (see Figure 2.6).

NOTICE Normally, the alarm modules should have been properly set up before delivery. If not, please follow the procedures presented in the part 3 to set up the module assembly before the next step.

Step 10 Connect the AC power to the DC power supply if have not done so.

WARNING **Make sure that both AC power and the DC power supply have been switched off first.**

Step 11 Proceed to connect all input and output signal wires to the screw terminals of the module assembly as detailed in the next section.

WARNING **The DC power supply should remain off while making the connections.**

Step 12 If RS-485 network is not to be used, skip to Step 13. Otherwise, connect the in-coming and out-going RS-485 cables as described in the next section.

Step 13 Turn on the DC power supply.

Step 14 Swing the module assembly upward and secure it onto the metal case using the screw holes at the top edges of the metal case and the module assembly. Snap in the plastic caps over the screws to conceal the screw heads.

Step 15 Insert channel identification labels and, then, the their protective covers into the front plastic panels as shown in Figure 2.7(a), Please note that the right and left labels are asymmetrical.

Step 16 Apply the button labels above the TEST/SUSPEND buttons as shown in Figure 2.7(b)

Step 17 **NOTICE** **Per NFPA-99 and HTM-02, validate the label placement and signal connections by responsible authority of the facility.**

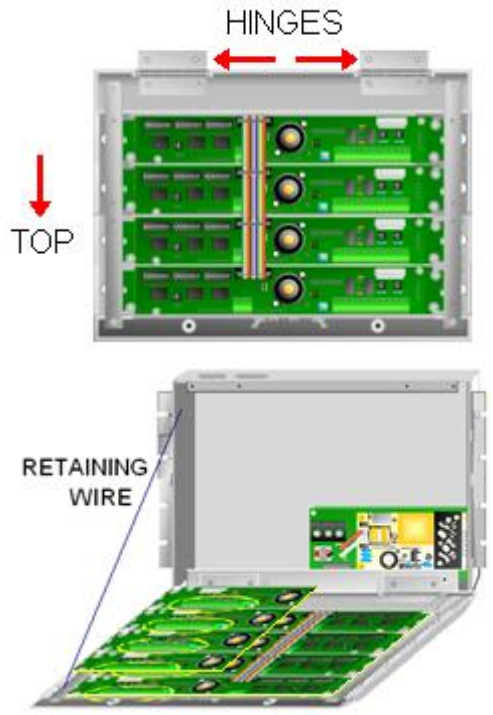
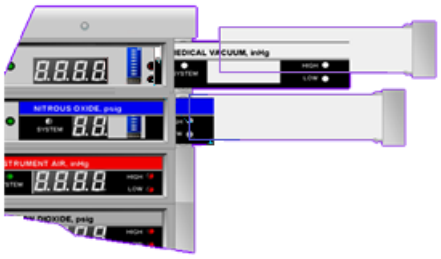
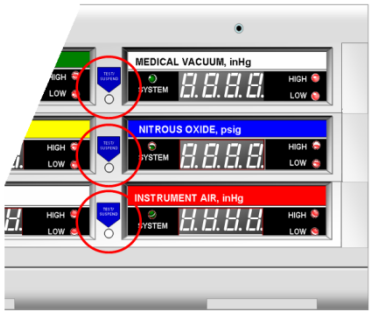


Figure 2.6 Attachment of Module Assembly to the Metal Case



(a)



(b)

Figure 2.7 Label Placement

2.4 SIGNAL CONNECTION

2.4.1 TRANSDUCER SIGNALS

NOTICE Both input channels of each module can accept either a voltage or a current input (but **NOT BOTH** at the same time) using the screw terminals of JA2 on the module's add-on daughterboard as shown in Figure 2.8 and Table 2.1.

CONNECTING PROCEDURES:

Step 1 **WARNING** **Turn off the DC power supply if it is connected.**

Step 2 Locate JA2 screw terminals on the add-on daughterboard of the module (see Figure 2.8).

Step 3 Connect wires to A1+ and A1- screw terminals of channel 1

Step 4 Connect wires to A2+ and A2- screw terminals of channel 2.

Step 5 Connect the ground leads of both sensor inputs to COM screw terminal.

Step 6 If needed, use VDC screw terminal to supply DC power to the remote sensors.

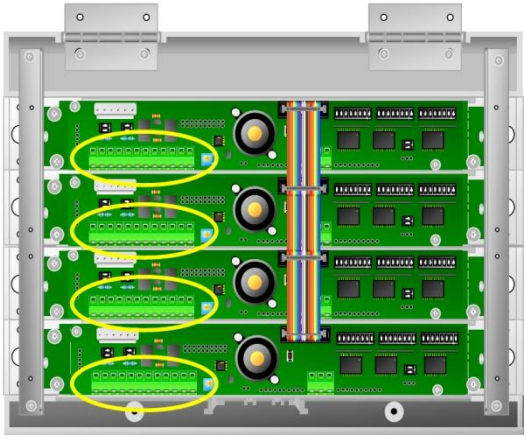


Figure 2.8 The location of screw terminal JA2 of the g-Smart Data Display Enhanced™ module.

