Pattons medical

Automatic Changeover Medical Manifold Intelliswitch

Installation, Operation and Maintenance Manual

Model Number:	
Date Purchased:	
Purchased from:	

For further technical assistance, service or replacement parts, please contact:

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Patton's Medical reserves the right to make changes and improvements to update products sold previously without notice or obligation.

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SAFETY

THIS PRODUCT IS NOT INTENDED FOR USE WITH TOXIC GASES, FLAMMABLE GASES OR CORROSIVE GASES.

NOTICE

The Medical IntelliSwitch™ is intended for use in medical installations. This product meets NFPA-99 requirements for switchover systems. Compliance with NFPA-99 for a complete installation (ie Cylinders, piping, alarms, etc.) are the responsibility of the installer. Refer to NFPA-99 for complete system requirements.

⚠ CAUTION

Basic safety precautions must be followed to reduce the risk of fire, electrical shock or injury.

Connect the Medical IntelliSwitch™ to the correct line voltage. A label on the product identifies what voltage it is wired for. CONNECTION TO AN INCORRECT VOLTAGE CAN CAUSE SERIOUS DAMAGE TO THE PRODUCT AND WILL VOID ANY WARRANTY.

While the Medical IntelliSwitch™ Switchover is dust and moisture resistant, it is NOT water-proof or completely sealed. It should be installed where it will not be subjected to rain or high concentrations of dust. Never pour or spray liquids directly onto the product.

Install the Medical IntelliSwitch™ where the ambient temperature range is between 0° F and 140° F.

Do not install this product in a hazardous environment.

If product appears damaged in any way, do not use and request service from Patton's Medical.

Consult the cylinder distributor for the proper use of cylinders and for any restrictions on their use (such as flow rate and temperature requirements).

Store cylinders with valve caps screwed on, and chain cylinders to a supporting wall or column.

Handle cylinders carefully and only with valve caps screwed on. The cap will reduce the chance that the cylinder valve will break off if the cylinder is accidentally dropped or falls over. The cap also protects the cylinder valve from damage to screw threads, which could cause leaky connections.

No smoking should be permitted near oxygen, nitrous oxide, any other oxidizer, flammable gases, or flammable mixtures, or in areas where cylinders are stored.

Where an oxidizer (such as nitrous oxide or oxygen) is used, the manifold and cylinders must be kept clean. No oil, grease, or combustible substances should come in contact with oxygen or nitrous oxide storage or handling equipment. Such materials in contact with oxygen or nitrous oxide are readily ignitable and, when ignited, will burn intensely.

- Never lift gas cylinders with a magnetic lifting device.
- Never use an open flame when leak testing.
- Always open valves slowly when high-pressure gases are being used.
- Always be sure that a cylinder contains the correct gas before connecting it to any manifold.
- Always leak-test any manifold or distribution pipeline before using.
- Always be sure that the gas in a pipeline is the correct gas for the intended use.
- Always close all cylinder valves before disconnecting cylinders from a manifold.
- Always remove all empty cylinders from a manifold before connecting full cylinders.
- Always test cylinders to be sure the cylinders are full before connecting to a manifold.

All gas distribution piping systems must meet the appropriate standards for the intended service. For the United States, some applicable safety rules and precautions are listed below:

1. N.F.P.A. Standard 99, Health Care Facilities
2. Local Ordinances
3. O.S.H.A. Standard 29 CFR
4. C.G.A. Pamphlet C-4, American National Standard Method of Marking Portable Compressed Gas Containers to Identify the Material Contained.
5. C.G.A. Pamphlet G-4, Oxygen – Information on the properties, manufacture, transportation, storage, handling, and use of oxygen.
6. C.G.A. Pamphlet G-4.1, Equipment Cleaned for oxygen service.
7. C.G.A. Pamphlet G-4.4, Industrial Practices for Gaseous Oxygen Transmission and Distribution Piping Systems.
8. C.G.A. Pamphlet G-5, Hydrogen – Information on the properties, manufacture, transportation, storage, handling, and use of hydrogen.
9. C.G.A. Pamphlet G-6, Carbon Dioxide – Information on the properties, manufacture, transportation, storage, handling, and use of carbon dioxide.
10. C.G.A. Pamphlet G-6.1, Standard for Low Pressure Carbon Dioxide Systems at Consumer Sites.
11. C.G.A. Pamphlet P-1, Safe Handling of Compressed Gases in Containers.
12. C.G.A. Pamphlet P-2, Characteristics and Safe Handling of Medical Gases.
13. C.G.A. Pamphlet C-9, Standard Color Marking of Compressed Gas Containers for Medical Use.
14. C.G.A. Pamphlet M-1, Guide for Medical Gas Systems at Customer Sites
15. C.G.A. Pamphlet E-10, Maintenance of Medical Gas and Vacuum Systems in Health Care Facilities.

16. C.G.A. Pamphlet G-7, Compressed Air for Human Respiration.

17. C.G.A. Pamphlet 9.1, Commodity Specification for Helium.

18. C.G.A. Pamphlet 10.1, Commodity Specification for Nitrogen.

19. C.G.A. Pamphlet SA-6, Safety Alert, Use of Nitrogen for Surgical Air Tools

20. C.G.A. Pamphlet SA-17, Safety Alert, Hazards of Nitrogen/Inert Gases Creating an Oxygen Deficient Atmosphere

INSTALLING THE MEDICAL INTELLISWITCH™

Understanding the application and sizing the components properly is the key to any successful system installation.

Check that the correct Medical IntelliSwitch has been selected for the application. The Medical IntelliSwitch is shipped with "factory default" settings. Refer to the Section "Factory Default Values" to determine how the system is configured.

Figure 1 shows a typical installation.

The inlets, outlet, relief valve vent, and reserve gas port (option) on the Medical IntelliSwitch™ are 1/2" Female NPT fittings. These fittings have an anti-rotation plate around them to keep them from twisting during installation. However, it is strongly recommended that two wrenches be used when tightening external devices to these fittings.

DO NOT APPLY AC POWER TO THE MEDICAL INTELLISWITCH WITHOUT FIRST APPLYING INLET PRESSURE TO IT.

1. The installation of the system requires that the vent for the relief valve exhaust be piped away to a filtered, turned down port to avoid the entry of bugs and moisture.

2. The Medical IntelliSwitch™ uses four mounting tabs for mounting to a wall or panel. Refer to Figure 19 at the back of this manual for the dimensions of the system. Anchor the Medical IntelliSwitch™ securely to a wall or panel at a height adequate to conveniently connect a manifold or pigtail. THE HEIGHT SELECTED MUST MEET ALL REGULATORY REQUIREMENTS

3. Once all mechanical connections are made pressurize the system and check for leaks.

4. Connect the Remote Alarm and serial device (if used) to the Medical IntelliSwitch™.

5. Finally connect AC power to the Medical IntelliSwitch™. The system operates at 100-240V 50/60Hz. Connection of the Medical IntelliSwitch™ to the incorrect input voltage will damage the product and void any warranty.

6. Apply power to the Medical IntelliSwitch™. The inlet pressure readings will appear on the two 4-digit displays. If necessary use the Bank Select pushbutton to choose the side considered to be the primary gas source. The Medical IntelliSwitch™ will default to the left inlet side as the primary side.

7. Check the delivery pressure. The value will appear on the 3-digit display. Switch between the two

Normal operation of the Medical IntelliSwitch™ can now begin. The “primary” or “active” inlet side of the system, whether left or right, will have the green Ready light ON and the In-Use light ON over the source pressure. The “secondary” side or the “in-active” side will have only the green Ready light ON.

Lighted green lights above the Source Select buttons should match the types of cylinders being used by each side.

All switching is automatic. If the primary inlet gas side drops below the set switchover point, the system will transfer to the reserve inlet gas side and the status lights will indicate the transition. The Replace status light and alarm indicate the need to replenish a bank. In the case of high pressure cylinders, the system will reset when pressure has been restored to the depleted bank. In the case of liquid cylinders, the system will reset when pressure has been restored to the depleted bank and the Reset button has been depressed.

There is a delivery pressure tolerance feature designed into the product. It allows for the pressure to vary over a programmed range before the product indicates an error condition. If the delivery regulator in use has its pressure fall out of its programmed operating range the system will alarm indicating a problem. Switching from the “faulted” delivery regulator must be done manually by OPENING the valve feeding the delivery regulator you want to place into service and CLOSING the valve feeding the delivery regulator you wish to remove from service. The factory default delivery pressure tolerance is +/- 7 PSI.

