Installation & Operating Instructions for
Integra Touch Series
Area Alarm Zone Valve Box Systems
Features & Benefits

- **Five year parts and one year labor warranty**
- Up to 7 valves and area/gas boards in one box
- Dual gauge/purge ports on all valves
- Accommodates valve sizes from 1/2” to 2”
- Eliminates extra costs associated with typical area alarm with remotely installed transducers; brazing in tee’s and risers, installing low voltage wiring
- Drastically reduces long term costs of annual testing and maintenance vs typical area alarm with transducers installed remotely above the ceiling
- Individual 2.85” LCD touch screen display for each gas service
- The LCD touch screen allows all alarm programming and set up to be done without the use of tools
- A green normal or red alarm condition for each gas service confirms the condition for each individual gas service
- Emergency preparedness instructions - Med Touch alarm panels allow users to set up customized instructions for each alarm signal which appear when the signal is in alarm
- Last event history (per gas board /signal point).
- Made in the U.S.A.
- NFPA and ISO pre-loaded gas ‘labels’
- English, and English/French pre-loaded languages
- Editable text and alarm ‘labels’
- Self-contained unit designed for ease of installation & service
- Self-diagnostic error message display for ease of maintenance
- Audio and visual alarm indicators
- Bright, easy to read LCD displays – clearly visible in both day and night lighting conditions
- Constant display and monitoring of each gas
- User programmable high/low set points
- Dry contacts for remote monitoring of all alarm conditions on each gas module and on the CPU module for the entire panel
- Easy to read – color coded gas modules
- Hinged frame for easy accessibility
- Color coded displays

In addition, each Area Alarm Module shall incorporate the following features:
- Does not require re-calibration
- Gas specific sensor with DISS nut & nipple. An error message will be displayed if incorrect sensor or no sensor is attached.
- Shall be capable of displaying gas readouts in in PSI, kPa, BAR, inHg, or mmHg.
- Gas alarm repeat feature is factory set at 10 minutes, and is adjustable or may be turned off

The following options shall be able to be added to the panel at the time of order or after installation;
- Optional Text / e mail notification of alarm events sent to up to 5 addresses
- Optional Ethernet module. This module may be added to any alarm panel. It will provide the following features:
  - Webserver – allows a remote user access to the alarm’s webpage – viewing a graphic image of the alarm with all signal conditions, pressure & event / history log information
  - Text notification of alarm conditions (up to 5 addresses)
  - Event / history log – maintains a rolling list of the 100 most recent alarm condition events and a file of the 1,000 most recent alarm events and is downloadable through embedded web page
  - Event log is viewable and downloadable through embedded web page, including the most recent 1,000 events.
  - Optional Ethernet connectivity with embedded web page
  - Interface with building automation system via Ethernet
# Table of Contents

## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features &amp; Benefits</td>
<td>2</td>
</tr>
<tr>
<td>Major components</td>
<td>4</td>
</tr>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td><strong>Alarm Panel Installation</strong></td>
<td>6</td>
</tr>
<tr>
<td>Rough-In Box Installation</td>
<td>7</td>
</tr>
<tr>
<td>Plumbing of ball valves</td>
<td>8</td>
</tr>
<tr>
<td>Wiring/AC</td>
<td>9</td>
</tr>
<tr>
<td>Installing the window frame</td>
<td>10</td>
</tr>
<tr>
<td>Assembling the ground wiring</td>
<td>11</td>
</tr>
<tr>
<td>Wiring alarm front</td>
<td>12</td>
</tr>
<tr>
<td>Wiring the transducers</td>
<td>12</td>
</tr>
<tr>
<td>Wiring the circuit board panel/DC</td>
<td>12</td>
</tr>
<tr>
<td>Installing the gauges</td>
<td>12</td>
</tr>
<tr>
<td>Installing the Transducers</td>
<td>13</td>
</tr>
<tr>
<td>Installing the circuit board panel</td>
<td>13</td>
</tr>
<tr>
<td>Installing the transducers</td>
<td>13</td>
</tr>
<tr>
<td><strong>Alarm Start Up</strong></td>
<td>14</td>
</tr>
<tr>
<td><strong>Programming the Alarm</strong></td>
<td>15</td>
</tr>
<tr>
<td>Accessing the Program Mode</td>
<td>15</td>
</tr>
<tr>
<td>Text &amp; E Text</td>
<td>15</td>
</tr>
<tr>
<td>High &amp; Low Alarm Pressure set points</td>
<td>16</td>
</tr>
<tr>
<td>Repeater Delay</td>
<td>16</td>
</tr>
<tr>
<td>Units of Measure</td>
<td>16</td>
</tr>
<tr>
<td>Gas Service</td>
<td>17</td>
</tr>
<tr>
<td>Language &amp; Latching/Non-Latching</td>
<td>17</td>
</tr>
<tr>
<td>View Screen</td>
<td>17</td>
</tr>
<tr>
<td>Digital Calibration</td>
<td>18</td>
</tr>
<tr>
<td>Com ID</td>
<td>18</td>
</tr>
<tr>
<td>Ethernet/rabbit</td>
<td>18</td>
</tr>
<tr>
<td>Create Receive Connector</td>
<td>19-21</td>
</tr>
<tr>
<td>E mail text notifications</td>
<td>22-25</td>
</tr>
<tr>
<td>Rabbit board programming commands</td>
<td>26</td>
</tr>
<tr>
<td>Website</td>
<td>27</td>
</tr>
<tr>
<td><strong>Alarm Displays &amp; Functions</strong></td>
<td>28</td>
</tr>
<tr>
<td>Component identification</td>
<td>28</td>
</tr>
<tr>
<td>Button module displays &amp; functions</td>
<td>29</td>
</tr>
<tr>
<td>Power on indicator</td>
<td>29</td>
</tr>
<tr>
<td>Silence button</td>
<td>29</td>
</tr>
<tr>
<td>Test button</td>
<td>29</td>
</tr>
<tr>
<td>(\uparrow) button</td>
<td>29</td>
</tr>
<tr>
<td>(\downarrow) button</td>
<td>29</td>
</tr>
<tr>
<td>(\rightarrow) button</td>
<td>29</td>
</tr>
<tr>
<td>(\leftarrow) button</td>
<td>29</td>
</tr>
<tr>
<td>Clear Alarm History</td>
<td>29</td>
</tr>
<tr>
<td><strong>Alarm Operation</strong></td>
<td>30</td>
</tr>
<tr>
<td>Silencing the alarm</td>
<td>30</td>
</tr>
<tr>
<td>Repeater Delay</td>
<td>30</td>
</tr>
<tr>
<td>Testing the alarm</td>
<td>-30</td>
</tr>
<tr>
<td><strong>Area alarm gas modules</strong></td>
<td>31</td>
</tr>
<tr>
<td>Gas service</td>
<td>31</td>
</tr>
<tr>
<td>Gas pressure</td>
<td>31</td>
</tr>
<tr>
<td>Units of measure</td>
<td>31</td>
</tr>
<tr>
<td>High/Normal/Low condition status</td>
<td>31</td>
</tr>
<tr>
<td>Other possible conditions</td>
<td>31</td>
</tr>
<tr>
<td>Rooms/area covered &amp; emergency text instructions</td>
<td>31</td>
</tr>
<tr>
<td><strong>Appendix A Glossary of Terms</strong></td>
<td>32</td>
</tr>
<tr>
<td><strong>Appendix B Specifications &amp; Maintenance</strong></td>
<td>33</td>
</tr>
<tr>
<td><strong>Appendix C Servicing Ball Valve Seals</strong></td>
<td>34</td>
</tr>
<tr>
<td><strong>Appendix D Wiring Diagram</strong></td>
<td>35</td>
</tr>
<tr>
<td><strong>Appendix E Ethernet kit installation</strong></td>
<td>36</td>
</tr>
<tr>
<td><strong>Appendix F Wiring Diagram</strong></td>
<td>37</td>
</tr>
<tr>
<td><strong>Appendix G Text Message Carriers</strong></td>
<td>38-42</td>
</tr>
</tbody>
</table>

Tel. 1-800-253-8692 -or- 440-937-6244 Fax. 440-937-5060
Web site www.tri-techmedical.com E mail address: sales@tri-techmedical.com
Major Components

Note: Shown above with E Z Backfeed assemblies assembled and installed. The E Z Backfeed assemblies will be shipped assembled with the exception: plugs will be installed in the gauge ports for compliance with NFPA 99 required pressure tests.
Introduction

The Tri-Tech Medical gas alarm system monitors the status of the medical gas distribution system and provides audible and visual indicators. The Tri-Tech alarm system monitors the status of the medical gas sources in accordance with NFPA 99 and CSA Z7396.1. An optional Ethernet/rabbit board may be added either at the time of order or retro-fit after installation which will provide; website launch for real-time monitoring of the alarm, text/e mail notifications of alarm condition(s) sent to up to 5 addresses, event log history of up to 1,000 events, and Modbus interface.