Table 2.1: Screw Terminal JA2

INPUT AND OUTPUT CONNECTIONS	
SCREW TERMINAL	**CONNECTION**
A1+	Analog Channel 1 Signal +
A1-	Analog Channel 1 Signal -
VDC	DC Power Output)
COM	Analog Input Common (Ground)
A2+	Analog Channel 2 Signal +
A2-	Analog Channel 2 Signal -
NC1	Relay 1 Normally Close
COM1	Relay 1 Common
NO1	Relay 1 Normally Open
NC2	Relay 2 Normally Close
COM2	Relay 2 Common
NO2	Relay 2 Normally Open

2.4.2 RELAY OUTPUT

NOTICE There is one relay switch for each data channel of the module. The relay is activated whenever the read-in data is outside the normal operating range. Both normally open and normally closed outputs are available simultaneously. The relay outputs are accessed through screw terminals of JA2 on the add-on daughterboard.

CONNECTING PROCEDURES:

Step 1 **WARNING** Turn off the DC power supply.

Step 2 Locate JA2 screw terminals on the add-on daughterboard of the module (see Figure 2.8).

Step 3 To use channel 1 relay output, connect one lead of cable to COM1 screw terminal of JA2 and the other lead to either NO1 (normally open) or NC1 (normally closed) screw terminal of JA2.

Step 4 To use channel 2 relay output, connect one lead of cable to COM2 screw terminal of JA2 and the other lead to either NO2 (normally open) or NC2 (normally closed) screw terminal of JA2.

2.4.3 RS-485

NOTICE JC2 connectors on the module daughterboard are used to connect the alarm to an RS-485 network. If the alarm is the first or the last device on the RS-485 network, the terminating resistor of the first or last module of the alarm must be shorted using DIP switch S9 on the add-on daughterboard.

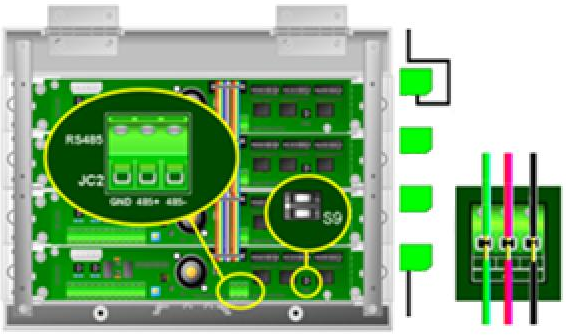


Figure 2.9 RS-485 Connection for g-Smart Data Display Enhanced™ Modules.

CONNECTING PROCEDURES:

Step 1 **WARNING** Turn off the DC power if it is connected.

Step 2 Locate connectors JC2 and DIP switches S9 on the daughterboards of the first and last modules of the alarm.

Step 3 If the alarm is NOT the first device from the host computer on the network, or a Gentec RS-232-to-RS-485 convertor is used then skip to Step 4. Otherwise, push both knobs of S9 of the first module to their ON positions to short its terminating resistor.

Step 4 Connect the incoming RS-485 cable (from the last network node) to 485+, 485-, and GND connectors of JC2 of the first module (see Figure 2.9).

Step 5 If the alarm is the last device on the network, push both knobs of S9 of the last module to their ON positions and skip Step 6.

Step 6 Connect the outgoing RS-485 cable (to the next network node) to 485+, 485-, and GND connectors of JC2 of the last module (see Figure 2.9)..

2.5 MODULE SETUP

NOTICE When delivered, all the modules of a pre-assembled module assembly should have already been properly set up in the factory. This section is primarily prepared for authorized personnel (e.g. field application engineers, FAE, or well-trained technicians certified by Gentec) who need to modify or upgrade the parameters of installed Gentec area alarms in the field.

WARNING Tampering by unauthorized individuals with the module setup, internal wiring and AC-to-DC power converter may damage the alarm and other connected devices, and may cause electrical shock to the individuals.

NOTICE Each g-Smart Data Display Enhanced™ module needs to be set up individually.

WARNING Be sure to use only a genuine Gentec communication cable from Gentec Systems or its agents. Do not use any other look-alike cables from unknown sources. They may cause damages to the module or even the host computer.

NOTICE Be sure to record all the settings following each setup step for future references.

2.5.1 QUICK SETUP

NOTICE The input electrical signals are converted to meaningful true physical values by the alarm in real-time. Electrical signal-to-physical value scaling factors for some commonly used pressure sensors (with full sensing ranges of **0 to 100 psig and 0 to 3000 psig, or equivalents** in other unit systems) and vacuum pressure sensors (with a full sensing range of **0 to 24 inches of mercury** or equivalents in other unit systems) are pre-stored in the module's flash memory.

The ranges and units to be used can be selected using dipswitches S4 and S5 directly for the pressure sensors of the above-mentioned sensor types (see Tables 2.3 and 2.4). Note that,

(1) The mid-point of the input ranges (e.g. 50 psig, 1500 psig, and 12 inHg or their equivalents in other unit systems) are used as the set-points;

(2) Alarm condition will be recognized if the input reading is (a) more than ±20% off the set-point for gas pressure sensors, or (b) smaller than the set-point for the vacuum pressure sensors.

SETUP ITEMS:

1. RS-485 network device ID (optional),
2. Sensor channels to be used and their sensor input signal ranges and types (e.g. current or voltage);
3. Display units; and
4. Buzzer silencing time.

SETUP PROCEDURES:

Step 1 If the module or module assembly has not been mounted onto the wall, skip to Step 4.

Step 2 Carefully detach two screw caps at the top edge of the system (see Figure 2.10). Remove the fastening screws and swing down the module assembly to its horizontal position (see Figure 2.6).