Figure 1a

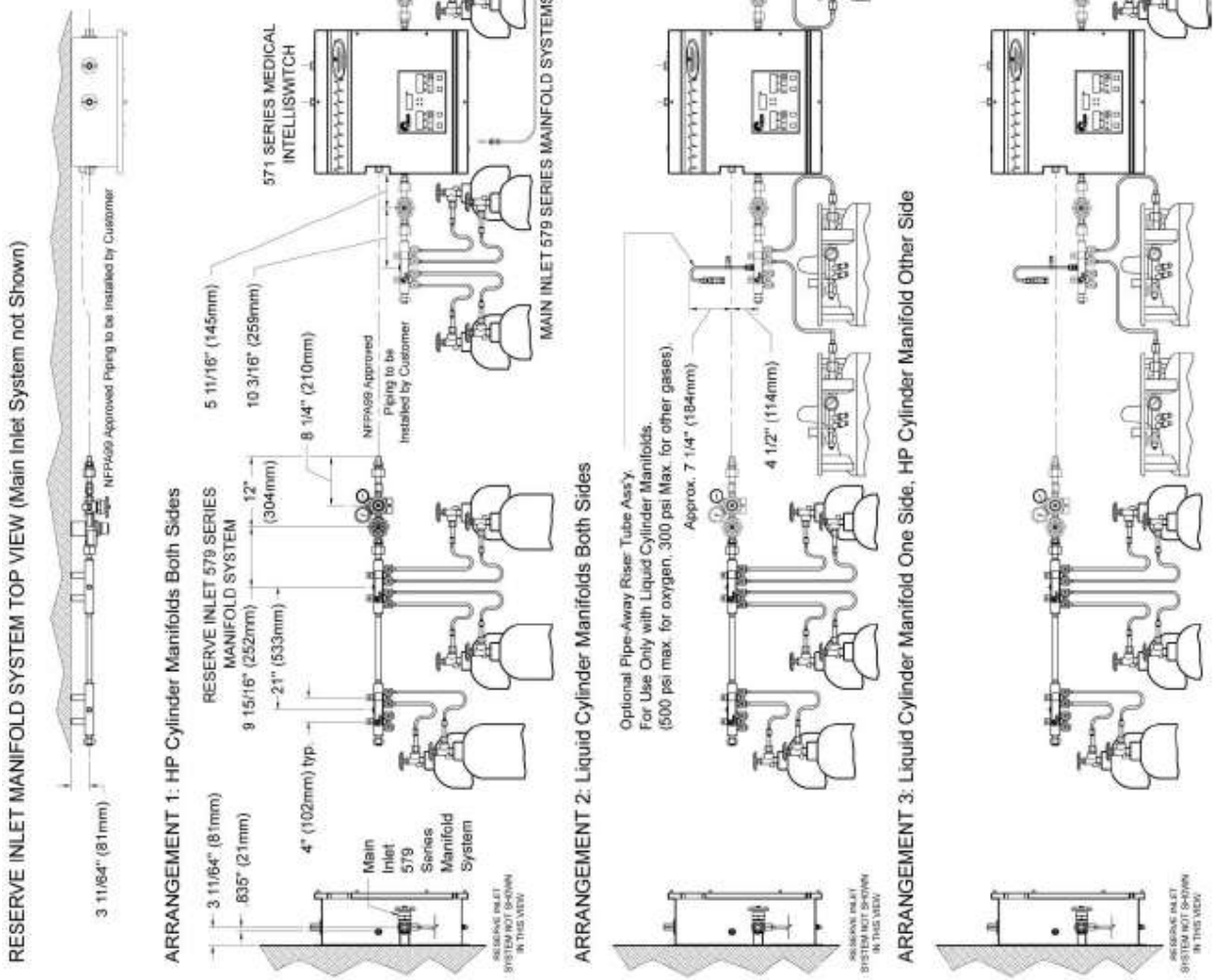
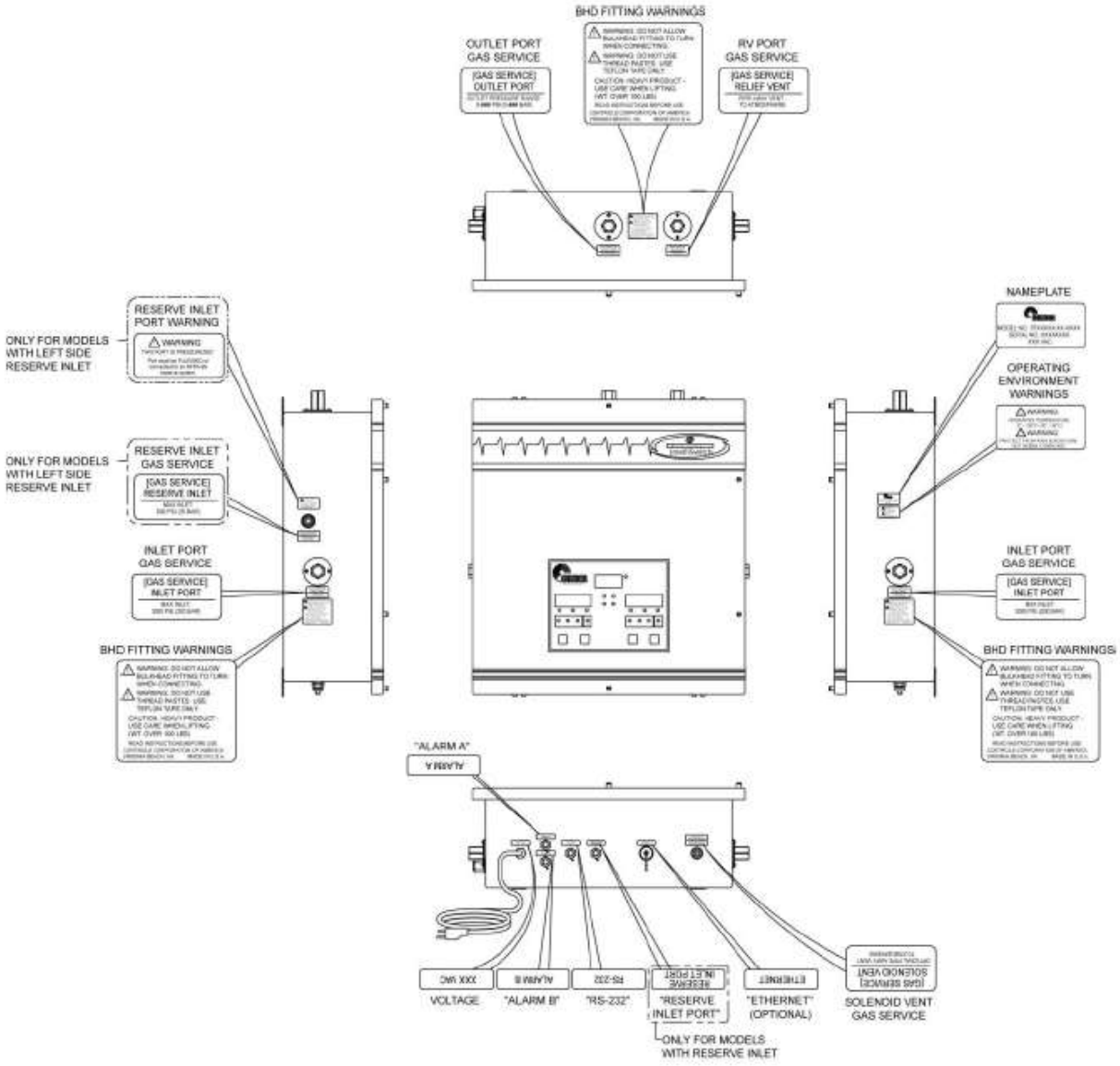

RESERVE INLET MANIFOLD SYSTEM TOP VIEW (Main Inlet System not Shown)
3 11/64" (81mm)
NFPA99 Approved Piping to be Installed by Customer
ARRANGEMENT 1: HP Cylinder Manifolds Both Sides
3 11/64" (81mm)
.835" (21mm)
RESERVE INLET 579 SERIES MANIFOLD SYSTEM
9 15/16" (252mm)
12" (304mm)
21" (533mm)
4" (102mm) typ.
5 11/16" (145mm)
10 3/16" (259mm)
8 1/4" (210mm)
NFPA99 Approved Piping to be Installed by Customer
Optional Advantium RX Alarm
5740001 = 120 VAC
5740002 = 220 VAC
571 SERIES MEDICAL INTELLISWITCH
Optional Alarm Conn. Cable:
529 5325-3 (3 ft)
529 5325-10 (10 ft)
529 5325-25 (25 ft)
529 5325-50 (50 ft)
MAIN INLET 579 SERIES MAINFOLD SYSTEMS LEFT & RIGHT
Main Inlet 579 Series Manifold System
ARRANGEMENT 2: Liquid Cylinder Manifolds Both Sides
Optional Pipe-Away Riser Tube Ass'y.
For Use Only with Liquid Cylinder Manifolds.
(500 psi max. for oxygen, 300 psi Max. for other gases).
Approx. 7 1/4" (184mm)
4 1/2" (114mm)
ARRANGEMENT 3: Liquid Cylinder Manifold One Side, HP Cylinder Manifold Other Side

Figure 1b


BHD FITTING WARNINGS
OUTLET PORT GAS SERVICE
[GAS SERVICE] OUTLET PORT
RV PORT GAS SERVICE
[GAS SERVICE] RELIEF VENT
RESERVE INLET PORT WARNING
ONLY FOR MODELS WITH LEFT SIDE RESERVE INLET
RESERVE INLET GAS SERVICE
[GAS SERVICE] RESERVE INLET
INLET PORT GAS SERVICE
[GAS SERVICE] INLET PORT
BHD FITTING WARNINGS
NAMEPLATE
OPERATING ENVIRONMENT WARNINGS
INLET PORT GAS SERVICE
[GAS SERVICE] INLET PORT
BHD FITTING WARNINGS
"ALARM A"
VOLTAGE
"ALARM B"
"RS-232"
"RESERVE INLET PORT"
"ETHERNET" (OPTIONAL)
SOLENOID VENT GAS SERVICE
ONLY FOR MODELS WITH RESERVE INLET

DESCRIPTION OF PRODUCT

The Medical IntelliSwitch™ is a device used to monitor, control and switch the flow of gas from cryogenic or high pressure cylinders from either of two independent sources to either of two independently controlled and isolated delivery regulators. In turn these regulators are connected to a single point of use output.

It consists of two electronically controlled inlet valves controlling the flow of gas into one of two delivery regulators.

Pressure coming into the Medical IntelliSwitch™ is monitored and displayed on two independent 4-digit displays. The outlet pressure of the system is monitored and displayed on a 3-digit display. Outlet pressure adjustment is available using an adjusting screw on the delivery regulators inside the cabinet.

A series of indicator lights show the status of the system at any given time.

The status of the Medical IntelliSwitch™ may be monitored remotely via a serial port or Ethernet port.

FEATURES

Operation from Multiple Gas Sources

The Medical IntelliSwitch™ is capable of operating with inlet pressure provided by 230, 350, and 500 PSI liquid cylinders, 3,000 PSI high pressure cylinders, or any combination.

Look Back

The Medical IntelliSwitch™ switches from one bank to the other based upon the pressure supplied to the selected bank. When using liquid cylinders, if the volume of the liquid in the cylinder becomes low or the gas flow becomes particularly high, it is not uncommon for the pressure to drop below the switching point even if there is plenty of gas left in the cylinder. When a typical switchover enters such a state, two undesirable situations may occur. First, the system may switch to the reserve temporarily until pressure builds on the primary enough to cause the system to switch back. This situation often leads to depleting both sides at the same time as the system rapidly alternates drawing from both sides or even draws both sides at the same time. Second, the system may permanently switch to the reserve leaving unused product in the primary and triggering a false alarm.

To avoid either of these situations, the Medical IntelliSwitch™ has a Look Back feature that allows the system to switch banks and wait a predetermined time period before checking the former primary cylinder. If the pressure has recovered enough, the system will switch back to the former primary cylinder. This look back time allows the pressure building circuit to recover and build sufficient pressure to supply the system and fully draw down the primary cylinder before an alarm is triggered indicating the cylinder is empty, allowing maximum utilization of cylinder contents. This feature is only activated when a liquid cylinder is selected for use. The look back time is factory set at 30 minutes.

Switchback Delay

Using the Look Back feature alone can result in the switchover switching back several times well after the cylinder can provide a useful gas supply. To prevent this, the Switchback Delay feature keeps track of how often the Medical IntelliSwitch™ switches back to a liquid cylinder that has been used and whose pressure has been restored to be used again.

If the system switches away from the priority side before the Switchback Delay timer has timed out, the system determines that all the useful gas has been extracted from the cylinder and switches to the auxiliary side and draws from it. This feature is only activated when a liquid cylinder is selected for use. The switch back time is factory set at 10 minutes.

Hysteresis

This feature is a pressure value added to the switchover pressure value to determine the pressure at which the Medical IntelliSwitch™ will switch back to a cylinder after the "Look Back" time has expired. This feature provides added protection against inadvertently drawing from the reserve bank when the primary still has gas. The Hysteresis pressure is factory set at 10 PSI.

Economizer Function

When using liquid cylinders in switchover applications, it is common for the reserve cylinder to build pressure due to the vaporization of liquid within the cylinder. When this pressure reaches the set point of the relief valve on the liquid cylinder, the relief valve will open, venting gas to the atmosphere. The Medical IntelliSwitch™ constantly monitors the reserve cylinder and, at a predetermined pressure, will change the valving to allow gas from the headspace of the reserve cylinder to feed the system, thus drawing down the pressure in the reserve cylinder. There are three pressure ratings for liquid cylinder relief valves, 230 PSIG, 350 PSIG and 500 PSIG; the Medical IntelliSwitch™ has predetermined settings for all three types that may be selected on the front panel of the system.

Settable Switchover Pressure

Serial Port

The Medical IntelliSwitch™ is capable of communicating to peripheral equipment via a standard serial port. For more information on the serial port refer to the section on connecting to a serial port.

Ethernet Port

The Medical IntelliSwitch™ is capable of communicating to peripheral equipment via an Ethernet connection. For more information on the Ethernet option refer to the section on connecting to the Ethernet.

High Flow Relief Valve Overpressure Protection

The Medical IntelliSwitch™ is equipped with a high flow relief valve to protect the system from extreme pressure increases and liquid withdrawal.

Cylinder Relief Valve Pressure	Economizer Activation Pressure	Normal Value to Switch Back
230 PSI	210 PSI	190 PSI
350 PSI	325 PSI	300 PSI
500 PS	475 PSI	450 PSI

If a liquid cylinder's pressure rises to the "activation" pressure, the Medical IntelliSwitch™ will redirect itself to draw the pressure down through the delivery stream. Once the pressure reaches a "normal" value, it will return to drawing from the previous side.

Bank Selection

The Bank Select button on the front panel allows for manually switching the active bank. The In-Use status indicator lights provide the feedback to indicate which side is selected.