Tri-Tech Medical ball valves and zone valve boxes are cleaned for use with oxygen. Each valve is tested for leakage in both the open and closed position. Each unit is designed and built in accordance with the National Fire Protection Association and Compressed Gas Association guidelines.

The installation and maintenance should be conducted in accordance with the following standards:
NFPA 99 or CSA Z7396.1

Components
The Tri-Tech Medical Integra Touch gas alarm system is comprised of a rough-in back box, a window frame, a circuit board panel, and transducer(s).

The **rough-in back box** houses the power supply, fuse, on/off switch, and a terminal strip for electrical wiring. An isolated transformer reduces the 110V or 220V AC input to low voltage DC.

The **circuit board panel** includes enclosed printed circuit boards with programming circuitry.

  The **Push Button module** includes a power on indicator, Silence button, History button, Alarm Set-Up buttons and an audible alarm.

  The **Gas (Area) module(s)** on the front panel are identified with gas specific, color coded displays (per NFPA 99 or CSA Z7396.1. The gas displays include LCD’s which indicate high/normal/low pipeline pressure. The digital LCD display(s) shows the actual gas pressure. The gas pressure may be displayed in in PSI, kPa, BAR, inHg, or mmHg. The unit is pre-programmed to display PSI / inHg from the factory, but may be re-programmed in the field to display BAR, kPa or mmHg. In addition there are features which illuminate to indicate System and Program failures. Each module is supplied with dry contacts for remote signaling of high and low pipeline pressure.

Transducers
The transducer converts pressure to an electrical signal and supplies the electrical signal to the alarm circuit board Gas module panels. **After the initial 24 hour 150 psi pressure test (required per NFPA 99) has been completed** the pressure/vacuum transducers may be connected to the medical gas pipeline. Should a transducer require service or replacement, it is considerably safer and less time consuming to locate and replace transducers which have been installed in the appropriate zone valve box as opposed to remotely above the ceiling. Installation of the transducers in the zone valve box also eliminates contamination issues – such as having to set up a tent in order to remove ceiling tiles.
Installation

Installation of the Tri-Tech Medical alarm involves installing the rough-in back box, transducers, front panel and making the necessary conduit, plumbing and electrical connections. All installation and testing should be done in accordance with NFPA 99 or CSA Z7396.1. Zone valves must be installed in accordance with NFPA 99 or CSA Z7396.1. Verify the valve is in the fully open position. An internal nitrogen purge must be used during the brazing operation. The purge gas should flow away from the valve body. Brazing alloys per appropriate standards must be used. Before brazing, wet rags must be wrapped around the tube extensions next to the valve flanges to prevent overheating and possible damage to the valve seals. Direct the flame away from the valve body. The valve body temperature must not exceed 300 degrees F to prevent damaging the Teflon seals. Do not braze the opposite side of the valve assembly until after the first side has cooled.

**WARNING:** Electrical power intended for the alarm should be disconnected prior to installation.

**WARNING:** This device should only be installed by qualified personnel. Installation should not be attempted by anyone not having general experience with the installation of devices of this nature.

**Rough-In Box Installation**

This example is a rough-in box for a three gas three valve alarm and zone valve box. Your rough-in box should look the same or similar to this unit. (Note: the transducers, gauges and circuit board panel are shipped loose, for protection during shipment, and must NOT be installed until after the initial pressure test is completed.

Refer to the building plans to determine the location of the alarm.

The contractor is to provide rigid mounting that will support the alarm box on both ends. The metal flanges provided on both ends of the rough-in box are to rest against the rigid mounting brackets. Screws (contractor provided) are to be driven thru the holes in the metal flanges into the mounting brackets. Flanges are adjustable to allow for a drywall depth of 1/2” to 1 1/8”.

Mount alarm rough-in box so it will be flush or just below the finished wall surface using the adjustment feature on the flanges.
Rough In Box Installation

1. Tri-Tech Medical Integrated alarm / zone valve box should be plumbed with inlet gas on the left and the patient (use) side on the right.

2. The rough-in (back box) is shipped with a cardboard dust cover installed. You will need to remove the dust cover to install the rough-in and perform the initial pressure test. The dust cover should be re-installed after the pressure test to protect the valves until the wall covering (drywall, paint etc.) is complete.

3. The rough-in box should be installed in accordance with NFPA 99. The height above the finished floor will vary depending on the back box size. Fasten the valve box to horizontal braces installed between the studs so that the front edge of the rough in box will be flush or slightly recessed with the finished wall covering.

4. Before brazing, remove the plastic tube caps from the valves. Ball valves must be installed in accordance with “Installation of Ball Valves” instructions on page 8.

5. The system must be tested (per appropriate standards) to ensure that no cross-connections have been made. The system must be tested (per appropriate standards) for leaks. Gauges and transducers should not be installed until after the leak testing is completed. Excessive pressure will damage the gauges and transducers. Note: Pressure in the system will increase or decrease with temperature rise or fall.

6. After the system passes the leak test, gauges and transducers may be installed. Gauges and transducers must be installed on the downstream (patient) side of the valve. Pipe sealants used to install the gauges must comply with NFPA 99 or CSA Z7396.1. Use care to exclude pipe sealants from the valve cavity and from interior tube surfaces exposed to medical gas flow or vacuum service. Properly applied Teflon tape is an acceptable alternative to pipe sealants.

7. Mark the areas controlled by each valve on the labels provided on each valve.

8. After the wall covering is complete, the dust cover may be removed from the rough-in box and the window frame and window may be installed. **Note: remove protective film from both sides of window.**

**WARNING:** Mis-connection of the gases could lead to serious or fatal injury to patients. Following installation, valves must be tested for cross-connection (per appropriate standards) to ensure that the intended services are correctly connected to the appropriate service lines.

**WARNING:** Make certain the labeling coincides with the gas service, and areas controlled by the valve and that it is easily read.
Installation of Ball Valves

Ball valves must be installed in accordance with NFPA 99 or CSA Z7396.1. Verify the valve is in the fully open position. An internal nitrogen purge must be used during the brazing operation. The purge gas should flow away from the valve body. Brazing alloys per appropriate standards must be used. Before brazing, wet rags must be wrapped around the tube extensions next to the valve flanges to prevent overheating and possible damage to the valve seals. Direct the flame away from the valve body. The valve body temperature must not exceed 300 degrees F to prevent damaging the Teflon seals. Do not braze the opposite side of the valve assembly until after the first side has cooled.

Note: the valve bolts may need to be re-tightened after brazing due to the effects of heating & cooling. Torque the hex nuts in ¼ turn increments, using a cross pattern until the proper torque setting is reached per the chart below:

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Torque (inch pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>½” to 1”</td>
<td>100</td>
</tr>
<tr>
<td>1 ¼” to 1 ½”</td>
<td>150</td>
</tr>
<tr>
<td>2”</td>
<td>270</td>
</tr>
</tbody>
</table>

The system must be tested (per appropriate standards) to ensure that no cross-connections have been made.

The system must be tested (per appropriate standards) for leaks.

Gauges and transducers should not be installed until after the leak testing is completed. Excessive pressure will damage the gauges and transducers.

Note: Pressure in the system will increase or decrease with temperature rise or fall.

After the system passes the leak test, gauges and transducers may be installed. Pipe sealants used to install the gauges must comply with NFPA 99 or CSA Z7396.1. Use care to exclude pipe sealants from the valve cavity and from interior tube surfaces exposed to medical gas flow or vacuum service. Properly applied Teflon tape is an acceptable alternative to pipe sealants.

Check shutoff valve handle operation for proper clearance from any obstructions.

**WARNING:** Mis-connection of the gases could lead to serious or fatal injury to patients. Following installation, valves must be tested for cross-connection (per appropriate standards) to ensure that the intended services are correctly connected to the appropriate service lines.

**Maintenance**

1. Ball valves should be operated periodically and tested for closure ability and leakage. If seals stick or leak, they should be replaced.

2. Clean the exterior of the valve boxes routinely with soap and water. Strong solvents will damage the lexan window and the silk screened printing on the window.

3. The ball valves have a removable swing out body design which allows for the changing of internal components. All valve bodies can be accessed by loosening all bolts and nuts and removing only one bolt, at this point the body may be swung out for servicing.

**WARNING:** To protect the lives of patients, always notify the appropriate medical facility staff before shutting off the supply of medical gas or vacuum through a ball valve. Do not close ball valves except in cases of emergency. Authorized hospital personnel or staff should close ball valves in the event of fire, explosion or damage to the pipeline or equipment.
Wiring

The power supply is located in the top (left side) of the rough-in box. Remove the cardboard dust cover and panel covering the power supply. Make conduit connections for wiring from the facility emergency power source per NFPA 99.