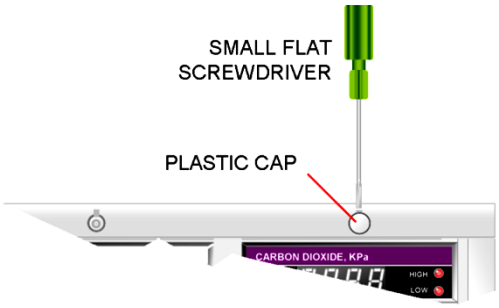


Figure 2.10 Removal of Plastic Cap

Step 3 **WARNING** Turn off the DC power supply.

Step 4 If RS-485 network is not to be used, skip to Step 5. Otherwise, select a unique RS-485 device ID using dipswitch S6 on the module daughterboard (see Table 2.2).

Step 5 Using dipswitches S4 to select the sensor input range for analog channel 1 (see Table 2.3).

Step 6 Using dipswitches S5 to select the sensor input range for analog channel 2 (see Table 2.4).

Step 7 Using dipswitches S7 and S8 to select the sensor signal input type for data channel 1 and 2 respectively (see Table 2.5)

Step 8 If the module or module assembly has not been mounted onto the wall, then go to Step 9. Otherwise, turn on the DC power supply. Wait for a few seconds for the system to reboot.

Step 9 Swing up the module assembly and secure it to the metal case using the original screws and, at last, snap in the screw caps.

Step 10 To change the buzzer silencing time,

(a) Slide out the channel label and its transparent protective cover of the right data channel to expose DIP switch S2 as shown in Figure 2.11.

(b) Use positions 4 to 7 of the dipswitch to select a desired silencing time (see Table 2.6).

(c) Insert the right channel label and, then, its protective cover into the front panel again.

NOTICE For any setting change to be effective, the module must be reset either by switching the system power off and on (preferred) or by pressing the reset button S1.

Table 2.2: RS-485 Device ID Selection for a g-Smart Data Display Enhanced™ (S6)

DEVICE ID	S6 DIP SWITCH SETTING							
	1	2	3	4	5	6	7	8
001	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
002	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
003	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
004	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
005	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
006	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
007	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
008	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
				… … …				
254	OFF	ON	ON	ON	ON	ON	ON	ON
255	ON	ON	ON	ON	ON	ON	ON	ON

Table 2.3: g-Smart Data Display Enhanced™Channel 1 Quick Setup (S4)

SWITCH S4		
PIN NUMBER		Pressure Type and Range Selection
3	4	
OFF	OFF	Channel 1 not used
ON	OFF	High pressure sensor connected to Channel 1
OFF	ON	Low pressure sensor connected to Channel 1
ON	ON	Vacuum sensor connected to Channel 1

SWITCH S4		
PIN NUMBER		Units Selection
1	2	
OFF	OFF	Pressure in bar and vacuum in torr
ON	OFF	Pressure in KPa and vacuum in mmHg
OFF	ON	Pressure in psig, vacuum in inHg
ON	ON	Use system-specific scaling factors loaded using Gentec g-Prog™ programming tool.

SWITCH S4		
PIN NUMBER		Relay Action
7	8	
OFF	OFF	Channel 1 relay disable (always off)
ON	OFF	Channel 1 relay activated if data abnormally low
OFF	ON	Channel 1 relay activated if data abnormally high
ON	ON	Channel 1 relay activated if data abnormally high or low

Table 2.4: g-Smart Data Display Enhanced™ Channel 2 Quick Setup (S5)

SWITCH S5		
PIN NUMBER		Pressure Type and Range Selection
3	4	
OFF	OFF	Channel 2 not used
ON	OFF	High pressure sensor connected to Channel 2
OFF	ON	Low pressure sensor connected to Channel 2
ON	ON	Vacuum sensor connected to Channel 2

SWITCH S5		
PIN NUMBER		Units Selection
1	2	
OFF	OFF	Pressure in bar and vacuum in torr
ON	OFF	Pressure in KPa and vacuum in mmHg
OFF	ON	Pressure in psig, vacuum in inHg
ON	ON	Use externally loaded scaling factors loaded using Gentec g-Prog™ programming tool.

SWITCH S5		
PIN NUMBER		Relay Action
7	8	
OFF	OFF	Channel 2 relay disable (always off)
ON	OFF	Channel 2 relay activated if data abnormally low
OFF	ON	Channel 2 relay activated if data abnormally high
ON	ON	Channel 2 relay activated if data abnormally high or low

Table 2.5 Signal Input Type Selection (S7 and S8 for Channel 1 and 2 respectively)

DIP Switch S7 and S8	1	2
Differential Voltage	OFF	OFF
Single-ended Voltage	OFF	On
Differential 4-to-20-mA	On	OFF
Single-ended 4-to-20-mA	On	On

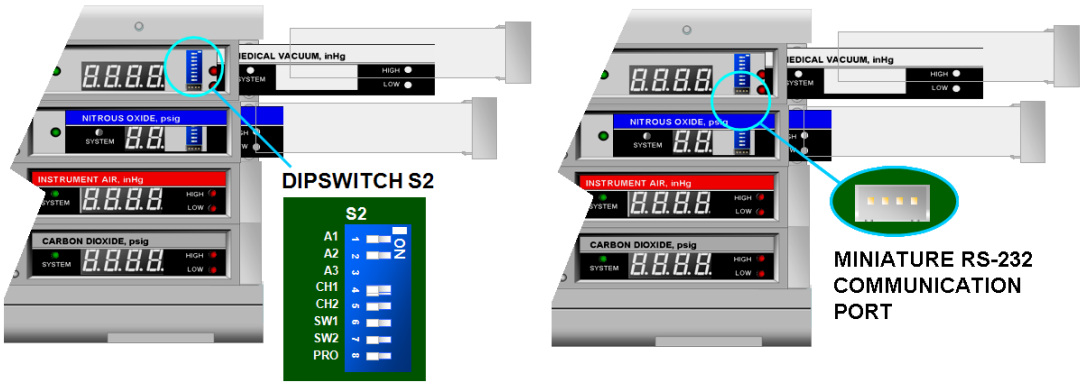


Figure 2.10 Locations of Operation Mode Selection Dipswitch S2 and RS-232 System Setup Connector PJ2