Reset

The Reset button is primarily used to reset a "replace" condition when using liquid cylinders. The Replace status light can only be cleared if the side with the condition has its pressure restored to a value above the switchover (trip point) plus the Hysteresis value AND the Reset button is pushed. If the button is pushed while the condition still occurs, the system will attempt to clear the condition but will reinstate the indicators automatically. Example: Switchover(trip point) = 130 PSI. System will switch to the other side when pressure drops to 130 PSI. It will not allow switching back until the pressure reaches 140 PSI (130 PSI + 10 PSI Hysteresis pressure)

Testing

GAS WILL CONTINUE TO FLOW WHILE IN THE TEST MODE.

system will perform a different test. Continuing to press the Reset button will step through all the tests after which the system will return to normal operation. If after the test mode has been entered there is no pushbutton activity for 5 minutes, the system will return to the normal display operation. Gas flow is maintained during the test mode. Refer to the Troubleshooting Section for details on testing.

Keypad Lockout

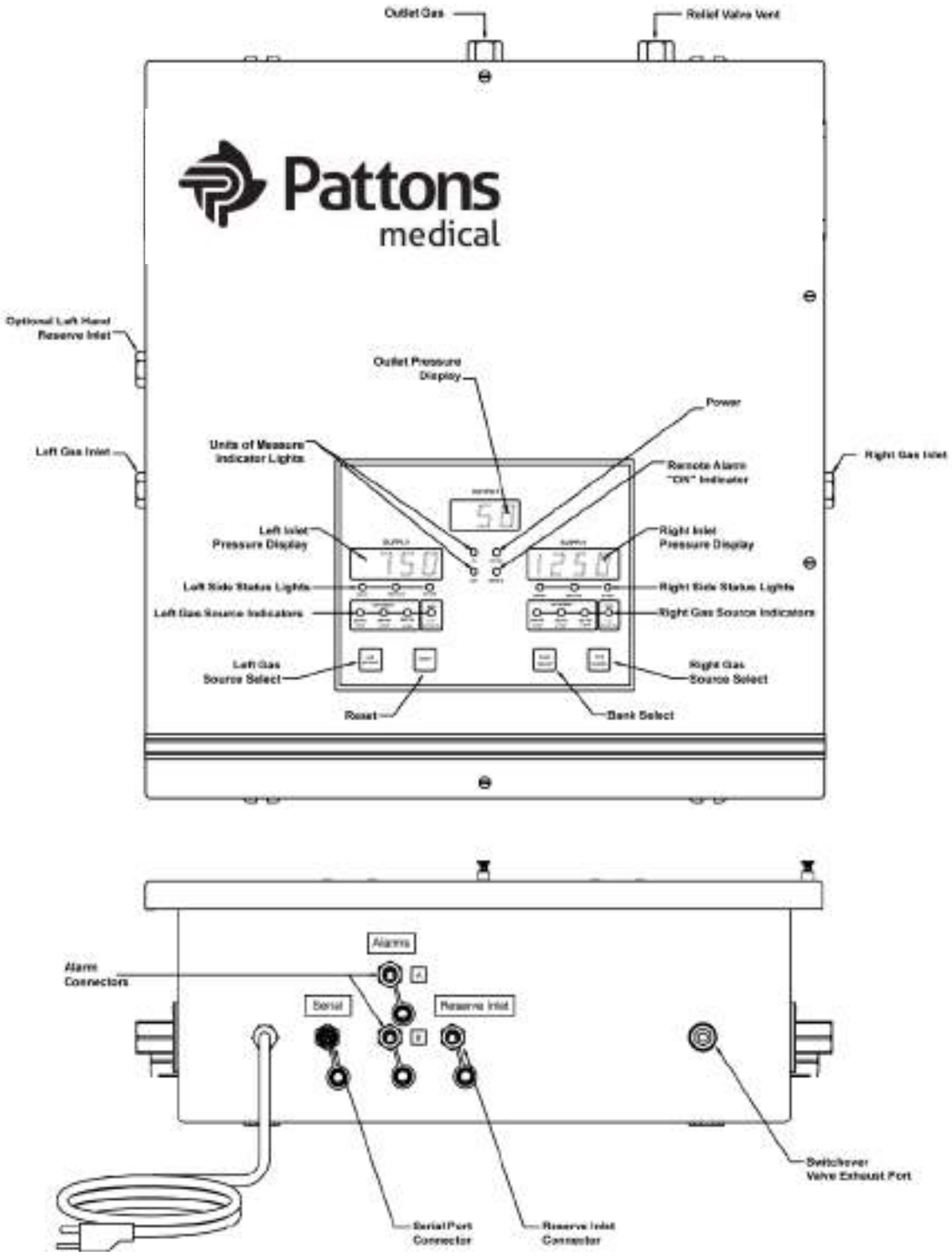
If the keypad security lockout feature is enabled, the keypad will become inoperative after approximately 5 minutes provided there has been no buttons pressed. There will be an audible beep when the keypad goes into the locked state. If the keypad becomes locked it can be re-activated by holding the Bank Select Pushbutton for approximately 4 seconds. The system will make an audible beep when it is unlocked. To enable this feature, see Section "User Selectable Features" for explanation on enabling/disabling this feature.

USER SELECTABLE FEATURES

The Medical IntelliSwitch™ allows various system parameters to be set in the field. They are:

a. Switchover Pressure
b. Delivery Regulator Pressure
c. Delivery Regulator Pressure Tolerance
d. Units of Measure
e. Keypad Security Lockout
f. Remote Alarm Configuration
g. Enabling Reserve Gas Supply
h. Enabling Remote Setup
i. Communication Port

Figure 2

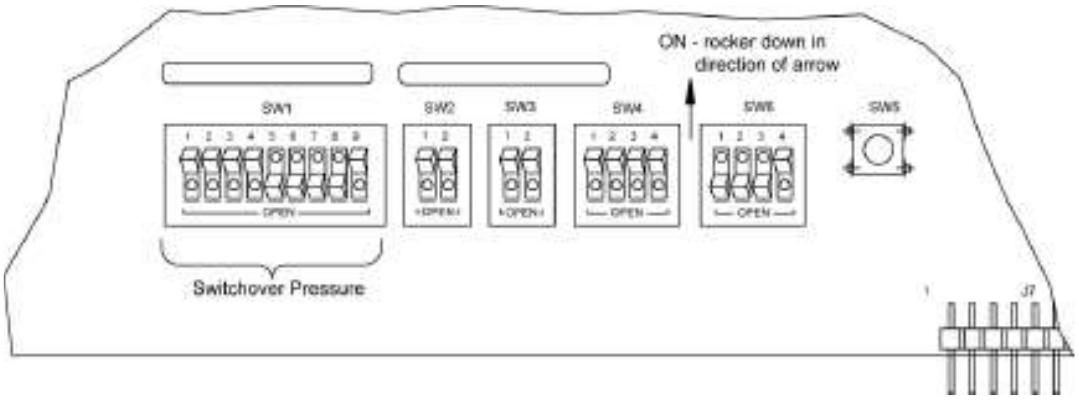

Outlet Gas
Relief Valve Vent
Pattons
medical
Optional Left Hand Reserve Inlet
Left Gas Inlet
Outlet Pressure Display
Power
Units of Measure Indicator Lights
Remote Alarm "ON" Indicator
Right Gas Inlet
Left Inlet Pressure Display
Right Inlet Pressure Display
Left Side Status Lights
Right Side Status Lights
Left Gas Source Indicators
Right Gas Source Indicators
Left Gas Source Select
Right Gas Source Select
Reset
Bank Select
Alarms
Alarm Connectors
Serial
Reserve Inlet
Switchover Valve Exhaust Port
Serial Port Connector
Reserve Inlet Connector

SETTING SWITCHOVER PRESSURE

The switchover pressure (changeover pressure) point for the Medical IntelliSwitch™ is changeable up to a value of 500

1. Turn power OFF to the system.
2. Open door by loosening the four screws holding it to the cabinet.
3. Using Figure 3, locate DIP switch SW1 at the bottom of the electronic circuit board on the door.

Figure 3



4. Using Table 2 or Table 3, set the desired switchover pressure.
5. Close system door and tighten 4 screws holding door to cabinet.
6. Turn power back ON. The new switchover pressure will take effect on power ON.

Table 2 — DIP Switch Settings

SWITCH	VALUE
SW1-1	1
SW1-2	2
SW1-3	4
SW1-4	8
SW1-5	16
SW1-6	32
SW1-7	64
SW1-8	128
SW1-9	256

Note:
The values shown in the table are additive. Example: To set switchover pressure to 130 PSI, turn on SW1-8 (128) and SW1-2 (2). These added together equal 130 PSI.

Note: Tables 2 & 3 show values in PSI. If operating in BAR or MPA it will be necessary to convert the PSI units to the units being used in order to use the tables. To convert values to BAR divide the PSI value by 14.5. To convert the values to MPA divide the PSI value by 145.

Table 3 — Typical Switchover Pressure DIP Switch Settings

PSI	Sw1-1	Sw1-2	Sw1-3	Sw1-4	Sw1-5	Sw1-6	Sw1-7	Sw1-8	Sw1-9	
75	ON	ON	OFF	ON	OFF	OFF	ON	OFF	OFF	
100	OFF	OFF	ON	OFF	OFF	ON	ON	OFF	OFF	
125	ON	OFF	ON	ON	ON	ON	ON	OFF	OFF	
135	ON	ON	ON	OFF	OFF	OFF	OFF	ON	OFF	
150	OFF	ON	ON	OFF	ON	OFF	OFF	ON	OFF	
155	ON	ON	OFF	ON	ON	OFF	OFF	ON	OFF	default
155										
175	ON	ON	ON	ON	OFF	ON	OFF	ON	OFF	
200	OFF	OFF	OFF	ON	OFF	OFF	ON	ON	OFF	
225	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF	
240	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	default
240										
250	OFF	ON	OFF	ON	ON	ON	ON	ON	OFF	
275	ON	ON	OFF	OFF	ON	OFF	OFF	OFF	ON	
300	OFF	OFF	ON	ON	OFF	ON	OFF	OFF	ON	
325	ON	OFF	ON	OFF	OFF	OFF	ON	OFF	ON	
350	OFF	ON	ON	ON	ON	OFF	ON	OFF	ON	
375	ON	ON	ON	OFF	ON	ON	ON	OFF	ON	
400	OFF	OFF	OFF	OFF	ON	OFF	OFF	ON	ON	
425	ON	OFF	OFF	ON	OFF	ON	OFF	ON	ON	
450	OFF	ON	OFF	OFF	OFF	OFF	ON	ON	ON	
475	ON	ON	OFF	ON	ON	OFF	ON	ON	ON	
500	OFF	OFF	ON	OFF	ON	ON	ON	ON	ON	