To remove the power supply cover, loosen the two screws at the bottom of the cover and slide the cover to the right, then lift the cover over the screw heads. Slide the wiring harness strain relief to the left until it is free from the cover.

Use the 3/4” conduit knock-out provided on the top left side of the rough-in box to route conduit to supply either 120 or 240 VAC to the power supply. Note: Should optional low voltage wires be used, they should be installed in a separate conduit.

Route wires through the power supply conduit installed on the top left side of the rough-in box. Connect the 120 or 240 VAC facility emergency power source electrical wiring to the terminal strip provided on the lower left side of the box. (N = Neutral, L = Line (hot), FG = Field Ground)
Installing the window frame and circuit board panel

After the wall covering and finishing have been completed, remove the cardboard dust cover and attach the window frame to the rough-in box using the 12-3115 8-32 x 3/4” screws provided.

Temporarily hang the circuit board panel from the window frame by the bottom edge using one of the 12-3085 6-32 x 7/16” screws as shown. This will make it easier to assemble the ground wires.

This photo shows the ground wires partially assembled as supplied from the factory.
Assembling the ground wiring and attaching the circuit board panel

Assemble the ground wires as shown and attach the brass grounding screw to the bottom left corner hole in the window frame and rough-in box.

The finished ground wiring assembly should look like this.

Remove the 12-3066 6-32 x 3/8" screw while supporting the circuit board panel.

Position the circuit board panel into the window frame so that the displays are in the normal reading position with the panel at 90° (open position). The window frame has built-in hinge pin holes on the left side at the top and bottom – as shown here. The circuit board panel has a mating fixed hinge pins. Insert the top hinge pin into the top hole first.

Insert the bottom hinge pin into the bottom frame hole.
Wiring the circuit board panel

Attach the yellow/orange plug connector at the end of the wiring harness to the appropriate connector located at the bottom right corner of the button module circuit board as shown here. The plug should lock/clip into place. The plug can only be inserted one way.

There is a green ground wire in the wiring harness which must be fastened to the nearest grounding screw terminal on one of the gas board sub-plates.

The wire terminal connector on the gas board has six wire connection slots. The two wires from the transducer should be installed in the BLK & WHT SENSOR slots. These are the two slots closest to the center of the gas board (as shown).

The other four connection slots are for optional remote signals of the low and high line pressure alarms.

The transducer plug may be removed from the gas module to make it easier to install the wires.

Gauges have been provided and packaged separately for protection during shipment. There are three different gauges for the different gas pressure applications; 0 – 30 in Hg for medical vacuum and WAGD service, 0 – 300 psig for high pressure (100 psig and above), and 0 – 100 psig for all other applications. Use oxygen safe Teflon tape on the threads and tighten wrench-tight until gauge face is facing forward. Pressurize each line and use oxygen safe leak test to verify each connection is free from leaks.
Installing the transducers and circuit board panel

The transducers have been shipped with gas specific DISS fittings and are labeled for a specific gas service. Match the transducer to the valve labeled with the same gas service and connect it (wrench tight) to the mating DISS gas fitting. Pressurize each line and use oxygen safe leak test to verify each connection is free from leaks.

When finished the gauges and transducers will look like this.

After all of the transducer wires have been attached and the transducers attached to the proper DISS gas connections, the circuit board panel may be closed and fixed in place using two each 12-3066 6-32 x 3/8” screws as shown here.

Visually verify that the appropriate transducer wire pair has been attached to the appropriate gas module by looking at the front of the alarm panel. If there is not an Error Condition or a System alarm, the proper (matching gas service) transducer has been connected to the gas board.

WARNING: If the transducer leads are shorted together – the display may freeze. To clear this condition, turn power off to the alarm for a few seconds, correct the wiring, and then turn power back on.
Alarm Start-Up

A toggle switch is provided to control the power supplied to the alarm. To restore power to the circuit feeding this alarm panel, the toggle switch on the front of the power supply should be placed in the ON position.

Check the green power LED indicator on the front of the button module. It should be illuminated.

If you haven’t already, you are now ready to pressurize the piping system to normal operating pressures. The gas circuit board shown here is a Medical Air module at normal operating pressures.

The window has been shipped with a clear plastic protective covering on both sides. This should be removed before installing the window into the window frame.
This section covers the procedures to follow in order to configure a module with site specific information such as; room / area coverage information, re-programming the high and low alarm points and emergency preparedness instructions. Note: Only authorized personnel should program the alarm! It is important to note that while the panel being programmed is in the program mode, it is **not** monitoring the medical gas system and alarm conditions will **not** trigger an alarm.

### Accessing the Alarm Program Mode

*To program the alarm, the circuit boards must be placed individually, one at a time in the program mode. To place a circuit board in the programming mode, simply touch the board to be programmed. The display should change to this security screen.*

All alarm panels have been pre-programmed to allow access with the pin # 0711. Type in 0711 and touch Enter. You will have 30 seconds to make selections when programming. After 30 seconds of no key touch, the display will return to its standard view and any information which has not been saved will be lost.

The next screen which will appear is the function options. There are eleven different function options. Simply touch the icon representing the function you wish to program. The following table provides a brief description of each function:

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Set high alarm set point</td>
</tr>
<tr>
<td>Low</td>
<td>Set low alarm set point</td>
</tr>
<tr>
<td>Gas</td>
<td>Set gas service</td>
</tr>
<tr>
<td>Repeat</td>
<td>Set repeater delay (in minutes)</td>
</tr>
<tr>
<td>Cal</td>
<td>Change calibration of pressure reading</td>
</tr>
<tr>
<td>Units</td>
<td>Change units of measure</td>
</tr>
<tr>
<td>ComID</td>
<td>Change Com ID number</td>
</tr>
<tr>
<td>Text</td>
<td>Input room / area and emergency instructions &amp; master alarm signal selection menu</td>
</tr>
<tr>
<td>Set</td>
<td>Change label and latching</td>
</tr>
<tr>
<td>Back</td>
<td>Return to previous screen</td>
</tr>
<tr>
<td>View</td>
<td>Synopsis view of programming</td>
</tr>
</tbody>
</table>

### Programming Text and E Text

After placing the board in the program mode and touching the Text function icon, the text input screen (shown here) is displayed. To enter text such as the room(s) or area(s) monitored by the alarm panel, touch the Text button. To enter emergency instruction text, touch the EText button. The two white areas represent a top and bottom line of text which will be displayed at the bottom of the gas board display. Touch the top white area to enter the top line of text or the bottom white area to enter the bottom line of text.

Use the character keypad (shown here) to enter the text message you would like displayed. Note: each text display line is limited to 20 total characters or spaces.

- when finished touch Enter
- on the next screen touch OK
- on the next screen touch Back
- on the next screen touch Save

Note: to delete a line of text after it has been saved you must press the SP button

Below are examples of a completed Text display screen and how it appears as displayed as part of gas display. When an alarm occurs the emergency instructions will appear alternately with the normal information label. Note: the text will automatically be centered.
E Text instructions are entered in the same method as described above. Note that E Text instructions will appear in red and will be displayed alternately with the normal display screen only when the board is in an alarm condition.

Programming the High & Low Alarm Pressure set points

After placing the board in the program mode and touching the High function icon, the high line pressure set point and programming keypad is displayed. The currently programmed high pressure alarm set point is displayed in the white box in the top left corner. If the gas module being programmed is a typical 50 psig delivery pressure gas, the board has been pre-programmed at the factory with the high line pressure set point at 60 psig, so the display should show the number 60. If you wish to change this setting:
  • type in the new pressure
  • touch Enter
  • on the next screen touch Back
  • on the next screen touch Save to adjust the pressure setting

After placing the board in the program mode and touching the Low function icon, the low line pressure set point and programming keypad is displayed. The currently programmed low pressure alarm set point is displayed in the white box in the top left corner. If the gas module being programmed is a typical 50 psig delivery pressure gas, the board has been pre-programmed at the factory with the low line pressure set point at 40 psig, so the display should show the number 40. If you wish to change this setting:
  • type in the new pressure
  • touch Enter,
  • on the next screen touch Back
  • on the next screen touch Save to adjust the pressure setting

Note: The alarm is designed with a safety feature so that the high and low set points must be at least 1 (psig / in Hg), 1 (bar) or 1 (kPa) increments apart. The high set point will not be able to be set below the low set point and vice versa.