Table 2.6 g-Smart Data Display Enhanced™ Module
Font Panel Operation Mode Selection Switch (S2)

S2 SWITCH SETTING								OPERATIONAL MODE SELECTION
1	2	3	4	5	6	7	8	
X	X	X	X	OFF	OFF	OFF	OFF	Self-testing Mode (1)
X	X	X	X	ON	OFF	OFF	OFF	Calibration Mode (2)
X	X	X	X	OFF	ON	OFF	OFF	Reserved, Not Used
X	OFF	OFF	X	ON	ON	OFF	OFF	Run Mode with Externally Loaded Silencing Time (Default Setup)(3)
X	X	X	X	OFF	OFF	ON	OFF	Plant Calibration
X	OFF	OFF	X	ON	OFF	ON	OFF	Run Mode, Silencing Time: 30 min (4)
X	OFF	OFF	X	OFF	ON	ON	OFF	Run Mode, Silencing Time: 60 min (5)
X	OFF	OFF	X	ON	ON	ON	OFF	Demo Mode
X	OFF	OFF	X	X	X	X	OFF	Baud Rate 9600
X	X	X	ON	X	X	X	OFF	Baud Rate 19200
X	X	X	X	X	X	X	ON	Firmware Uploading

(1) All the LEDs and buzzer will be turned on and off in sequence continuously.
(2) Display raw input data in mV without converting them into equivalent physical values.
(3) Buzzer silencing time is loaded externally (e.g. using Gentec g-Prog™ program via PJ2).
(4) Set the buzzer silencing time as 5 minutes.
(5) Set the buzzer silencing time as 30 minutes.
(6) Set the buzzer silencing time as 60 minutes.

4.3.2 PROFESSIONAL SETUP

NOTICE To take full advantage of the flexibility of the module, it is highly recommended to use our PC-based module programming tool, **Gentec g-Prog™**, to set up the system via the module's miniature RS-232 connector.

Gentec g-Prog™ can base on the input signal range to automatically derive scaling coefficients for each analog input channel individually in any desired units.

The programming tool also has the capability of deriving a calibration curve for a sensor using measured calibration data, if it (1) has unknown or uncertain response characteristics, (2) is inherently nonlinear, or (3) drifts or loses its linearity over time.

Furthermore, the alarm triggering condition and the buzzer silencing time can be individually specified for all the input channels.

Please refer to the operating manual of **Gentec g-Prog™** for more details.

SETUP ITEMS:

1. RS-485 network device ID (optional),
2. Sensor channels to be used and their sensor input signal ranges and types (e.g. current or voltage);
3. Coefficients of the signal-to-physical value conversion equations;
4. Alarm triggering upper and lower limits; and
5. Buzzer silencing time for each sensor channel.

SETUP PROCEDURES:

Step 1 If the module or module assembly has not been mounted onto the wall, connect the DC power supply to the module assembly and skip to Step 3.

Step 2 Carefully detach two screw caps at the top edge of the system (see Figure 2.10). Remove the fastening screws and swing down the module assembly to its horizontal position.

Step 3 **WARNING** Be sure to turn off the DC power supply.

Step 4 If RS-485 network is not to be used, skip to Step 5. Otherwise, select a unique RS-485 device ID using dipswitch S6 on the module daughterboard (see Table 2.2).

Step 5 Remove the transparent plastic cover and the label of the right display window to expose the miniature COM port connector PJ2 and operation mode selection DIP switch S2 (see Figure 2.11).

Step 6 Using S2 to select a communication baud rate (see Table 2.6).

Step 7 Connect PJ2 to a COM or USB port of the host PC using the cable provided by Gentec Systems Corporation.

Step 8 Turn on the DC power supply.

Step 9 Run g-Prog™ and refer to its user manual to:

(1) select the data channels to be used and their signal types individually (current or voltage);

(2) input the ranges of analog input signals and their equivalent physical values for selected data channels individually; and

(3) specify the alarm-triggering upper and lower limits for the selected channels as well as the alarm silencing time.

Step 10 **WARNING** Turn off the DC power and disconnect the communication cable from PJ2.

Step 11 Using dipswitch S2 to select the “Run Mode with Externally Loaded Silencing Time” option (see Table 2.6)

Step 11 Re-insert the removed channel label and, then, its transparent plastic cover into the right display window (see also Figure 2.7(a)).

Step 12 If the module or module assembly has not been mounted onto the wall, the setup is completed. Otherwise, turn on the DC power supply. Wait for about a few seconds for the system to reboot.

Step 12 Swing up the module assembly and secure it to the metal case using the original screws and, at last, snap in the screw caps.

NOTICE For any setting change to be effective, the module must be reset either by switching the system power off and on (preferred) or by pressing the reset button S1.

PART 3

TECHNICAL INFORMATION

WARNING Only trained, certified personnel shall be permitted to perform the hardware installation and firmware setup of this product. Tampering by unauthorized individuals with the internal wiring and AC-to-DC power converter may damage the alarm and other connected devices, and cause electrical shock to the individuals.