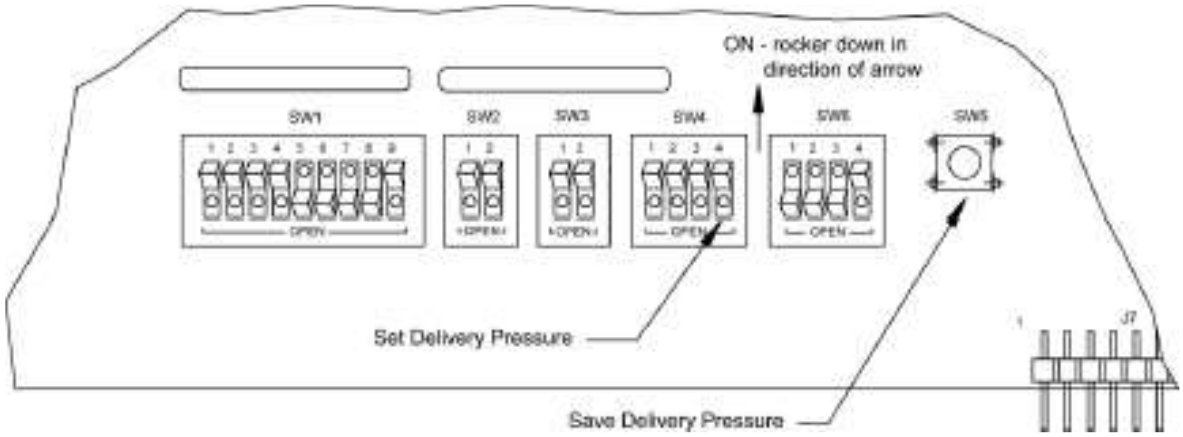
SETTING DELIVERY REGULATOR PRESSURE

The Delivery Regulator Pressure is factory set based on the model purchased. If it is necessary to change the pressure of the regulators after installation perform the following steps:

1. Open door by loosening the four screws holding it to the cabinet.

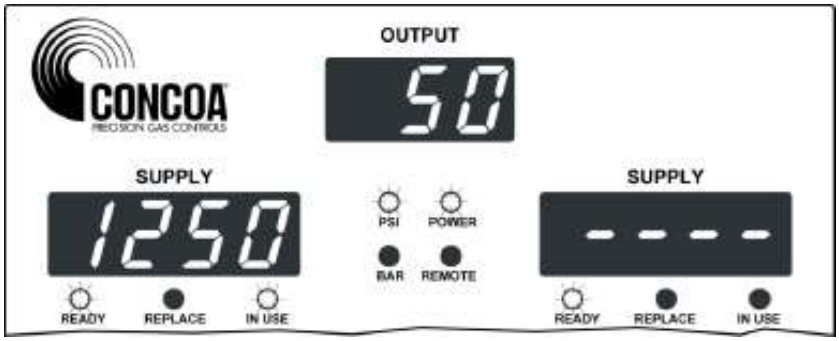
2. Using Figure 4, locate DIP switch SW4 at the bottom of the electronic circuit board on the door. Move SW4-4 to the ON position. The front panel display will s how a screen similar to Figure 5 indicating the system is in CALIBRATE mode. The front panel display will show the inlet pressure from the side that it is currently drawing from.

Figure 4



3. Locate the Allen wrench attached to the inside panel.
4. Delivery regulator selection is manual. The delivery pressure shown on the display is the pressure from the delivery regulator in service. Switching from one delivery regulator to the other is done by manually OPENING the valve feeding the delivery regulator you want to place into service and CLOSING the valve feeding the delivery regulator you wish to remove from service.
5. Locate the Allen wrench attached to the inside panel. Starting with the delivery regulator that is currently in use, place the Allen wrench into the set screw and adjust the pressure to the desired value. Turning the set screw clockwise increases pressure. Counterclockwise decreases pressure. The system will not decrease in pressure if there is no flow. See Fig

Figure 5



6. After the pressure is set to the desired value, manually switch to the other delivery regulator.

7. Place the Allen wrench into the set screw of the second regulator and adjust the pressure to the desired value.

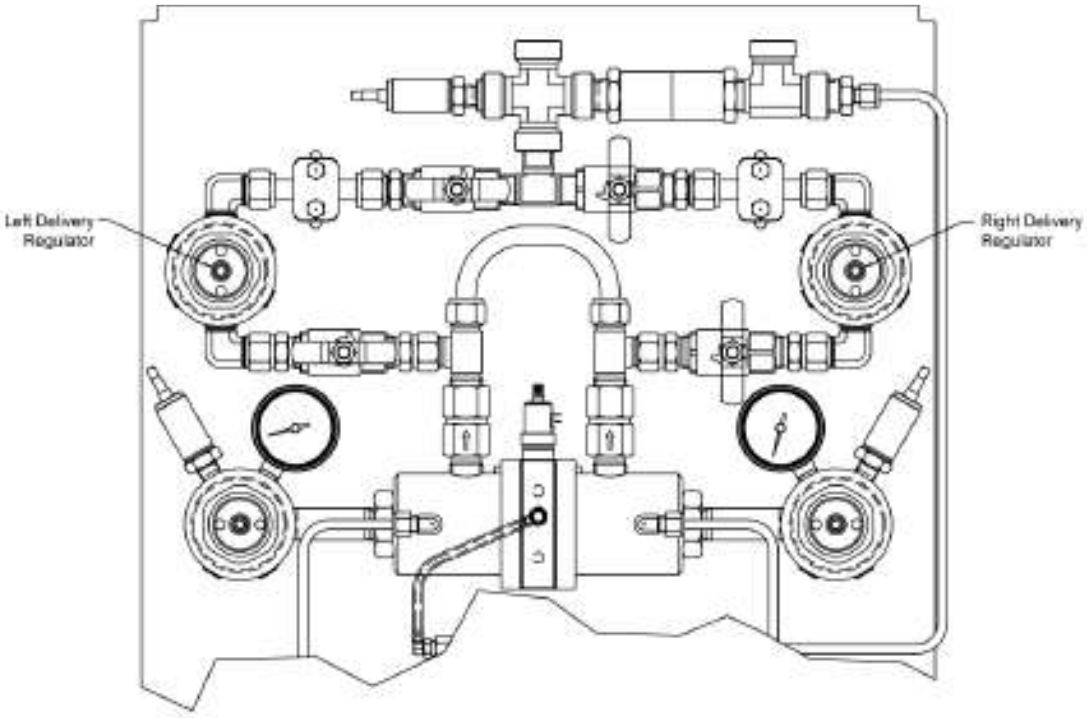
   The delivery pressure for both regulators should be the same to within 1-2 PSI for best per formance.

8. When the desired delivery pressure for both regulators is set, turn OFF SW4-4 on the control board. See Figure 4.

9. Locate SW5 on the control board (Figure 4) and press it once. The system should go back to normal operation showing inlet pressures on both inlet displays.

10. Calibration is complete. Close door and re-attach screws.

Figure 6



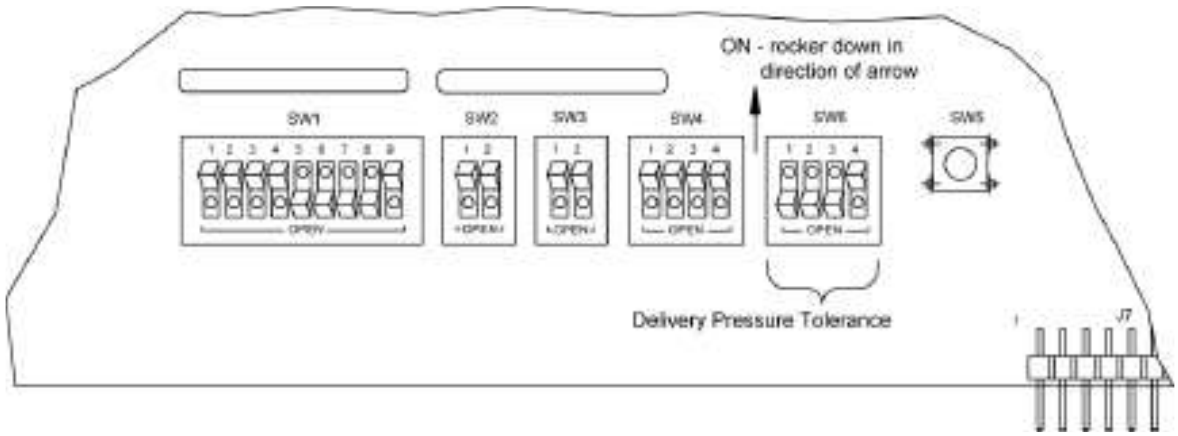
SETTING DELIVERY REGULATOR PRESSURE TOLERANCE

The range of allowable variation in delivery regulator pressure is settable. The factory default is +/- 7 PSI. This value may be changed by setting DIP switches on the Electronic Control Board or remotely via the optional serial interface. To change this pressure tolerance, perform the following steps:

Note: In order for the DIP switches to be recognized, DIP switch SW4-3 must be OFF.

1. Turn AC power OFF to the system.
2. Open door by loosening the four screws holding it to the cabinet.
3. Using Figure 7, locate DIP switch SW6 at the bottom of the electronic circuit board on the door.

Figure 7



4. Using Table 4 set the pressure range tolerance.

   Note: It is highly recommended that the tolerance setting be no less than 5 PSI for proper system operation.

5. Close system door and tighten 4 screws holding door to cabinet.
6. Turn AC power back ON. The new tolerance will take effect on power ON.

Table 4
Delivery Pressure Tolerance

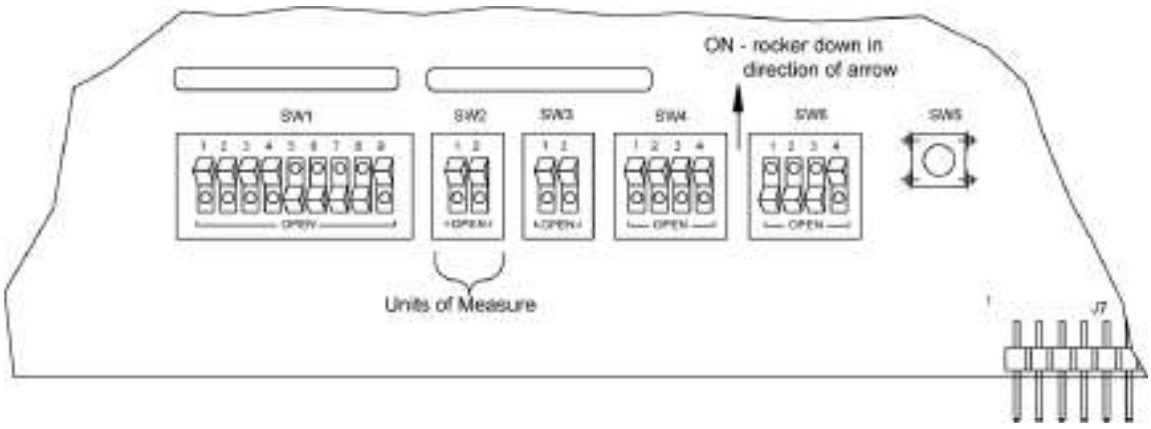
Pressure Tolerance	SW6-1	SW6-2	SW6-3	SW6-4	
1	ON	OFF	OFF	OFF	
2	OFF	ON	OFF	OFF	
3	ON	ON	OFF	OFF	
4	OFF	OFF	ON	OFF	
5	ON	OFF	ON	OFF	
6	OFF	ON	ON	OFF	
7	ON	ON	ON	OFF	**default**
8	OFF	OFF	OFF	ON	
9	ON	OFF	OFF	ON	
10	OFF	ON	OFF	ON	
11	ON	ON	OFF	ON	
12	OFF	OFF	ON	ON	
13	ON	OFF	ON	ON	
14	OFF	ON	ON	ON	
15	ON	ON	ON	ON	

SETTING UNITS OF MEASURE

The Medical IntelliSwitch™ can display pressure in three different units of measure, PSI, BAR, and MPA. The factory default is PSI. To change units of measure perform the following steps:

Note: In order for the DIP switches to be recognized, DIP switch SW4-3 must be OFF.

Figure 8



6. Turn AC power back ON. The new units of measure will take effect on power ON.

7. The indicator light son the front panel show the units of measure selected. If the PSI and BAR indicator lights are OFF, the system is displaying MPA units.