Programming the Repeater Delay

After placing the board in the program mode and touching the Repeat function icon, the remote signal input screen (shown here) is displayed. The current repeater delay programmed is displayed in the white box at the top. In the example shown here, Rp 10 means the repeater delay is programmed for 10 minutes. Use the keypad to type in the number of minutes you would like (maximum is 240 and entering zero will disable the repeater);
  • then touch Enter
  • on the next screen touch Back
  • on the next screen touch Save

Programming the Units of Measure

After placing the board in the program mode and touching the Units function icon, the units input screen (shown here) is displayed. The alarm panel has been pre-programmed with the units desired based on the part number which was ordered. The positive gas service options are; PSI, kPa and BAR. The negative gas service options are; inHg and mmHg. Simply touch the button you would like to re-program the units;
  • then touch Enter
  • on the next screen touch Back
  • on the next screen touch Save
Programming the Gas Service (area alarm)

After placing the board in the program mode and touching the GAS function icon, the gas input screen (shown here) is displayed. The alarm panel has been pre-programmed with the gas service desired based on the part number which was ordered. To select a different gas service use the double arrow left or right buttons to scroll thru the database of gas services until you find the one you need

- then touch Enter
- on the next screen touch Back
- on the next screen touch Save

Programming language and latching or non-latching alarm relays

After placing the board in the program mode and touching the Set function icon, the sets input screen (shown here) is displayed. The alarm panel has been pre-programmed with the language desired based on the part number which was ordered. Choose a different language set by simply touching the button you would like. Your selection will take you immediately to the next screen on which you should touch Back and on the next screen touch Save. You will need to re-enter the program mode and again select the Set function icon to choose Latching (LAT) or Non-Latching (NLAT) software. Your selection will take you immediately to the next screen on which you should;

- touch Back
- on the next screen touch Save

View screen

After placing the board in the program mode and touching the VIEW function icon, the view screen (shown here) is displayed. The view screen provides a synopsis view of all of the programming for the circuit board. It does not provide any programming options. It is simply a view only screen. The first line provides the software version. The Cal value represents any re-programmed change from the factory calibration. The High and Low Limit values are the high and low pressure alarm set points. The Units value is the units of measure. The Repeat value is the number of minutes in which an alarm will be repeated after it has been silenced but remaining in an alarm condition. The Gas Type number is a code (see table below) which corresponds to the gas service which has been programmed for the board. The Com ID number is the communication ID number which has been programmed for the board. The Language Set is an abbreviation for the label set which has been programmed for the board. The Alarm Logic is the latching or non-latching software which has been programmed for the board. MSG 1 are the rooms or area(s) covered by the alarm. MSG 2 are the emergency instructions programmed for the board.

The gas boards are pre-programmed for a specific gas service from the factory. After placing a gas board in the program mode, it is possible to change the gas service of the board. The following list cross references the number that is actually displayed on the gas board numeric display when the ► (right arrow) button is pressed with the full names of the gases:

<table>
<thead>
<tr>
<th>Gas # displayed</th>
<th>Gas service</th>
<th>Transducer type</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Nitrogen</td>
<td>250</td>
</tr>
<tr>
<td>24</td>
<td>Oxygen</td>
<td>100</td>
</tr>
<tr>
<td>04</td>
<td>Nitrous oxide</td>
<td>100</td>
</tr>
<tr>
<td>08</td>
<td>CO2 or CO2-O2 mix</td>
<td>100</td>
</tr>
<tr>
<td>22</td>
<td>Medical Vacuum</td>
<td>30</td>
</tr>
<tr>
<td>32</td>
<td>Wagd / AGSS</td>
<td>30</td>
</tr>
<tr>
<td>16</td>
<td>Medical air</td>
<td>100</td>
</tr>
<tr>
<td>06</td>
<td>Helium or Heliox</td>
<td>100</td>
</tr>
<tr>
<td>H16</td>
<td>Instrument air</td>
<td>250</td>
</tr>
<tr>
<td>H24</td>
<td>Hyperbaric oxygen</td>
<td>100</td>
</tr>
<tr>
<td>H08</td>
<td>Medium pressure carbon dioxide</td>
<td>100</td>
</tr>
<tr>
<td>SP</td>
<td>Gas mixture</td>
<td>100</td>
</tr>
<tr>
<td>HSP</td>
<td>High Pressure gas mix</td>
<td>250</td>
</tr>
<tr>
<td>3SP</td>
<td>Tri-Gas</td>
<td>100</td>
</tr>
</tbody>
</table>
Adjusting the Digital Pressure Calibration

The digital line pressure may be adjusted slightly (per the chart below) by following the simple procedure below. *This can be done by one person at the alarm panel – no need to open/adjust the transducers!*

**Range of adjustment:**
- VAC or EVAC/WAGD ± 1 inHg
- 100 psig transducers ± 3 PSI
- 250 psig transducers ± 5 PSI

After placing the board in the program mode and touching the CAL function icon, the calibration input screen (shown here) is displayed. The alarm panel has been calibrated and programmed and does not ever require recalibration. If you wish to slightly change the calibration (usually to match another alarm panel in immediate area) you may. The number displayed in the white box at the top of the display is the current pressure reading. Simply touch the Down or the Up button until you achieve the pressure reading desired;

- then touch OK,
- on the next screen touch Back
- on the next screen touch Save

**Programming the Board Com ID**

*Note:* This feature is used when the alarm is used in conjunction with the optional Ethernet module.

*Note:* When used in conjunction with the Ethernet module. Each circuit board must have a sequential Identification Number from 1 to 7 based on its position in the alarm panel. Com ID 1 is always at the top. The Com ID numbers should increase sequentially from top to bottom.

After placing the board in the program mode and touching the COM ID function icon, the remote signal input screen (shown here) is displayed. The current Com ID # programmed is displayed in the white box at the top. Entering zero will disable the Com ID for this board. Use the keypad to type in the Com ID number you would like;

- then touch Enter
- on the next screen touch Back
- on the next screen touch Save

Programming the Ethernet / Rabbit boards

(e mail / text messages, accessing alarm website, interface Modbus with building automation system & access event log). **NOTES:** Networking options only work when used with manufacturer supported software systems (currently Windows 7 or newer). System router ports must be configured for ‘half duplex’.

The Ethernet/rabbit board module (photo at right) may be ordered initially as part of the alarm or added later as a simple retro-fit assembly. To install the Ethernet kit, follow the installation instructions per Appendix F. To program the rabbit board, you will need to download **Real Term: Serial Capture Program.** This is a free software download available on the internet. You will want to install the Real Term software on a laptop so that you have the mobility to bring the laptop close to the alarm panel. You will also need a 35-3033 rabbit board programming kit. **NOTE: If your operating system doesn’t pull in the driver for the 35-5069 cable, you must download the driver from the website.**

http://www.ftdichip.com/Drivers/VCP.htm

Always turn the power off to the alarm panel before making any electrical connections or disconnections. After the Ethernet kit is installed in the alarm panel and the **Real Term: Serial Capture Program** software is installed on a laptop and the 35-3033 rabbit board programming kit is connected properly, you are ready to begin. **Note: all commands are issued from the command prompt over the serial port. Set the laptop’s serial port to 9600 8n1. Restore power to the Ethernet/rabbit board.**
Create Receive Connector – Exchange 2007/2010

“SMTP” (Simple Mail Transfer Protocol) is one of the most common ways of sending e-mail. SMTP is a simple text conversation across a TCP/IP connection. The Email Server resides on port 587, and so, that is what the rabbit board SMTP _ PORT is currently defined.

1. Open the Exchange Management Console.
2. Expand Server Configuration.
3. Click on Hub Transport.
4. Select the server name on the right hand side.
5. In the Toolbox Actions, Click on New Receive Connector.

6. In the New Receive Connector wizard enter a Name for the connector and leave the intended use set to Custom then click [Next].

7. In the Local Network Settings Click Edit and change the Port to Use from 25 to 587 and click [OK] then Click [Next].
7. In the Local Network Settings, click Edit and change the Port to use from 25 to 587 and click [OK] then click [Next].

8. In the Remote Network Settings, click on the red X to delete the default IP range of 0.0.0.0-255.255.255.255 then click Add.

9. In the Add IP Address of Remote Servers, enter the IP address of your Rabbit Board and click [OK] then [Next].

10. On the New Connector configuration summary screen, click [New].
11. Once the new receive connector is successfully created right click on it in the list of Receive Connectors and select Properties.
12. Configure the Authentication and Permission Groups tabs as illustrated below and click [OK].
Launch the **Real Term: Serial Capture Program**. The set-up screen should look like this. Under the Display Tab check the Half Duplex Box.

Under the Port Tab:
1. Select a baud rate of 9600
2. Leave the defaults of Parity= None, Data Bits = 8, and Stop Bits = 1
3. Select the port in use on the laptop
4. Click the Open button
To set up a new Ethernet/Rabbit board, the following 4 commands must be completed:

**INIT (Initialize)** – this command MUST be run first after installing a new rabbit board or after if a battery was replaced on the rabbit board when the alarm panel was not under 120 VAC power.

**PPN (program panel name)** – this command programs the name of the alarm panel as it will be displayed on the website and recorded in the event log. In the example below, we have named the alarm panel West Wing.