3.1 ELECTRICAL AND PHYSICAL SPECIFICATIONS

MECHANICAL	
Front Panel	Injection Molded Plastic (PCABS, V0 Flame Rated)
Case Body	Metal Alloy
Nominal Physical Dimensions	Beneath the Wall: Width: 270mm Height: 45 mm + 40 mm x Number of SDDE Data Input Modules + 80 mm x Optional Number of Vacant Compartments Depth: 85 mm Above the Wall: Width: 300mm Height: 55 mm + 40 mm x Number of SDDE Data Input Modules + 80 mm x Optional Number of Full-height Vacant Compartments + 40 mm x Optional Number of Half-height Vacant Compartments Depth: 12 mm Overall Size: Width: 300mm x Height: 55 mm + 40 mm x Number of SDDE Data Input Modules + 80 mm x Optional Number of Vacant Compartments + 40 mm x Optional Number of Half-height Vacant Compartments Depth: 97 mm
Wall Mounting Opening	Width: 270mm Height: 45 mm + 40 mm x Number of SDDE Data Input Modules + 80 mm x Optional Number of Vacant Compartments + 40 mm x Optional Number of Half-height Vacant Compartments
ENVIRONMENT	
Ambient Temperature	0℃ ~50℃ (32℉ ~122℉)
Ambient Humidity	10% ~85% RH, non-condensing
ELECTRICAL	
Power Requirements	Input: 100~240 VAC, 0.5A Maximum or Input: +5V DC: 3W Maximum, +15V DC: 15W Maximum
Analog Input (for each g-SDDE module)	Input Type: (1) Single-ended, voltage, (2) Differential, voltage, (3) 4-to-20 mA current supplying 15V DC, or (4) 4-to-20 mA current without supplying 15V DC. Working Range: ±10V DC or 4 to 20mA Number of Channels: Two Safe Range: ±14V DC/0~28mA Maximum Resolution: 14 bit or 1% of sensor full input range
Relay Output (for each g-SDDE module)	Number of Channels: Two Maximum Load: 0.15A at 48VDC; 1A at 30VDC; or 0.5A at 120VAC
Display (for each g-SDDE module)	Numerical Data Display: Two Channels LED Display: Four digits
WIRING	
Termination	Analog Input: PCB mounted screw terminal connections
	RS-485: PCB mounted screw terminal connections
	Relay Output: PCB mounted screw terminal connections
	DC Power: PCB mounted screw terminal connections AC Power: 3 pin AC power connections
COMMUNICATION	
RS-485 (Modbus RTU)	9600 or 19200 baud, 8-bit data, no parity, 1 stop bit
HUMAN INTERFACE	
Display	LED lights and seven-segment LED Displays
Buzzer	Adjustable volume

3.2 SCHEMATICS AND DRAWINGS of g-SMART DATA DISPLAY ENHANCED™

Figure 3.1 Front View of an assembled g-Smart Data Display Enhanced™ Module

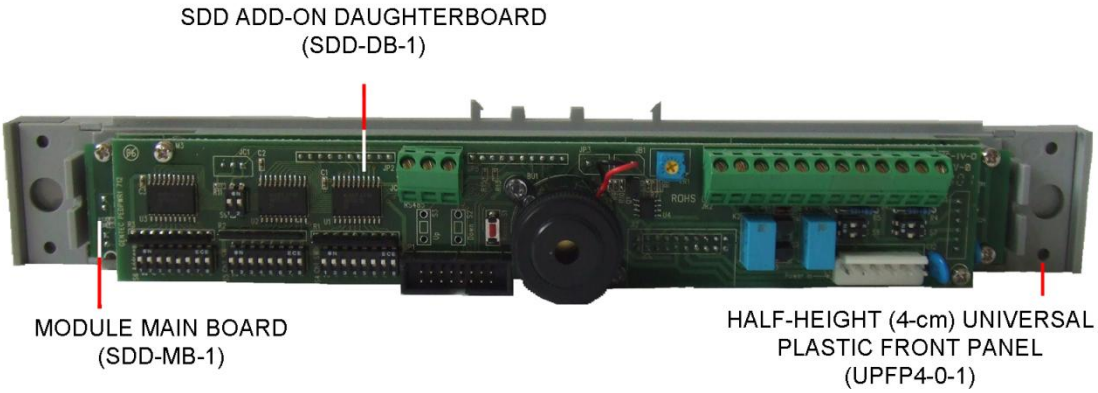


Figure 3.2 Internal View of an Assembled g-Smart Data Display Enhanced™ Module.