Table 5

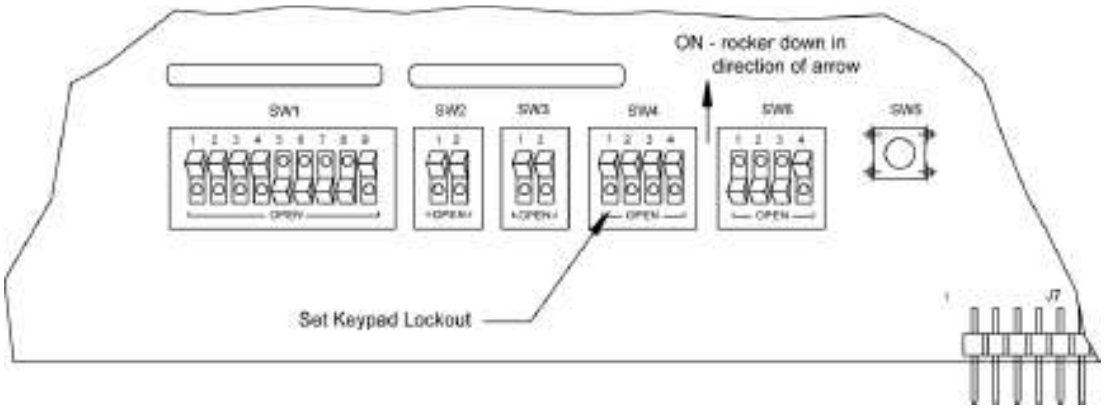
Comm Mode	SW2-1	SW2-2	
PSI	OFF	OFF	**default**
BAR	ON	OFF	
MPA	OFF	ON	

SETTING KEYPAD SECURITY LOCKOUT

The Medical IntelliSwitch™ has a feature that allows locking out the keypad located on the front panel. When enabled, the keypad will become inoperative after approximately 5 minutes if no key presses are detected. The factory default for this feature is DISABLED. To enable this feature perform the following steps:

1. Turn AC power OFF to the system.
2. Open door by loosening the four screws holding it to the cabinet.
3. Using Figure 9, locate DIP switch SW4-1 at the bottom of the electronic circuit board on the door.
4. Turn switch to the ON position.
5. Close system door and tighten 4 screws holding door to cabinet.
6. Turn AC power back ON. The Keypad Lockout feature will take effect on power ON.

Figure 9



CONNECTING TO A REMOTE ALARM

There are two 8-pin remote alarm interface connectors

Figure 10

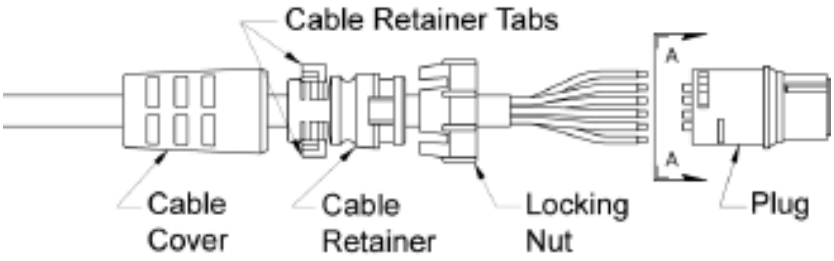
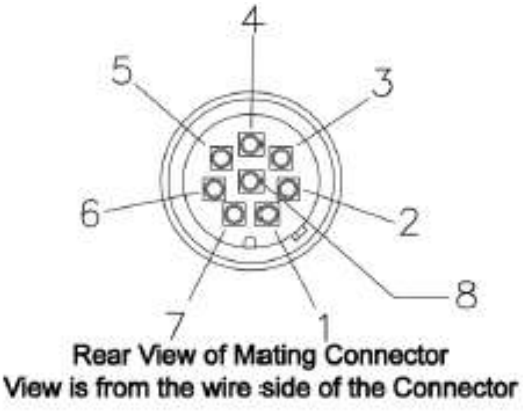


Figure 11



Using the pin assignments shown in Table 6 and the connector views in Figure 10 and Figure 11, solder the wires to the appropriate pins. After soldering is complete, slide the locking nut over the connector body. Snap the cable retainer into the body and then slide the protective cover over the cable retainer.

Table 6 — Remote Alarm Pin Assignments

Medical IntelliSwitch™ Alarm Output Connectors (A or B) Pin Numbers	5740001 Alarm Pin Number	Function
1	1	Left Inlet Alarm
2	2	Delivery Regulator Alarm.
3	3	+12v (provided by the remote alarm)
4	4	Right Inlet Alarm
5	5	Reserve Gas Supply Alarm.
6	6	Ground (provided by the remote alarm)
7	7	N.C.
8	8	Reserve In-Use

Wire terminations to the Alarm side of the cable are done in the same fashion as the Medical IntelliSwitch™ connector.

Slide the protective cover, cable retainer, and locking nut over the end of the cable as shown in Figure 10.

SETTING REMOTE ALARM OUTPUTS

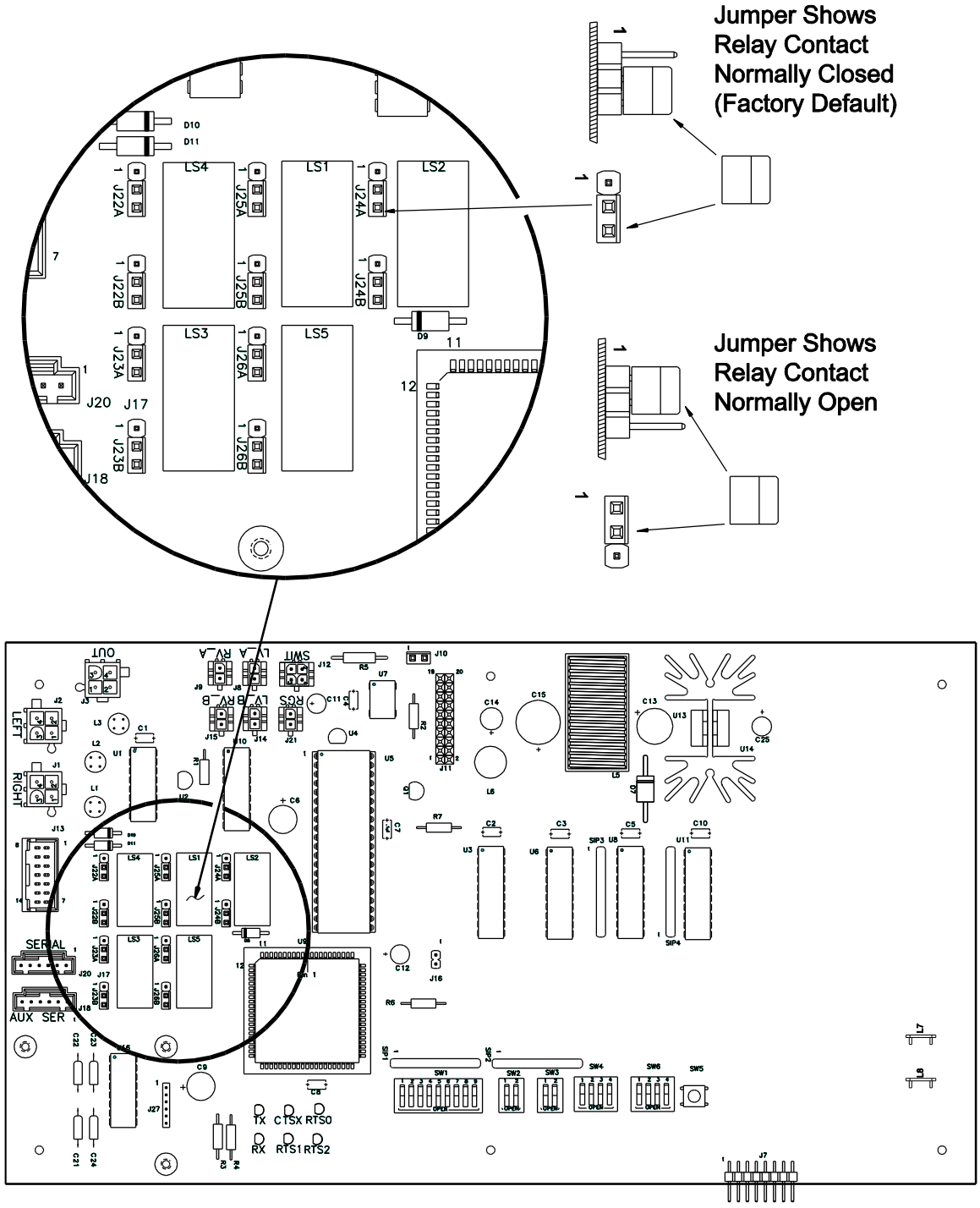
The Medical IntelliSwitch™ is designed to interface to an external alarm system. Relay contacts are brought out through a connector on the bottom of the cabinet. The pin connections on this connector are set to connect directly to a CONCOA alarm. CONCOA alarms are designed such that the contacts are Normally Closed (N.C.). In an alarm condition these contacts will open. This is the factory default. It is possible to change any of these contacts to Normal Open (N.O.) Figure 14 shows the location of the jumpers on the Control Board. To change a contact from N.C to N.O follow the steps below.

1. Turn AC Power OFF to the system
2. Open front door by loosening the 4 screws holding it to the cabinet.
3. Locate the jumpers on the Control Board.
4. Using Table 7 and Figure 13, set the jumpers.
5. Close door and re-secure it to the cabinet.
6. Make the necessary connections to the alarm and plug the alarm cable into the alarm connector on the bottom of the cabinet.
7. Turn AC power ON.
8. Test Mode may be used to test the alarm installation.

Table 7

Jumper	Function
J26	Reserve Gas In-Use
J25	Left Inlet Alarm
J24	Right Inlet Alarm
J23	Delivery Regulator Alarm
J22	Reserve Gas Source Alarm

Figure 13


Jumper Shows
Relay Contact
Normally Closed
(Factory Default)
Jumper Shows
Relay Contact
Normally Open
LS1
LS2
LS3
LS4
LS5
J20
J17
J18
OUT
LEFT
RIGHT
SERIAL
AUX SER

Remote Alarm Terminal Block Wiring

Channel A duplicates Channel B to provide two isolated contacts

CHANNEL "B"

Terminal Number	Function	Color
1	UNUSED	WHITE
2	EXT V+ _2	RED
3	CHANGEOVER _2	BROWN
4	EXT V+ _2	RED
5	RESERVE IN –USE_2	GREEN
6	EXT V+ _2	RED
7	RESERVE ALARM_2	BLUE
8	EXT V+ _2	RED
9	DEL REG ALARM_2	ORANGE
10	EXT V+ _2	RED
11	EXT.GND	BLACK
12	EXT V+ _2	RED