**PDT (program date/time)** – this command programs the date and time as it will be displayed on the website and recorded in the event log.

**PIP (program panel IP)** – this command programs the rabbit board’s IP address.
To set up users to receive e-mail or text notifications when alarm conditions occur, the following 4 commands must be completed:

**PMI** (program SMTP mail server IP) – this command establishes the mail server IP address.

![PMI example](image)

**PUN** (program user name) – this command establishes the SMTP user name. In the example below, we have used TRI-Tech@wolfcreekmicro.com.

![PUN example](image)

**PUP** (program user password) – this command programs the SMTP password. In the example below, we have used Foastt29. (Case Sensitive)

![PUP example](image)

**PCx** (program contact) – this command is used to program a contact to be notified where x is the contact number. The contact number(s) will be displayed on the event log. Up to five contacts may be programmed.

![PC example](image)
To set up communication through the facilities network server with the internet, the Program Gateway must be used. **PGW** (program gateway) – this command establishes communication from the alarm rabbit board through the facilities network server to the internet.

Below is an illustration of a simplified typical managed network at a facility. Both the Server’s IP address and Gateway address must be programmed into the Ethernet/rabbit board of any alarm panel desired to be connected to the internet.
The following additional commands are available for reviewing and testing:

**SCx** (show contact) – this command is used to verify the contact entry. For example - **SC2** would display the contact entry for user #2.

**MCx** (test command) – this command is used to verify that a contact and email server is set up correctly. It sends a test email to that contact.

**Following is a complete list of the available commands:**

All commands are issued from the command prompt over the serial port. Set the PC's serial port to 9600 8N1.

Boot the rabbit board.

**INIT // INIT SETUPS.**

!!! IMPORTANT !!! This MUST be run first on a new board or after battery replacement. Usage: INIT

- **SIP // SHOW IP.**
- **SMB // SHOW MODBUS ID.**
- **SUN // SHOW USER NAME.**
- **SDT // SHOW DATE/TIME.**
- **SGW // SHOW GATEWAY.**
- **SCx // SHOW CONTACT where x is contact number 1-5.** Usage: SC1 will show email contact 1 of 5.
- **PPN // PROGRAM PANEL NAME.** Usage: PPNMyPanel will set the Panel Name to MyPanel.
- **PMB // PROGRAM MODBUS ID.** Usage: PMB01 will set the Modbus ID to 1.
- **PDT // PROGRAM DATE/TIME.** Usage: PDT0129160842 will set RTC to Jan 29th, 2016 at 8:42am. PDT0203162042 will set rtc to Feb 3rd, 2016 at 8:42pm.
- **PIP // PROGRAM IP.** Usage: PIP192.168.0.50 will set the rabbit board IP address to 192.168.0.50
- **PGW // PROGRAM GATEWAY.** Usage: PGW192.168.0.1 will set the gateway IP address to 192.168.0.1
- **PMI // PROGRAM SMTP MAIL SERVER IP.** Usage: PMI192.168.0.50 will set the SMTP mail server to 192.168.0.50
- **PUN // PROGRAM USER NAME.** Usage: PUNMyUserName will set the SMTP user name to MyUserName.
- **PUP // PROGRAM USER PASSWORD.** Usage: PUPMyPassword will set the SMTP password to MyPassword, (Case Sensitive) PUN will clear the password.
- **PCx // PROGRAM CONTACT where x is contact number 1-5.** Usage: PC1Name@mymail.com will set contact 1 to Name@mymail.com PC1 will delete the contact.
- **MCx // MAIL CONTACT where x is contact number 1-5.** Usage: MC1 will send contact 1 a test email.

**To setup a new Rabbit board...**

1. INIT
2. PPNPanelName
3. PDT0129160842 replace with current date and time.
4. PIPx.x.x.x replace x's with board's IP address.
5. PGWx.x.x.x replace x's with gateway's IP address.

**If SMTP mail server is to be used...**

6. PMIx.x.x.x replace x's with Server's IP address.
7. PUNMyUserName
8. PUPMyPassword…(Case Sensitive)
9. PCxname@email.com and/or PCx14567890123@vtext.com …up to 5 contacts total.
10. Use the show and test mail commands as necessary to check setups.
Website Access –

Web access to the overview and alarm log pages is designed to be fully functional without any setup. As long as the user can 'ping' the rabbit board all they have to do is point a browser at it. In the case of the default IP Address (192.168.1.99) not being appropriate for their network they would then need to issue a PIP command with the IP Address they wish to use, ex. PIP192.168.0.55.
### Alarm Displays & Functions

#### Button Board Module

- **Low alarm set point**
- **High alarm set point**
- **Gas code number**
- **Transducer type**
- **Alarm silence button**
- **Clear last event history button**
- **View last event history button**

#### Audible alarm indicator

#### Power on indicator

#### Alarm test button

### Gas (Area) Module

- **Low alarm set point**
- **High alarm set point**
- **Gas code number**
- **Transducer type**
- **Color coded & language specific gas identification display**
- **Gas pressure**
- **Units of measure indicators** PSI, kPa, BAR, inHg, or mmHg.
- **Condition status**
- **Rooms / area monitored & alarm emergency instructions**
Alarm Displays & Functions

Button Module

**Power on Indicator**
The power on indicator (green LED) is illuminated whenever electrical power (120 or 240 VAC) is connected to the alarm and the on/off switch is turned on.

**Test Button**
When the Test button on the front panel is pressed, the alarm illuminates all circuit boards and sounds the buzzer. The word ‘Test’ will be displayed on each gas module.

**Alarm Silence**
In the event of an alarm condition an audible alarm sounds. The audible alarm can be silenced by pressing the alarm silence button. The alarm will alternately displaying the rooms/area monitored with the emergency instructions until the alarm condition is rectified. Depressing the silence button will silence the alarm for approximately 10 minutes (factory setting). After approximately 10 minutes, the audible alarm will sound again. (See alarm operation section on page 21 for more detail).

**View Last Event Alarm History Button**
The Last Event History button may be pressed and held at any time to view last event alarm history. Viewing alarm history is only active while the Last Event History button is pressed, releasing the button returns the alarm to normal operation. Pressing the Last Event History Button will display the following:

- **Gas (Area) and Remote Signal Transducer Modules** - The High and/or Low Pressure indication will be displayed along with the actual highest or lowest pressure which occurred.
- **Remote Signal (Master) Module** – If there was an alarm condition for any Remote Signal the Red LCD will be illuminated. All other LCD’s will be off.
- **4 – 20 mA Module** - The High and/or Low value indication will be displayed along with the actual highest or lowest value which occurred

**Clear Last Event Alarm History Button** – To clear Last Event Alarm History you simply press the Clear History button.

▲ (up arrow)
The up arrow may be pressed & held at any time to display the high line pressure alarm set points of the gas module (area) boards, the remote signal transducer boards and the 4 – 20mA boards.

▼ (down arrow)
The down arrow may be pressed & held at any time to display the low line pressure alarm set points of the gas module (area) boards, the remote signal transducer boards and the 4 – 20mA boards.

► (right arrow)
The right arrow may be pressed & held at any time to display the gas service for which the gas modules (area) boards are currently programmed. (See list on page 17).

◄ (left arrow)
The left arrow may be pressed & held at any time to display the type of transducer that is connected to each gas module (area) board. The 3 types are 0 – 30 inHg, 0 – 100 PSI and 0 – 250 PSI. When the left arrow is pressed

- “30” will be displayed for a 0 – 30 inHg transducer,
- “100” will be displayed for a 0 – 100 PSI transducer
- “250” will be displayed for a 0 – 250 PSI transducer.
Appendix A

Glossary of Terms

AC  Alternating Current
An electric current that reverses direction or polarity at regular intervals.

BAR  A measurement of force in a compressed gas system.  1 BAR = 14.5 PSI or 1 BAR = 100 kPa

DC  Direct Current
An electric current that flows in one direction. The current can be steady or pulse.

inHg  Inches of Mercury
A measurement of the force in a gas vacuum system.  1 inHg = .49 PSI or 1 inHg = 25.4 mmHg

kPa  Kilopascals
A measurement of the force in a compressed gas system.  1 kPa = .14 PSI or 1 kPa = .01 BAR

Latching Alarm Relay
Requires manual intervention (pressing the Silence button) to silence the alarm buzzer if the alarm condition has corrected itself

LCD  Liquid Crystal Display
A semiconductor liquid crystal film sealed between glass plates that changes its optical properties when voltage is applied.

LED  Light Emitting Diode
A semiconductor diode that converts applied voltage to light.

mmHg  A measurement of force in a gas vacuum system.  1 mmHg = .019 PSI or 1 mmHg = .039 inHg

NFPA  National Fire Protection Association
The National Fire Protection Association is an association engaged in standards development.