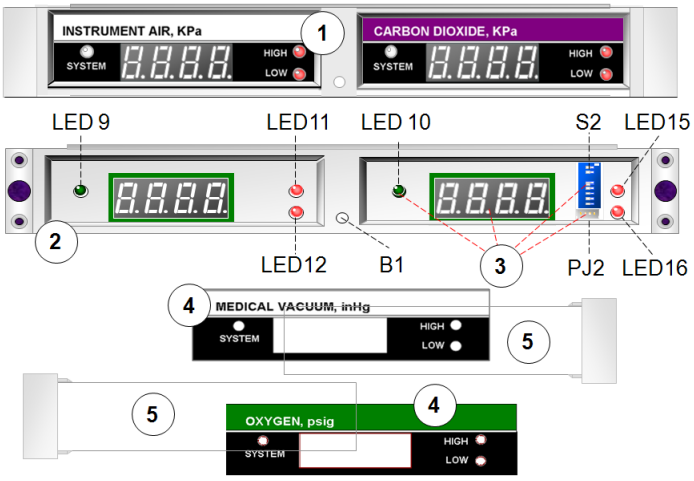


Figure 3.3 Front Views of a Gentec g-Smart Data Display Enhanced™ module, where

(1) Front View of an Assembled Module,
(2) Plastic Front Cover with a TEST/SUSPEND button (**B1**, see also Table 3.1),
(3) Opening on the Front Cover for housing the LED Numerical Displays, the LED Status Indicators (see also Table 3.2), the Operation Mode Selection Dipswitch (**S2**, see also Table 3.3), and the Miniature RS-232 Port (**PJ2,** see also Table 3.4),
(4) Data Channel Identification Label, and
(5) Transparent Label Cover (see also Figure 3.4).

Table 3.1 g-Smart Data Display Enhanced™ Module
Font Panel Buzzer TEST/SUSPEND Button (B1)

MODE	ACTION
TEST	During normal operation, pressing the button for more than three seconds will turn on the buzzer with all LED lights on the panel blinking for about five seconds.
BUZZER SILENCING	When the buzzer is turned on due to an alarm condition, pressing the button will temporally silence the buzzer. The silencing time can be specified using dipswitch S2 or Gentec g-Prog™ program.

Table 3.2 g-Smart Data Display Enhanced™ Module
Front Panel Panel LEDs

	FUNCTION DESCRIPTION
LED9 and LED10	**Channel Status LEDs for Channel 1 and 2 Respectively** Three-color LED Lights. Green if the channel's data is normal, yellow if in warning state, red if abnormal, and flashing red if abnormal with the buzzer in its silenced state.
LED11 and LED15	**Abnormally High LEDs for Channel 1 and 2 Respectively** Red LED Lights. On if the channel's data is abnormally high, otherwise, off. Flashing red if abnormally high with the buzzer temporally silenced.
LED12 and LED16	**Abnormally Low LEDs for Channel 1 and 2 Respectively** Red LED Lights. On if the channel's data is abnormally low, otherwise, off. Flashing red if abnormally low with the buzzer temporally silenced.

Table 3.3 g-Smart Data Display Enhanced™ Module
Front Panel RS-232 Connector (PJ2)

PIN NUMBER	1	2	3	4
ASSIGNMENT	+5V	TXD	RXD	GND

Table 3.4 g-Smart Data Display Enhanced™ Module
Font Panel Operation Mode Selection Switch (S2)

S2 SWITCH SETTING								OPERATIONAL MODE SELECTION
1	2	3	4	5	6	7	8	
X	X	X	X	OFF	OFF	OFF	OFF	Self-testing Mode (1)
X	X	X	X	ON	OFF	OFF	OFF	Calibration Mode (2)
X	X	X	X	OFF	ON	OFF	OFF	Reserved, Not Used
X	X	X	X	ON	ON	OFF	OFF	Run Mode, Externally Loaded Silencing Time (3)
X	X	X	X	OFF	OFF	ON	OFF	Run Mode, Silencing Time: 5 min (4)
X	X	X	X	ON	OFF	ON	OFF	Run Mode, Silencing Time: 30 min (5)
X	X	X	X	OFF	ON	ON	OFF	Run Mode, Silencing Time: 60 min (6)
X	X	X	X	OFF	ON	ON	OFF	Baud Rate 9600
X	X	X	X	OFF	ON	ON	OFF	Baud Rate 19200
X	X	X	X	ON	ON	ON	OFF	Demo Mode
X	X	X	X	X	X	X	ON	Firmware Uploading

(1) All the LEDs and buzzer will be turned on and off in sequence continuously.
(2) Display raw input data in mV without converting them into equivalent physical values.
(3) Buzzer silencing time is loaded externally (e.g. using Gentec g-Prog™ program via PJ2).
(4) Set the buzzer silencing time as 5 minutes.
(5) Set the buzzer silencing time as 30 minutes.
(6) Set the buzzer silencing time as 60 minutes.

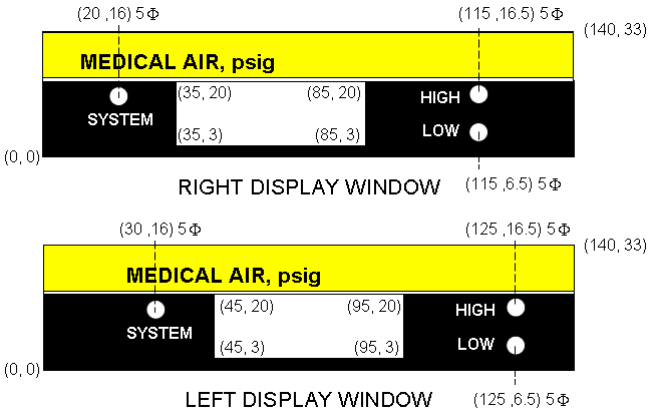


Figure 3.4 Dimensions of Display Labels

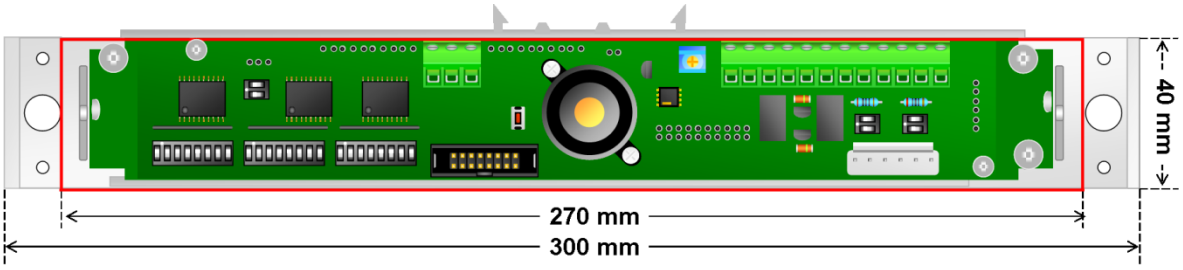


Figure 3.5 Dimensions of a g-Smart Data Display Enhanced™ Module (Rear View)