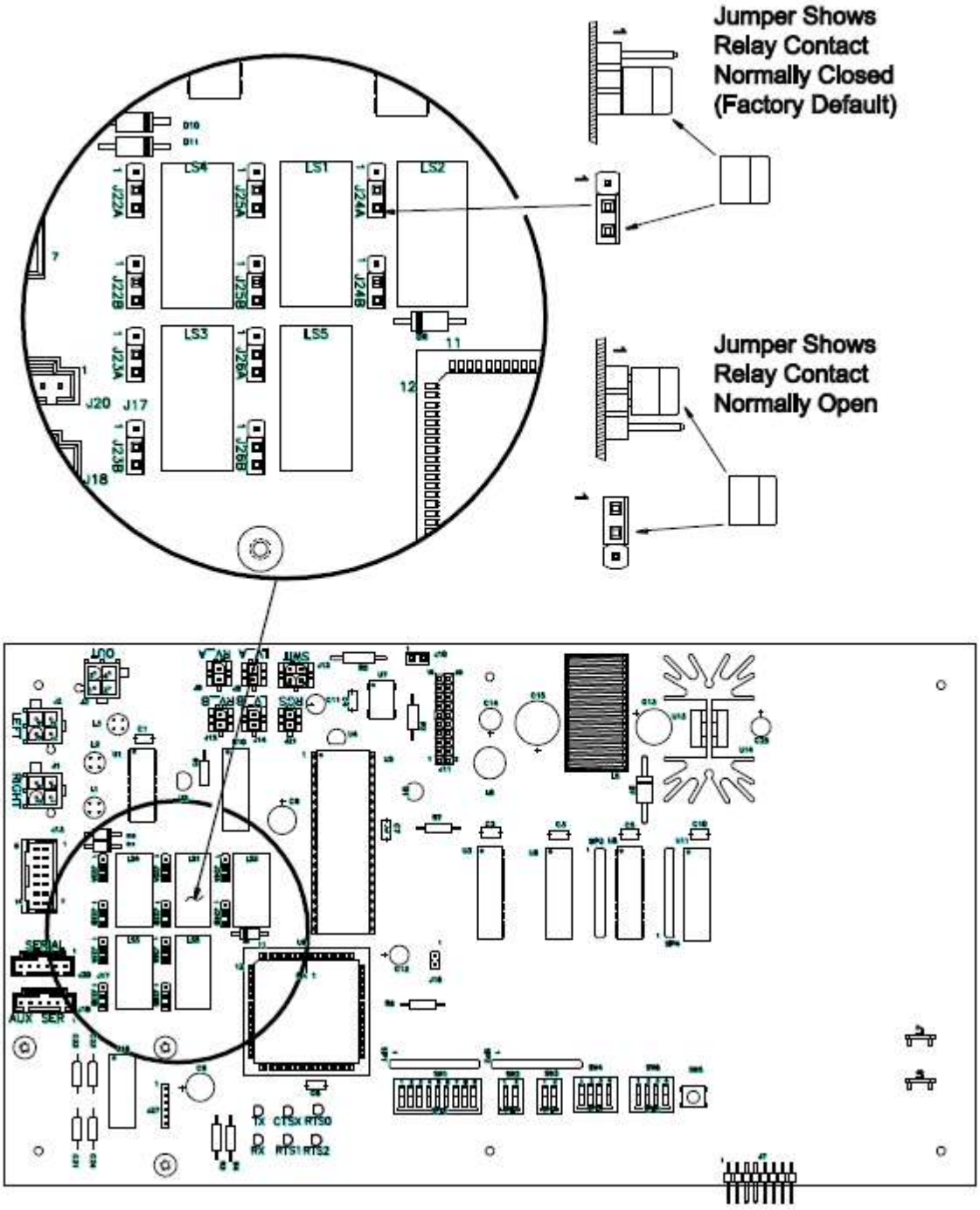
CHANNEL "A"

Terminal Number	Function	Color
13	UNUSED	WHITE
14	EXT V+ _2	RED
15	CHANGEOVER _2	BROWN
16	EXT V+ _2	RED
17	RESERVE IN –USE_2	GREEN
18	EXT V+ _2	RED
19	RESERVE ALARM_2	BLUE
20	EXT V+ _2	RED
21	DEL REG ALARM_2	ORANGE
22	EXT V+ _2	RED
23	EXT.GND	BLACK
24	EXT V+ _2	RED

Reserve Low works regardless of what is happening in the switch-over. Please note the Changeover only comes on after the look-back feature has timed out (default timet is 30 minute timer

INSTALLATION AND OPERATION INSTRUCTIONS

Figure 14



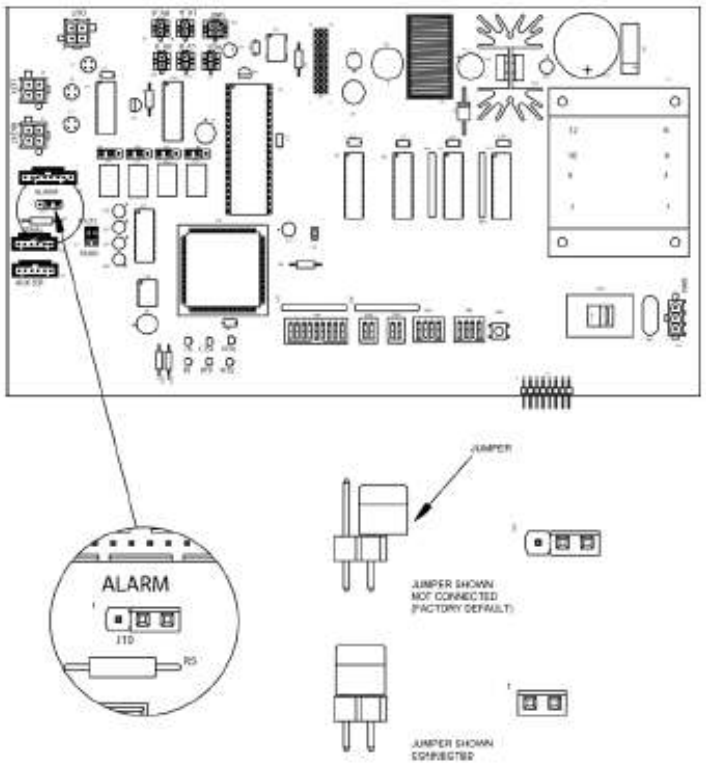
CONNECTING TO EXTERNAL ALARMS

The Medical IntelliSwitch is configured at the factory to operate with the Advantium Rx Alarm. The Advantium Rx Alarm provides 12 vdc as a voltage source to connect to the Alarm outputs of the Medical IntelliSwitch. There is an indicator light on the front panel of the Medical IntelliSwitch that lights when an alarm is properly connected to an alarm output connector and is powered ON. This indicator light is configured to operate using the 12vdc power source. If the Medical IntelliSwitch is connected to an alarm other than one provided by Pattons Medical that uses greater than 12vdc it will be necessary to change a jumper setting on the control board.

IT IS HIGHLY RECOMMENDED THAT THE VOLTAGE SOURCE USED AS THE ALARM SIGNAL NOT EXCEED 24 VOLTS.

When using 24 volts it will be necessary to remove jumper J10. See Figure 14

Figure 15



OPERATION OF RESERVE GAS SUPPLY

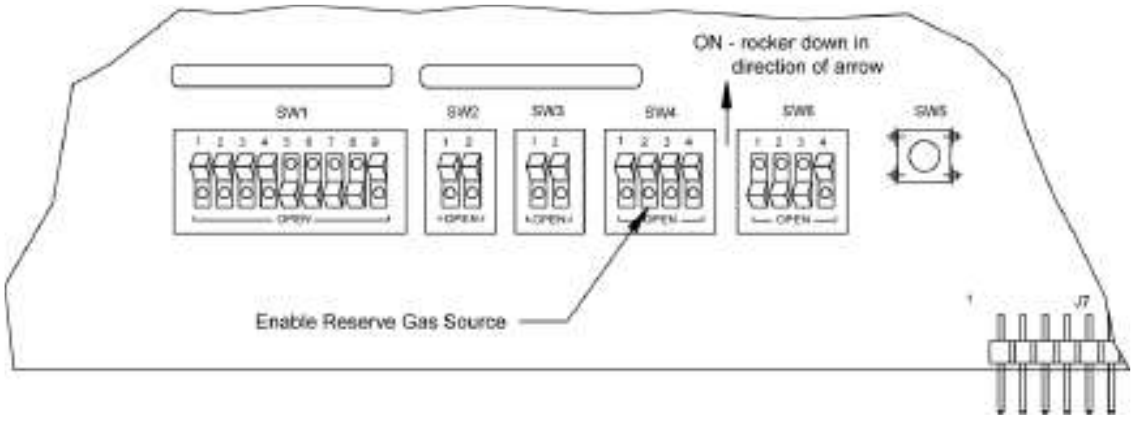
The Reserve Gas Supply Option provides a means to supply pressure to the system in the event that both the left inlet and right inlet gas sources have been exhausted. The Reserve Gas Option must be installed and enabled for this feature to work properly. When the Reserve Gas Option is enabled (see Section on "Enabling Reserve Gas") the Medical IntelliSwitch monitors both the inlet pressure and the pressure sensor coming from the Reserve Gas Supply. If the left and right gas sources have been exhausted the system will show an alarm condition on the front panel. The system will change the left and right pressure displays to read "rES" indicating that it is now receiving gas from the reserve supply. It will continue operating this way until gas is restored to either the left or right inlet. At that time the Medical IntelliSwitch will resume normal operation and the "rES" message will no longer be displayed.

If the pressure of the gas from the Reserve Supply drops below its preset value the pressure sensing switch will deactivate causing the left and right inlet displays will begin to flash.
Monitoring of the Delivery Pressure is maintained while operating from the Reserve Supply.

ENABLING RESERVE GAS SUPPLY

1. Turn AC power OFF to the system.
2. Open door by loosening the four screws holding it to the cabinet.
3. Using Figure 15, locate DIP switch SW4-2 at the bottom of the electronic circuit board on the door.
4. Turn SW4-2 to the ON position.
5. Close system door and tighten 4 screws holding door to cabinet.
6. Turn AC power back ON. The Reserve Gas Supply Option will be enabled on power ON.

Figure 15



ENABLING REMOTE SETUP

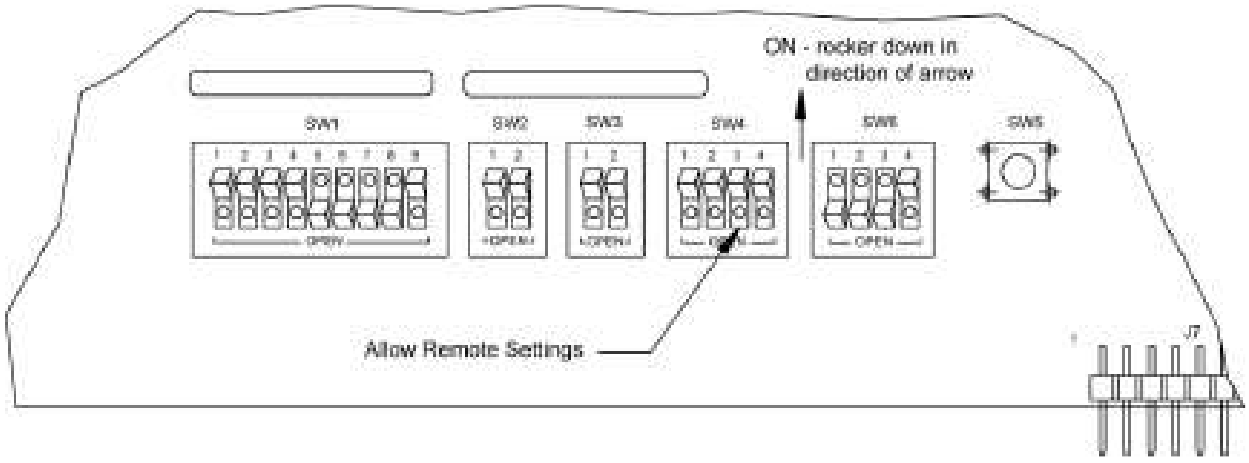
The Medical IntelliSwitch™ is equipped with a feature that allows setting of system parameters remotely via the serial port or the Ethernet port. FACTORY DEFAULT IS OFF. This feature MUST be enabled in order for the remote setup feature to work. To enable this feature perform the following steps:

1. Turn AC power OFF to the system.

Note:

When this feature is enabled, system setup parameters are saved to internal memory in the control electronics. The DIP switches on the control board for these setup parameters will be ignored. To allow use of the setup parameter DIP switches on the control board, SW4-3 must be in the OFF position.

Figure 16



SETTING COMMUNICATION MODE

The Medical IntelliSwitch™ has the built in capability to communicate to external devices via a serial port using either RS-232 or Ethernet protocol. The factory default value is RS-232.