NO  Normally Open
An electrical circuit in which the switch is normally open. No current flows through the circuit in normal operation. Only when the switch is closed is the flow of current started.

Non-Latching Alarm Relay
The alarm buzzer will silence itself when the alarm condition is corrected.

NC  Normally Closed
An electrical circuit in which the switch is normally closed. Current flows through the circuit in normal operation. Only when the switch is opened is the flow of current stopped.

PSI  Pounds per Square Inch
A measurement of the force in a compressed gas system.  1 PSI = 6.9 kPa or 1 PSI = .069 BAR

Transducer
A device that converts pressure into an electrical signal.

V  Voltage
Voltage is electrical pressure or force. One volt is equal to the difference of electrical potential between two points on a conducting wire carrying a constant current of one ampere when the power dissipated between the points is one watt.

Transient Signal
An intermittent and brief signal that quickly corrects and returns the alarm to a normal operating mode before monitoring personnel can silence the alarm.
Alarm Operation

This section deals with the daily operational aspects of the alarm panel. After installation has been completed and the final user programming of the panel has been properly configured, it is ready for operation.

Silencing the Alarm
Press the **Silence** button when the alarm is sounding and the alarm will be silenced.

Area alarm modules are programmed with a **Repeater Delay** feature which monitors only the Gas Module (Area) alarms. The Repeater Delay has been factory programmed to make the alarm re-sound every 10 (ten) minutes as long as the alarm condition exists. Note: the repeater delay may be re-programmed to a different duration or turned-off (see programming page 15).

Testing the Alarm
Pressing and holding the **Test** button initiates a self-test of the alarm. All LCD’s will illuminate for as long as the Test button is depressed. In addition the buzzer will sound. If any LCD is faulty the circuit board should be replaced. If the buzzer does not sound, it is faulty and the circuit board should be replaced.

**Note:** The alarms have a filter programmed to ignore transient signals that are less than 0.7 seconds in duration.

Area Alarm Gas Modules
Monitor the status of the medical gas ‘areas’ of the facility. Gas modules communicate with transducers and provide: 1) the pressure readings of the gas on each gas display 2) the Normal LCD (green) or Alarm Conditions LCD (red) on each gas display and 3) the emergency instructions (programmed by the user).

If the pressure of one of the gases drops below the programmed low limit setting, the following events take place simultaneously: 1) the Normal LCD will be extinguished 2) the High Pressure LCD (red) will illuminate 3) an audible alarm will sound 4) the emergency instructions will be displayed alternately with the high pressure (red) alarm display if they have been programmed by the user.

If the pressure of one of the gases rises above the programmed high limit setting, the following events take place simultaneously: 1) the Normal LCD will be extinguished 2) the High Pressure LCD (red) will illuminate 3) an audible alarm will sound 4) the emergency instructions will be displayed alternately with the high pressure (red) alarm display if they have been programmed by the user.
Gas Module (Area alarms)

Gas Service
(see programming – page 17)

Gas Pressure
The LCD Digital Pressure Display displays the pressure as indicated by the transducer. The gas pressure may be displayed in PSI, kPa, BAR, inHg, or mmHg. PSI and inHg is the factory setting.

Note: Vacuum & EVAC / WAGD may be displayed as inHg or mmHg. Only the applicable unit selection buttons will be active based on the gas service selected. For example - the PSI, kPa and BAR selection buttons will be displayed but are not active when a negative pressure gas has been selected. In kPa mode the Nitrogen gas display indicates one tenth of the actual pressure when the pressure exceeds 999 kPa (i.e. 1100 kPa is displayed as 110 and the kPa and (x 10) appears in the pressure text box.

Note: Alarm settings are maintained even if power is interrupted.

Units of Measure
The Units of Measure is displayed as PSI, kPa, BAR, inHg, or mmHg. (whichever is selected during programming – PSI and inHg is factory setting) providing the unit of measure displayed on the LCD pressure reading. In the kPa mode the Nitrogen gas display indicates one tenth of the actual pressure when the pressure exceeds 999 kPa (i.e. 1100 kPa is displayed as 110 and the kPa and (x 10) appears in the pressure text box

High / Normal / Low Condition Status
Should the line pressure of a gas exceed the programmed alarm set points for low or high line pressure, the corresponding low or high line pressure LCD will be illuminated simultaneously with the buzzer sounding to announce an alarm condition has occurred. When the line pressure is neither high nor low it is considered within the normal range and the green Normal LCD is illuminated. These indications are relative to the high and low pressure set points which have been programmed into the alarm. These high and low set points should be set in accordance with NFPA 99 at ±20% of the normal operating pressure.

Other possible Conditions
Other possible system conditions may occur in the event of a wiring problem, sensor problem or board malfunction. The following codes will be displayed when a System Error or Failure is detected, or when the View Recent History button is pressed:

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Sensor</td>
<td>Sensor wire(s) not connected</td>
</tr>
<tr>
<td>No Sensor Data</td>
<td>No data sent within allotted time</td>
</tr>
<tr>
<td>Bad Sensor Data</td>
<td>Corrupt data, sensor noise</td>
</tr>
<tr>
<td>Wrong Gas Type</td>
<td>Mis-matched sensor &amp; gas board</td>
</tr>
<tr>
<td>Wrong Pressure Range</td>
<td>Sensor does not match gas board sensor selection</td>
</tr>
<tr>
<td>Low Pressure</td>
<td>Pressure is below low alarm set point</td>
</tr>
<tr>
<td>High Pressure</td>
<td>Pressure is above high alarm set point</td>
</tr>
</tbody>
</table>

Rooms / area covered & alarm / emergency instructions

When in the Normal Condition, the rooms / area covered information which has been entered by the user is displayed. When in any alarm condition, the emergency instructions which have been entered by the user are displayed alternately with the rooms/area monitored information. In addition the display will flash on and off. (see programming – page 15)
Appendix B – Medical Gas Alarm Specifications & Maintenance

Operating Ambient Temperature range: +10C(50F) to +50C(122F)

Storage Temperature: -20C(-4F) to +85C(185F)

AC Input: 120 - 240 volts AC - 50-60 Hz

DC output (to remote signal devices): 5 VDC

Input Fuse: 5 amp input AC line fuse protects the input wiring to power supply

Power Consumption:
- 45 W maximum @ 120 V
- 50 W maximum @ 240 V

Pressure Measurement Accuracy:
- 0-30 inHg transducer +/-1%
- Vacuum, WAGD (Gas Evacuation)
- 0-100 PSIG transducer +/-1%
- Oxygen, Nitrous Oxide, Medical Air, Carbon Dioxide
- 0-250PSIG transducer +/-1%
- Nitrogen

Transducer Dimensions: Housing dimensions: 1.105 Dia x 3.700 Length (includes DISS nut/nipple)

Maintenance

1. Ball valves should be operated periodically and tested for closure ability and leakage. If seals stick or leak, they should be replaced.

2. Clean the exterior of the valve boxes routinely with soap and water. Strong solvents will damage the lexan window and the silk screened printing on the window.

3. The ball valves have a removable swing out body design which allows for the changing of internal components. All valve bodies can be accessed by loosening all bolts and nuts and removing only one bolt, at this point the body may be swung out for servicing.

WARNING: To protect the lives of patients, always notify the appropriate medical facility staff before shutting off the supply of medical gas or vacuum through a ball valve. Do not close ball valves except in cases of emergency. Authorized hospital personnel should close ball valves in the event of fire, explosion or damage to the pipeline or equipment.

Please note there is no required maintenance for area alarm components.
## SERVICING BALL VALVE SEALS

### FOR TRI-TECH MODEL NUMBERS:

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Seal Kit Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>52-02, 52-03, 52-04</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>52-05</td>
</tr>
<tr>
<td>1&quot;</td>
<td>52-06</td>
</tr>
<tr>
<td>1 1/4&quot;</td>
<td>52-07</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>2&quot;</td>
<td></td>
</tr>
</tbody>
</table>

### BALL VALVE

Removal of the seals and o-rings

---

**Figure 1**

Remove and discard the worn-out seals and o-rings from Ball Valve.