Above the Wall: 40 mm (Height) x 300 mm (Width) x 12 mm (Thickness above the Wall)
Beneath the Wall: 40 mm (Height) x 270 mm (Width) x 85 mm (Enclosure depth beneath the Wall)

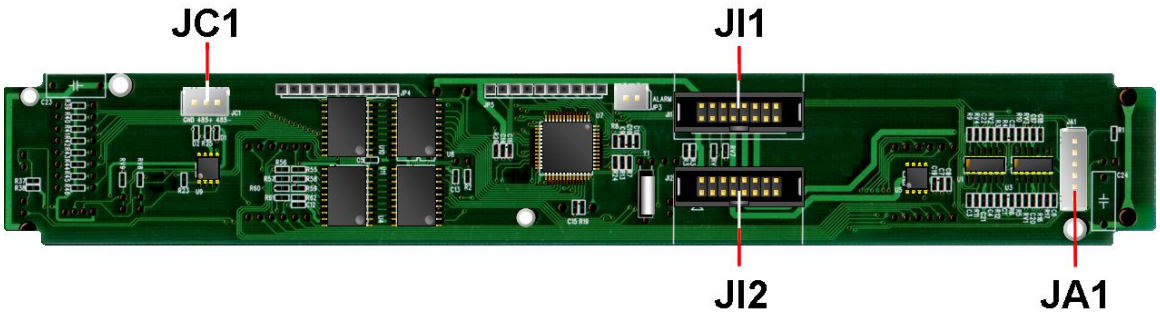


Figure 3.6 Rear View of g-Smart Data Display Enhanced™ Module Main Board, where

JA1: Daughterboard connector, connected to JA1 of the daughterboard.
JC1: RS-485 connector (reserved for other applications)
JI1, JI2: g-Smart Data Display™ inter-module data bus connectors (reserved for other applications)

Table 3.5 g-Smart Data Display Enhanced™ Module Mainboard/Daughterboard Connector, JA1

PIN NUMBER	FUNCTION ASSIGNMENT
1	Channel 1+
2	Channel 1-
3	GND
4	Channel 2+
5	Channel 2-
6	GND

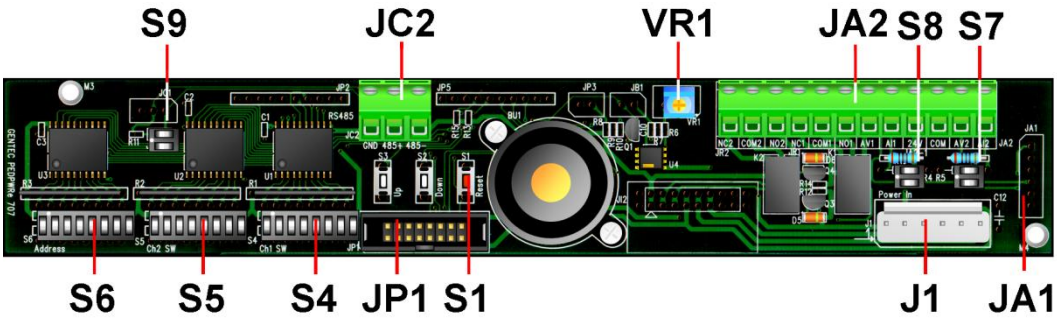


Figure 3.7 Rear View of g-Smart Data Display Enhanced™ Module Daughterboard, where

J1 **DC Power Connector** (see also Table 3.6)

JA1 **Module Main Board Connector:** The connector is used to connect the daughterboard to JA1 of the module main board.

JA2 **Input and Output Screw Terminal Connector** (see also Table 3.7)

JC2 **RS-485 Screw Terminal Connector** (see also Table 3.8)

JP1 **Inter-module Ribbon Cable Connector:** When the module is stacked together with other g-Smart Data Display Enhanced™ modules in a system, a ribbon cable can be used to connect the JP1 connectors of up to eight modules to share one DC power supply, e.g. only one of the modules needs to be connected to the power supply (see also Figure 3.8).

JP4 **RS-485 Cable Terminating Resistor Jumper:** When the jumper is shorted, JC2 is connected to a cable-terminating resistor. The jumper should be shorted only when the module is the last station of the network cable.

S1 **Module Rest Button:** For any setting change to be effective, the module must be reset either by switching the system power off and on (preferred) or by pressing the reset button.

S4 **Channel 1 Quick Setup Dipswitch** (see also Table 3.9)

S5 **Channel 2 Quick Setup Dipswitch** (see also Table 3.10)

S6 **RS-485 Device ID Selection Switch:** When connected to a RS-485 network, the switch is used to select a unique network device ID. The number must not be used by other modules, devices, or computers on the same network (see also Table 3.11).