1. Turn AC power OFF to the system.
2. Open door by loosening the four screws holding it to the cabinet.
3. Using Figure 17, locate DIP switch SW3 at the bottom of the electronic circuit board on the door.
4. Using Table 8 set the desired communication mode.
5. Close system door and tighten 4 screws holding door to cabinet.
6. Turn AC power back ON. The new communication mode will take effect on power ON.

Figure 17

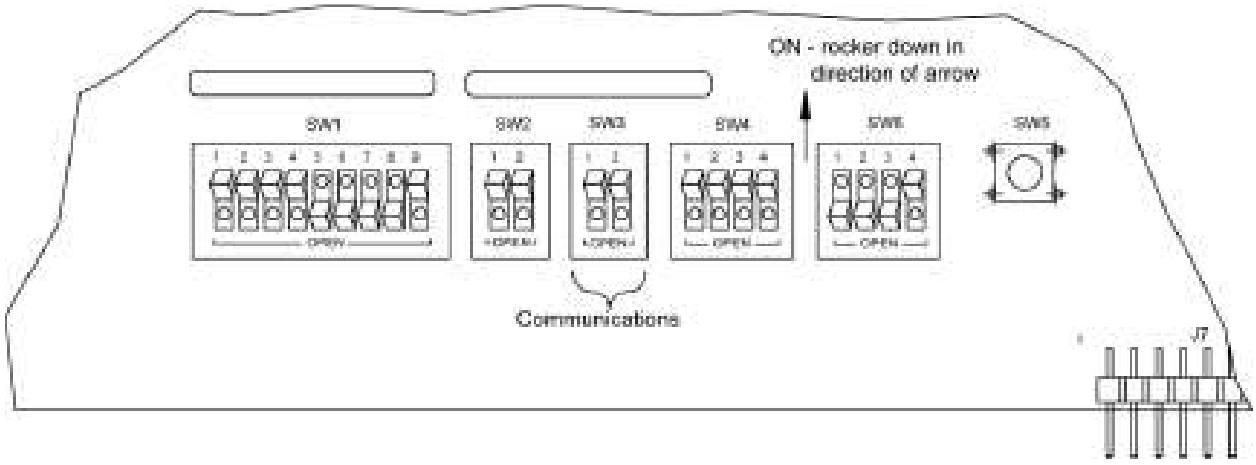


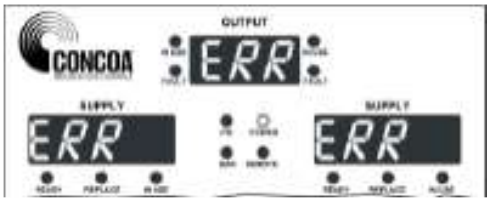
Table 8

Comm. Mode	SW-1	SW-2	
RS-232	OFF	OFF	**default**
Ethernet	OFF	ON	
Auxiliary	ON	ON	

Symptom	Possible Cause	Possible Solution
No display or status lights on	• No power to the system. • Check that the power source is live. • Check the system fuse.	• Restore power. • Replace fuse. • Replace electronic control board.
System will not switch from one side to the other automatically.	• Check that the pressure on the destination side is greater than the switchover pressure setting	• Restore pressure to proper operating level. • Check that the switchover pressure setting is correct for the cylinder size and inlet pressures required.
There are pressure readings on both inlet displays but no delivery pressure.	• Internal regulator for the valve system is plugged or faulty • Isolation valves for delivery regulator are closed	• Clean or replace internal regulator • Open isolation valves
Remote alarm does not work with the system.	• Remote alarm is not powered. • Wiring between the Medical IntelliSwitch™ and the alarm is incorrect.	• Check the remote alarm LED on Medical IntelliSwitch™ front panel. • Check alarm is powered and on. • Check wiring between alarm and Medical IntelliSwitch™
Outlet pressure from the system drops below the adjusted value.	• Flow demands on the system are greater than the cylinders can supply. • Cylinder pressures are too low. • Switchover pressure set too low for the application.	• Replace or resize cylinders. • Change switchover pressure on Medical IntelliSwitch™
Gas from one side appears to be flowing to the other.	• Dirty or bad check valve	• Replace check valve
Any display shows an “Err” Code	• Refer to section on Error Codes in this manual	
Delivery Regulator Alarm – System switches to other delivery regulator upon initial load draw	Instantaneous demand for gas that exceeds gas flow capabilities can cause the delivery regulator to fall below acceptable pressure value causing the system to think the regulator has failed.	• Turn pressure ON to application slowly • Increase delivery regulator alarm delay time. (factory set at 3 sec.)

ERROR CODES:

The Medical IntelliSwitch has built in diagnostics to assist in troubleshooting problems that may occur from time to time. In certain situations and error message can appear on one or more of the displays. The error codes and an explanation of what the code means and how to fix it are listed below.
Err



Reason:

This message appears if internal communication on the electronic control circuit board is lost.

Solution:

Temporarily this error can be corrected by turning the AC power OFF then ON again. If the problem reoccurs it will be necessary to have the product serviced. Contact your local service representative or patton's Medical at 704-529-5442.

Err3 [Left Display}

Reason:

On Power Up, the Switchover checks the switchover pressure value to determine if it is set higher than the cylinder type selected on the left side. If it is, it is considered an invalid condition. Example: Switchover pressure set to 300 PSI and the cylinder selected is 230 PSI .

Solution:

This problem will most likely occur when using liquid cylinders.
To solve this problem you must first determine if the problem is the cylinder size selected or the switch-over pressure setting. The switchover pressure MUST be lower than the cylinder size selected.

If the switchover pressure is set incorrectly (lower than the cylinder size) it must be increased. Turn power OFF to the system. Open the door and locate the switches at the bottom of the electronic circuit board. Referring to the Section "Setting Switchover Pressure" in this manual set the switchover pressure to a value above the cylinder size. Close door and turn power ON.

If the cylinder selection is incorrect turn power OFF to the system. Open the door and locate the switch-es at the bottom of the electronic circuit board. Referring to the Section "Setting

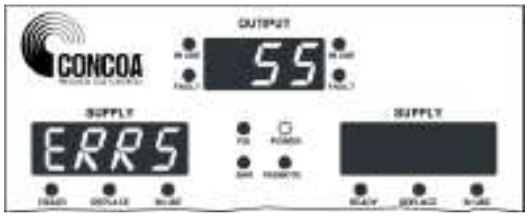
Switchover Pressure" in this manual set the switchover pressure to 0 PSI. Turn power back ON and select the correct cylinder size by pressing the left source select pushbutton.

Turn Power OFF again and open the door and set the switchover pressure to the appropriate value. Close door and turn power ON. System should operate properly.

Err3 [Right Display}

Reason: 

On Power Up, the Switchover checks the switchover pressure value to determine if it is set higher than

Reason: 

a. The system was powered up with no inlet pressure on either side.

b. Both the Left and Right Delivery Regulators have failed (not likely)

Solution:

a. When a delivery regulator can no longer maintain the set outlet pressure the system will switch to the other delivery regulator to try to maintain the outlet pressure. In this scenario there is no inlet pressure to feed the delivery regulators and the system will report this error. It is actually a false error because neither delivery regulator has failed. Power the system OFF and restore the inlet pressure. Power the system back ON. It will enter Calibrate mode. Refer to the section in this manual titled "Setting Delivery Regulator Pressure".

b. A more serious situation would be that both delivery regulators have actually failed. This requires replacement of both regulators for the system to work properly. This type of failure would generally be unlikely but in the event that it has occurred, the delivery regulators must be replaced.

Err6

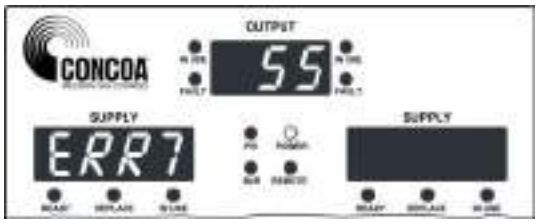
Reason:

An attempt is being made to select the right side delivery regulator when it is not available.

Solution:

Replace the right side delivery regulator and place it back into service.

Err7



Reason:

An attempt is being made to select the left side delivery regulator when it is not available.

Solution:

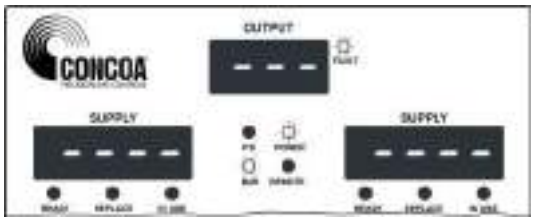
Replace the left side delivery regulator and place it back into service.

PERFORMING SELF TEST

Through the use of the Reset button on the front panel, a number of items can be observed or analyzed. A number 1 - 19 which is displayed on the output pressure display identifies each test. To enter Test Mode press and hold the Reset button for 4 seconds. The system will beep 3 times and then enter Test Mode. A description of the tests follows.

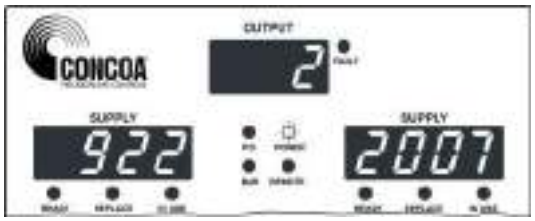
Test 1 –Display Test

This test exercises all segments of the displays and all status lights except the power and remote alarm indication. If serial communication is selected, the system will output a code indicating that a self-test is being performed.



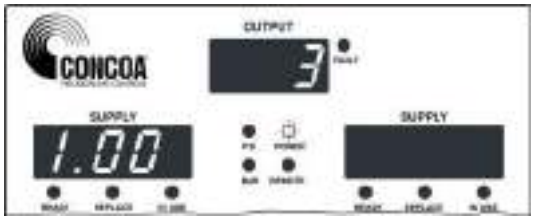
Test 2 - Date of Manufacturing

This test shows the year, month and day the product was manufactured



Test 3 - Software Revision

This is the revision of the software running the product.

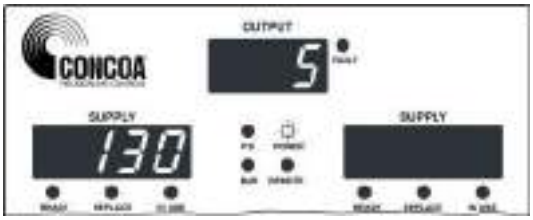


Test 4 – Analog Channel Check

This checks the circuitry that is used to read the pressure transducers. It should display a value between 475 to 525 to be working properly.

Test 5 - Display Switchover Pressure

The number on the display is the switchover (changeover) pressure value that is internally set for product operation. The value is in the units of measure selected for the product (PSI, BAR, etc.)



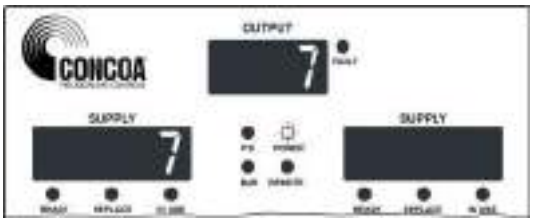
Test 6 – Auxiliary Settings

Displays settings for Units of Measure, Communication setting, Keypad lockout, allow remote settings enable, Reserve Gas source enable.

Refer to Table 9 to determine what is enabled

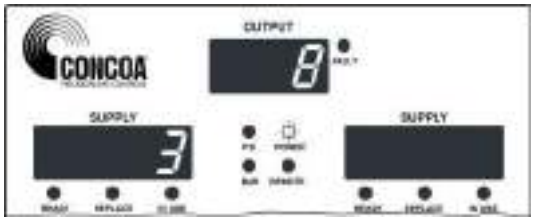
Test 7 – Delivery Regulator Pressure Tolerance

This number represents the value added or subtracted to the nominal delivery pressure of the product. It is used to determine the allowable range of operation before a delivery regulator fault condition is declared.