---

### Seal Kit Part Number

<table>
<thead>
<tr>
<th>Seal Kit Part Number</th>
<th>Valve Size</th>
<th>Seal Kits Includes the Following</th>
</tr>
</thead>
<tbody>
<tr>
<td>52-0002S</td>
<td>1/2&quot;</td>
<td>2 Ball Seat Seals</td>
</tr>
<tr>
<td>52-0003S</td>
<td>3/4&quot;</td>
<td>2 Flange O-Rings</td>
</tr>
<tr>
<td>52-0004S</td>
<td>1&quot;</td>
<td>1 Stem Seal</td>
</tr>
<tr>
<td>52-0005S</td>
<td>1 1/4&quot;</td>
<td>1 Stem Thrust Washer</td>
</tr>
<tr>
<td>52-0006S</td>
<td>1 1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>52-0007S</td>
<td>2&quot;</td>
<td></td>
</tr>
</tbody>
</table>

### Tools Needed

- Adjustable Wrench
- 7/16", 1/2", 9/16", 5/8" and 11/16" Hex Wrench
Appendix E

Wiring Diagram
Text Message Carriers

char Carriers[SMS_MAX_CARRIERS][2][64] = {
    "@sms.3rivers.net",  "3 Rivers Wireless",
    "@paging.acswireless.com",  "ACS Wireless",
    "@advantagepaging.com",  "Advantage Communications",
    "@airtouch.net",  "Airtouch Pagers",
    "@airtouchpaging.com",  "Airtouch Pagers1",
    "@alphapage.airtouch.com",  "Airtouch Pagers2",
    "@myairmail.com",  "Airtouch Pagers3",
    "@alltelmessage.com",  "Alltel",
    "@message.alltel.com",  "Alltel PCS",
    "@alphanow.net",  "AlphNow",
    "@page.americanmessaging.net",  "American Messaging (SBC/Ameritech)",
    "@clearpath.acswireless.com",  "Ameritech Clearpath",
    "@paging.acswireless.com",  "Ameritech Paging",
    "@pageapi.com",  "Ameritech Paging1",
    "@airtelap.com",  "Andhra Pradesh Airtel",
    "@archwireless.net",  "Arch Pagers (PageNet)",
    "@epage.arch.com",  "Arch Pagers (PageNet)",
    "@mmode.com",  "AT&T Free2Go",
    "@mobile.att.net",  "AT&T PCS",
    "@dpcs.mobile.att.net",  "AT&T Pocknet PCS",
    "@txt.att.net",  "AT&T SMS",
    "@sms.beemail.ru",  "BeeLine GSM",
    "@beepwear.net",  "Beepwear",
    "@message.bam.com",  "Bell Atlantic",
    "@txt.bellmobility.ca",  "Bell Canada",
    "@bellmobility.ca",  "Bell Canada",
    "@txt.bell.ca",  "Bell Mobility (Canada)",
    "@txt.bellmobility.ca",  "Bell Mobility",
    "@bellsouthtips.com",  "Bell South (Blackberry)",
    "@blsdcs.net",  "Bell South Mobility",
    "@bellsouth.c1",  "Bell South",
    "@blsdcs.net",  "Bell South",
    "@sms.bellsouth.com",  "Bell South",
    "@wireless.bellsouth.com",  "Bell South",
    "@blueskyfrog.com",  "Blue Sky Frog",
    "@sms.bluecell.com",  "Bluegrass Cellular",
    "@myboostmobile.com",  "Boost Mobile",
    "@bplmobile.com",  "BPL Mobile",
    "@cwmovil.com",  "Cellular & Wireless, Panama",
    "@cmcpaging.com",  "Cellular Mobile Communications",
    "@cwwsms.com",  "Cellular West Wireless",
    "@phone.cellone.net",  "Cellular One East Coast",
    "@paging.cellone-sf.com",  "Cellular One PCS",
    "@swmsg.com",  "Cellular One South West",
    "@mycellone.com",  "Cellular One West",
    "@cell1.textmsg.com",  "Cellular One",
    "@cellularone.textmsg.com",  "Cellular One",
    "@cellularone.txtmsg.com",  "Cellular One",
    "@message.cellone-sf.com",  "Cellular One"
}
Text Message Carriers

char Carriers[\textsc{SMS\_MAX\_CARRIERS}][2][64] = {

    "@mobile.celloneusa.com", "Cellular One",
    "@sbemail.com", "Cellular One",
    "@csouthl.com", "Cellular South",
    "@cwemail.com", "Centennial Wireless",
    "@cvc paging.com", "Central vermont Communications",
    "@messaging.centurytel.net", "CenturyTel",
    "@rpgmail.net", "Chennai RPG Cellular",
    "@airtelchennai.com", "Chennai Skycell/Airtel",
    "@mobile.att.net", "Cincinnati Bell",
    "@mobile.mycingular.com", "Cingular Wireless",
    "@mobile.mycingular.net", "Cingular Wireless",
    "@mycingular.textmsg.com", "Cingular Wireless",
    "@cingularm.com", "Cingular",
    "@mms.cingularm.com", "Cingular",
    "@mycingular.com", "Cingular",
    "@mycingular.net", "Cingular",
    "@page.cingular.com", "Cingular",
    "@msg.clearnet.com", "Cingular",
    "@comcastpcs.textmsg.com", "Cingular",
    "@pager.comspeco.com", "Cingular",
    "@pageme.comspeco.net", "Cingular",
    "@sms.comviq.se", "Cingular",
    "@cookmail.com", "Clearnet",
    "@corrwireless.net", "Comcast",
    "@airtelmail.com", "Communication Specialist Companies",
    "@delhi.hutch.co.in", "Communication Specialists",
    "@page.hit.net", "Comviq",
    "@mobile.dobson.net", "Cook Paging",
    "@mobile.cellularone.com", "Corr Wireless Communications",
    "@mobile.cellularone.com", "Delhi Airtel",
    "@t-mobile-sms.de", "Delhi Hutch",
    "@sms.orange.nl", "Digi-Page/Page Kansas",
    "@sms.edgewireless.com", "Dobson Cellular Systems",
    "@sms.emt.ee", "Dobson-Alex Wireless",
    "@escotelmobile.com", "Dobson-Cellular One",
    "@fido.ca", "DT T-Mobile",
    "@sendabeep.net", "Dutchtone/Orange-NL",
    "@webpager.us", "Edge Wireless",
    "@bplmobile.com", "EMT",
    "@epage.porta-phone.com", "Escotel",
    "@airmessage.net", "Fido",
    "@gte.pagegate.net", "Galaxy Corporation",
    "@messagealert.com", "GCS Paging",
    "@celforce.com", "Goa BPLMobile",
    "@messaging.sprintpcs.com", "Golden Telecom",
    "@text.houston cellular.net", "Graylink/Porta-Phone",
    "@ideacellular.net", "GTE",
    "@airmessage.com", "GTE",
    "@ivtext.com", "GTE",
    "@celforce.com", "Gujarat Celforce",
    "@celforce.com", "Helio",
    "@houston cellular.net", "Houston Cellular",
    "@ideacellular.net", "Idea Cellular",
    "@ivtext.com", "Illinois Valley Cellular",
}
Text Message Carriers