S7, S8 **Signal Input Type Selection:** The 2 dipswitches (from left to right in pairs) of S7 and S8 are used to select the signal input type of each analog input channel independently (see also Table 3.12).

S9 **RS-485 Terminating Resistor Switch:** The resistor should be used if the module is the last device of the RS-485 cable (see also Table 3.13).

VR1 **Buzzer Volume Adjustment Knob:** The volume of the buzzer has been adjusted to conform with US NFPA 99 recommendations. The installers and especially the users should not reduce the volume without justifiable reasons.

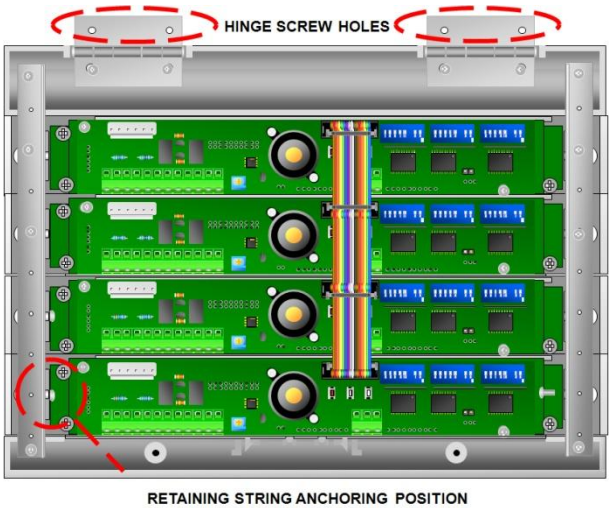


Figure 3.8 Inter-Module Connection Using JP1 connectors and 16-pin ribbon cables.

Table 3.6 DC Power Connector (J1)

J1 DC POWER CONNECTOR						
PIN	1	2	3	4	5	6
CONNECTION	+5V	+15V	GND	+15V	GND	-15V

Table 3.7 Input/Output Signal Connections (JA2)

INPUT AND OUTPUT CONNECTIONS	
SCREW TERMINAL	**CONNECTION**
A1+	Analog Channel 1Signal +
A1-	Analog Channel 1 Signal -
VDC	DC Power Output
COM	Analog Input Common (Ground)
A2+	Analog Channel 2 Signal +
A2-	Analog Channel 2 Signal -
NC1	Relay 1 Normally Close
COM1	Relay 1 Common
NO1	Relay 1 Normally Open
NC2	Relay 2 Normally Close
COM2	Relay 2 Common
NO2	Relay 2 Normally Open

Table 3.8 RS-485 Connector (JC2)

JP2 CONNECTOR			
Pin No.	**1**	**2**	**3**
Assignment	Non-inverting Input/Output	Inverting Input/Output	GND

Table 3.9 Channel 1 Quick Setup (S4)

SWITCH S4		
PIN NUMBER		**Pressure Type and Range Selection**
3	**4**	
OFF	OFF	Channel not used
ON	OFF	High pressure
OFF	ON	Low pressure
ON	ON	Vacuum

SWITCH S4		
PIN NUMBER		**Units Selection**
1	**2**	
OFF	OFF	Pressure in bar and vacuum in torr
ON	OFF	Pressure in KPa and vacuum in mmHg
OFF	ON	Pressure in psig, vacuum in inHg
ON	ON	Use externally loaded scaling factors specified using Gentec g-Prog™ programming tool.

SWITCH S4		
PIN NUMBER		**Relay Action**
7	**8**	
OFF	OFF	Channel 1 relay disable (always off)
ON	OFF	Channel 1 relay on if data abnormally low
OFF	ON	Channel 1 relay on if data abnormally high
ON	ON	Channel 1 relay on if data abnormally high or low

Table 3.10 Channel 2 Quick Setup (S5)

SWITCH S5		
PIN NUMBER		Pressure Type and Range Selection
3	4	
OFF	OFF	Channel not used
ON	OFF	High pressure
OFF	ON	Low pressure
ON	ON	Vacuum

SWITCH S5		
PIN NUMBER		Units Selection
1	2	
OFF	OFF	Pressure in bar and vacuum in torr
ON	OFF	Pressure in KPa and vacuum in mmHg
OFF	ON	Pressure in psig, vacuum in inHg
ON	ON	Use externally loaded scaling factors specified using Gentec g-Prog™ programming tool.

SWITCH S5		
PIN NUMBER		Relay Action
7	8	
OFF	OFF	Channel 2 relay disable (always off)
ON	OFF	Channel 2 relay on if data abnormally low
OFF	ON	Channel 2 relay on if data abnormally high
ON	ON	Channel 2 relay on if data abnormally high or low

Table 3.11 RS-485 Device ID Selection Switch (S6)

DEVICE ID	S6 DIP SWITCH SETTING							
	1	2	3	4	5	6	7	8
001	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
002	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
003	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
004	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
005	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
006	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
007	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
008	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
… … …								
254	OFF	ON	ON	ON	ON	ON	ON	ON
255	ON	ON	ON	ON	ON	ON	ON	ON

Table 3.12 Signal Input Type Selection (S7 and S8)

DIP Switch S7, S8	1	2
Differential Voltage	OFF	OFF
Single-ended Voltage	OFF	ON
Differential 4-to-20-mA	ON	OFF
Single-ended 4-to-20-mA	ON	ON

Table 3.13 Terminating Resistor Switch (S9)

S9 DIP Switch	1	2
Connected	ON	ON
Disconnected	OFF	OFF

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