char Carriers[SMS_MAX_CARRIERS][2][64] = {
    "@page.infopagesystems.com",      "Infogage Systems",
    "@inlandlink.com",               "Inland Cellular Telephone",
    "@opensms.ipipi.com",            "IPipi.COM",
    "@jsmtel.com",                   "JSM Tele-Page",
    "@airtelkol.com",                "Kerala Escotel",
    "@sms.kyivstar.net",             "Kolkata Airtel",
    "@2sms.kyivstar.net",            "Kyivstar-Contract",
    "@e-page.net",                   "Kyivstar-prepaid",
    "@smsmail.lmt.lv",               "Laumanns Communication",
    "@pagemci.com",                  "LMT",
    "@bplmobile.com",                "MCI",
    "@ideaecellular.net",            "Maharashtra BPL Mobile",
    "@text.mtsmobility.com",         "Maharashtra Idea Cellular",
    "@mci.com",                      "Manitoba Telecom Systems",
    "@mci.com",                      "MCI Phone",
    "@mci.com",                      "MCI",
    "@mymeteor.ie",                  "Meteor",
    "@mymeteor.ie",                   "Meteor",
    "@my2way.com",                    "Metrocall",
    "@my2way.com",                    "Metrocall 2-way",
    "@mymetropcs.com",               "Metro PCS",
    "@metropcs.sms.us",              "Metro PCS",
    "@microcell.com",                "Microcell",
    "@clearlydigital.com",           "Midwest Wireless",
    "@ml.com.sg",                    "MlWorld",
    "@page.mobilcom.net",            "Mobilcom PA",
    "@mobilecomm.net",               "Mobilcomm",
    "@ml.com.sg",                    "Mobileone",
    "@mobilfone.com",                 "Mobifone",
    "@mobilitybermuda.com",          "Mobility Bermuda",
    "@mobistar.belgium",              "Mobistar Belgium",
    "@mobitel.tanzania.com",          "Mobitel Tanzania",
    "@mobitel.srbija.com",           "Mobtel Srbija",
    "@merriswireless.com",           "Morris Wireless",
    "@motient.com",                  "Motient",
    "@movistar.com",                 "Movistar",
    "@mts.com",                      "MTS",
    "@mumbai.bplmobile.com",         "Mumbai BPL Mobile",
    "@mumbai.orange.com",            "Mumbai Orange",
    "@nbtel.com",                    "NBTel",
    "@netcom.com",                   "Netcom",
    "@nextel.com",                   "Nextel",
    "@nextel.co.uk",                 "Nextel",
    "@npiwireless.com",              "Npi Wireless",
    "@pcs.netelos.com",              "Ntelos",
    "@o2mail.co.uk",                 "O2 (M-mail)",
    "@o2.co.uk",                     "O2",
    "@o2mail.co.uk",                 "O2",
    "@page.pagesystems.com",         "@page.infopagesystems.com",
    "@inlandlink.com",               "@inlandlink.com",
    "@opensms.ipipi.com",            "@opensms.ipipi.com",
    "@jsmtel.com",                   "@jsmtel.com",
    "@airtelkol.com",                "@airtelkol.com",
    "@sms.kyivstar.net",             "@sms.kyivstar.net",
    "@2sms.kyivstar.net",            "@2sms.kyivstar.net",
    "@e-page.net",                   "@e-page.net",
    "@smsmail.lmt.lv",               "@smsmail.lmt.lv",
    "@pagemci.com",                  "@pagemci.com",
    "@bplmobile.com",                "@bplmobile.com",
    "@ideaecellular.net",            "@ideaecellular.net",
    "@text.mtsmobility.com",         "@text.mtsmobility.com",
    "@mci.com",                      "@mci.com",
    "@mymeteor.ie",                  "@mymeteor.ie",
    "@mymeteor.ie",                   "@mymeteor.ie",
    "@my2way.com",                    "@my2way.com",
    "@my2way.com",                    "@my2way.com",
    "@mymetropcs.com",               "@mymetropcs.com",
    "@metropcs.sms.us",              "@metropcs.sms.us",
    "@fido.ca",                       "@fido.ca",
    "@clearlydigital.com",           "@clearlydigital.com",
    "@ml.com.sg",                    "@ml.com.sg",
    "@page.mobilcom.net",            "@page.mobilcom.net",
    "@mobilecomm.net",               "@mobilecomm.net",
    "@ml.com.sg",                    "@ml.com.sg",
    "@page.mobilfone.com",           "@page.mobilfone.com",
    "@ml bm",                        "@ml bm",
    "@mobistar.be",                  "@mobistar.be",
    "@sms.co.tz",                    "@sms.co.tz",
    "@mobtel.co.yu",                 "@mobtel.co.yu",
    "@beepone.net",                  "@beepone.net",
    "@isp.com",                      "@isp.com",
    "@correo.movistar.net",          "@correo.movistar.net",
    "@text.mtsmobility.com",         "@text.mtsmobility.com",
    "@bplmobile.com",                "@bplmobile.com",
    "@orangemail.co.in",             "@orangemail.co.in",
    "@wirefree.informe.ca",          "@wirefree.informe.ca",
    "@sms.netcom.no",                "@sms.netcom.no",
    "@messaging.nextel.com",         "@messaging.nextel.com",
    "@nextel.com.br",                "@nextel.com.br",
    "@page.nextel.com",              "@page.nextel.com",
    "@npiwireless.com",              "@npiwireless.com",
    "@pcs.netelos.com",              "@pcs.netelos.com",
    "@mmail.co.uk",                  "@mmail.co.uk",
    "@o2.co.uk",                     "@o2.co.uk",
    "@o2mail.co.uk"                  "@o2mail.co.uk"
Appendix G

Text Message Carriers

char Carriers[SMS_MAX_CARRIERS][2][64] = {
    "@omnipoint.com",    "Omnipoint",
    "@omnipointpcs.com", "Omnipoint",
    "@onemail.at",       "One Connect Austria",
    "@onlinebeep.net",   "OnlineBeep",
    "@optusmobile.com.au", "Optus Mobile",
    "@sms.orange.nl",    "Orange-NL/Dutchtone",
    "@orangemail.co.in", "Orange Mumbai",
    "@orange.net",       "Orange",
    "@mujoskar.cz",      "Oskar",
    "@sms.luxgsm.lu",    "P&T Luxembourg",
    "@onlinebeep.net",   "Pacific Bell",
    "@airmessage.net",   "PageMart Advanced/2way",
    "@pmcl.net",         "PageMart Canada",
    "@pagemart.net",     "PageMart",
    "@pagegate.pagenet.ca", "PageNet Canada",
    "@page1nw.com",      "PageOne NorthWest",
    "@pcsone.net",       "PCS One",
    "@pelephone.net.il", "Pelephone Israel",
    "@msg.pioneerenidcellular.com", "Personal Communication",
    "@text.plusgsm.pl",  "Pioneer/Enid Cellular",
    "@bplmobile.com",    "PlusGSM",
    "@airmessage.net",   "Pondicherry BPL Mobile",
    "@pmcl.net",         "Powertel",
    "@pagemart.net",     "President's Choice",
    "@pmcl.net",         "Price Communications",
    "@pagemart.net",     "Primtel",
    "@msg.pioneerenidcellular.com", "ProPage",
    "@messaging.sprintpcs.com", "Public Service Cellular",
    "@qwestmp.com",      "Qualcomm",
    "@qwestmp.com",      "Qwest",
    "@ram-page.com",     "RAM Page",
    "@rogers.com",       "Rogers AT&T Wireless",
    "@rogers.com",       "Rogers Canada",
    "@safaricomsms.com", "Safaricom",
    "@satelindo.gsm.com", "Satelindo GSM",
    "@satellink.net",    "Satellink",
    "@satelindo.gsm.com", "SBC Ameritech Paging",
    "@sce-900.ru",      "Southwestern Bell",
    "@sfr.fr",           "Sprint",
    "@text.simplefreedom.net", "SCS-900",
    "@email.skytel.com", "SFR France",
    "@email.skytel.com", "Simple Freedom",
    "@myssmart.mymobile.ph", "Skytel Pagers",
    "@page.southernlinc.com", "Skytel Pagers",
    "@email.swbw.com",  "Smart Telecom",
    "@email.swbw.com",  "Southern LINC",
    "@email.swbw.com",  "Southwestern Bell",
    "@mailing.sprintpcs.com", "Sprint PCS",
    "@sprintpaging.com", "Sprint",  
}
### Text Message Carriers

```c
char Carriers[SMS_MAX_CARRIERS][2][64] = {
    "@page.stpaging.com",
    "@tms.suncom.com",
    "@suncom1.com",
    "@freesurf.ch",
    "@mysunrise.ch",
    "@mobile.surewest.com",
    "@bluewin.ch",
    "@bplmobile.com",
    "@tmomail.net",
    "@sms.tele2.lv",
    "@movistar.net",
    "@mobilpost.no",
    "@pageme.teletouch.com",
    "@msgtelus.com",
    "@pager.tdspager.com",
    "@timnet.com",
    "@t-mobile.uk.net",
    "@voicestream.net",
    "@tmomail.net",
    "@txt.att.net",
    "@tms.suncom.com",
    "@alphame.com",
    "@beep.com",
    "@sms.unc.com.ua",
    "@utext.com",
    "@sms.uraltel.ru",
    "@email.uscc.net",
    "@uscc.textmsg.com",
    "@uswestdatamail.com",
    "@escotelmobile.com",
    "@airmail.com",
    "@myvzw.com",
    "@vsvpix.com",
    "@vtext.com",
    "@pager.irkutsk.ru",
    "@vmobile.ca",
    "@vmobl.com",
    "@vxtras.com",
    "@voicestream.net",
    "@airmessage.net",
    "@pagemart.net",
    "@webtext.com",
    "@sms.wcc.net",
    "@cellularonewest.com",
    "@sms.wildmist.net",
    "@wyndtell.com",
    "ST Paging",
    "Suncom",
    "Suncom",
    "Sunrise Mobile",
    "Sunrise Mobile",
    "Surewest Communications",
    "Swisscom",
    "Tamil Nadu BPL Mobile",
    "T-Mobile",
    "Tele2 Latvia",
    "Telefonica Movistar",
    "Telenor",
    "Teletouch",
    "Telus",
    "The Indiana Paging Co",
    "TIM",
    "T-Mobile UK",
    "T-Mobile",
    "T-Mobile",
    "Tracfone",
    "Triton",
    "TSR Wireless",
    "TSR Wireless",
    "UMC",
    "Unicel",
    "Uraltel",
    "US Cellular",
    "US Cellular",
    "US West",
    "Uttar Pradesh Escotel",
    "Verizon Pagers",
    "Verizon PCS (MMS)",
    "Verizon PCS (MMS)",
    "Verizon PCS (SMS)",
    "Vessotel",
    "Virgin Mobile (CA)",
    "Virgin Mobile (US)",
    "Virgin Mobile",
    "VoiceStream/T-Mobile",
    "WebLink Wireless",
    "WebLink Wireless",
    "WEBTEXT",
    "West Central Wireless",
    "Western Wireless",
    "Wildmist Wireless",
    "Wyndtell"
};
```