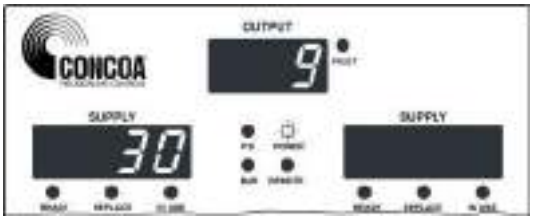
Test 8 – Delivery Regulator Alarm Delay

This value is the number of minutes the system waits before looking back.



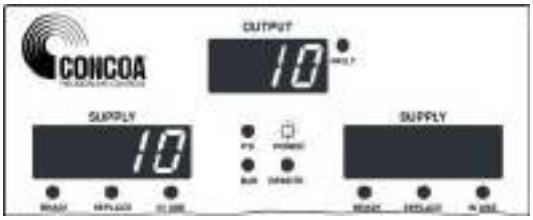
Test 9 – Look Back Time

This value is the number of minutes the system waits before looking back.



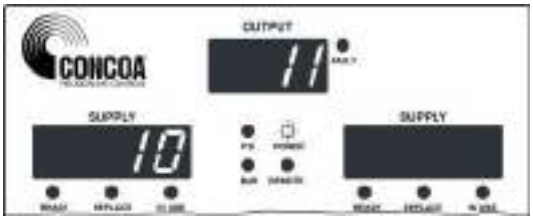
Test 10 – Switch Back Time

This is the value, in minutes, used by the system to determine when a cylinder is truly empty and incapable of supplying sufficient gas.



Test 11 – Hysteresis

This is a pressure value used to prevent the system from inadvertently switching back and forth between inlet sides unnecessarily.

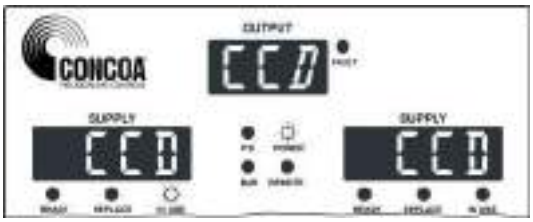


Test 12 – Offset Values

These numbers (factory set) are used to calibrate the left and right inlet pressures.

Test 13 – Calibration Values

These numbers are used to calibrate the inlet channels at zero PSI.

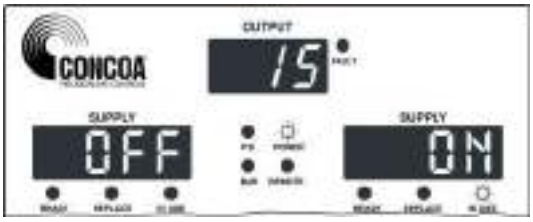


Test 14 – Test Left Inlet Valve

This test turns ON the left inlet valve allowing gas to flow from that side while turning OFF the right inlet valve.

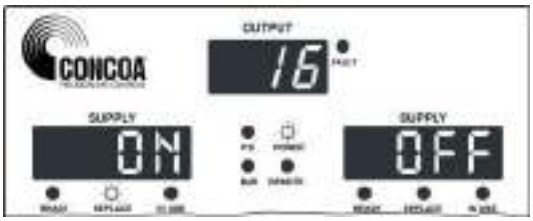
Test 15 – Test Right Inlet Valve

This test turns ON the right inlet valve allowing gas to flow from that side while turning OFF the left inlet valve.



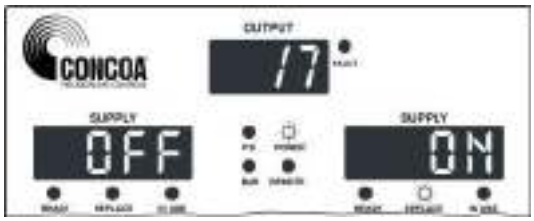
Test 16 – Test Left Inlet Alarm

This test activates the left inlet alarm relay contact.



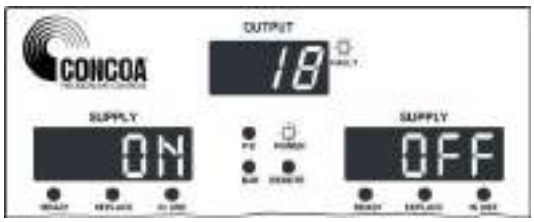
Test 17 – Test Right Inlet Alarm

This test activates the right inlet alarm relay contact.



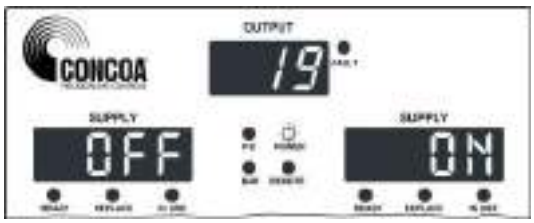
Test 18 – Test Delivery Regulator Alarm

This test activates the delivery regulator alarm relay contact.



Test 19 – Test Reserve Gas Supply Alarm

This test activates the reserve gas supply alarm relay contact.



Test 20 – Test Reserve Gas Active Relay

This test activates the reserve gas supply active relay contact.

Test 21 – Keypad test

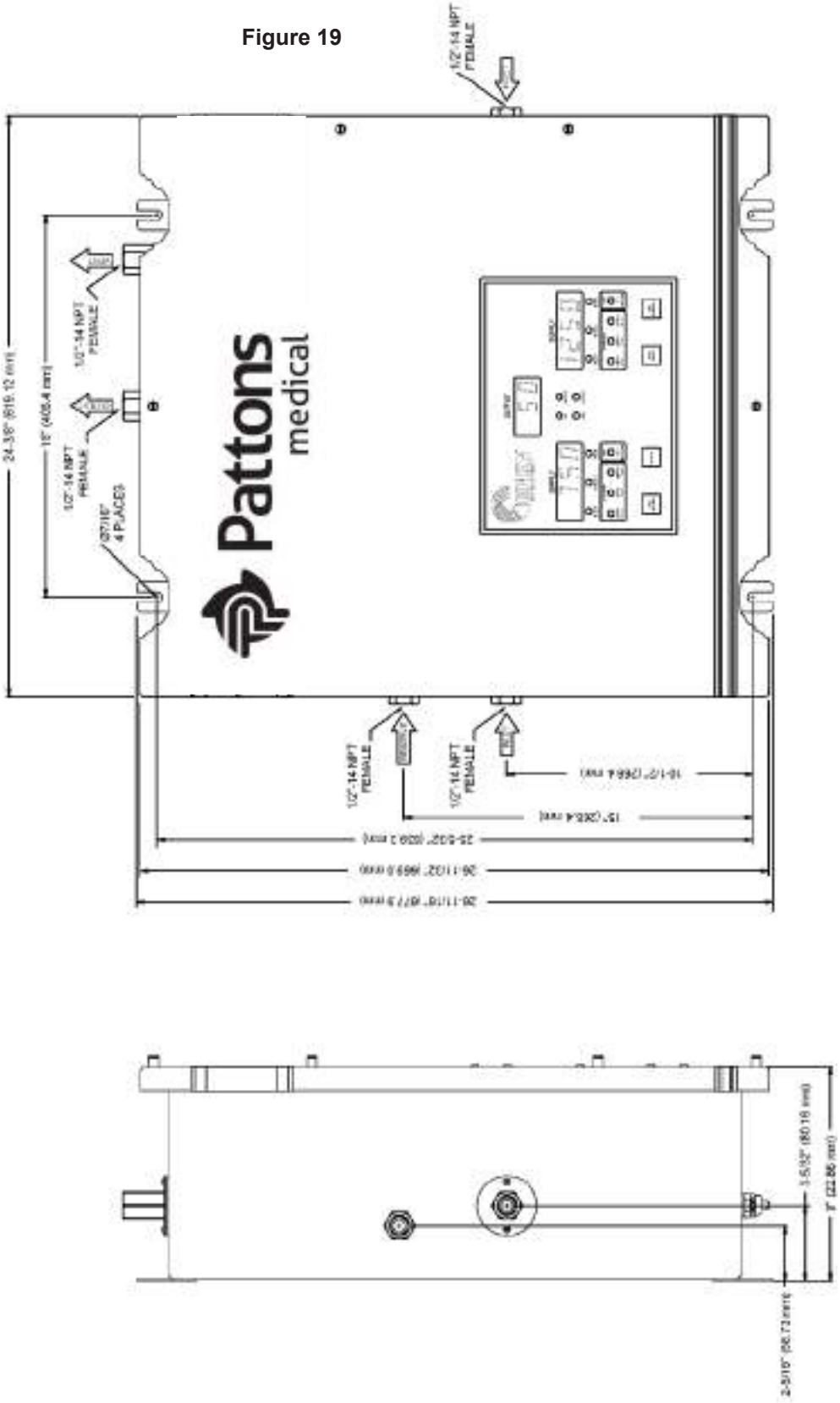
This test allows the testing of each function button on the front control panel and also indicates the status of the two toggle switches used to indicate the presence of the delivery regulators.

When a button is pressed, a segment will light on one of the displays.

Table 9 (for Test 6)

NUMBER DISPLAYED	PSI	BAR	MPA	RS232	ETHERNET	AUXILIARY	KEYPAD LOCKOUT	ALLOW REMOTE
0	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF	OFF
2	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF	OFF
3	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF	OFF
4	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF
6	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF
7	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
8	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF
10	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF
11	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF
64	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF
66	**ON**	OFF	OFF	OFF	**ON**	OFF	**ON**	OFF
67	**ON**	OFF	OFF	OFF	OFF	**ON**	**ON**	OFF
68	OFF	**ON**	OFF	**ON**	OFF	OFF	**ON**	OFF
70	OFF	**ON**	OFF	OFF	**ON**	OFF	**ON**	OFF
71	OFF	**ON**	OFF	OFF	OFF	**ON**	**ON**	OFF
72	OFF	OFF	**ON**	**ON**	OFF	OFF	**ON**	OFF
74	OFF	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF
75	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**	OFF
128	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF	**ON**
130	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**
131	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**
132	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF	**ON**
134	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**
135	OFF	**ON**	OFF	OFF	OFF	**ON**	OFF	**ON**
136	OFF	OFF	**ON**	**ON**	OFF	OFF	OFF	**ON**
138	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF	**ON**
139	OFF	OFF	**ON**	OFF	OFF	**ON**	OFF	**ON**
192	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**
194	**ON**	OFF	OFF	OFF	**ON**	OFF	**ON**	**ON**
195	**ON**	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**
196	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**
198	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**	**ON**
199	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**
200	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**	**ON**
202	OFF	OFF	OFF	OFF	**ON**	OFF	**ON**	**ON**
203	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**	**ON**

Figure 19


1/2"-14 NPT FEMALE
1/2"-14 NPT FEMALE
1/2"-14 NPT FEMALE
Pattons medical
1/2"-14 NPT FEMALE
1/2"-14 NPT FEMALE

POWER REQUIREMENTS

Input Voltage: 100-240V 50/60Hz

Power Consumption: 20 watts

SERVICE

For Service to the Medical IntelliSwitch™ contact your local Distributor or Patton's Medical Customer Service at 704-529-5442. Please fill in the Self Test Worksheet form included in this manual before contacting Patton's Medical for assistance. This will ensure a more timely response to your needs. An example of how to fill in the sheet is shown in Figure 20.

Figure 20

Test	Description	Data
2	Date of Manufacture	□□2 2007 0926

SELF TEST WORKSHEET – Page 1

Test	Description	Data
1	Display	Display Segments OK? ☐ Yes ☐ No Indicator Lights OK? ☐ Yes ☐ No
2	Date of Manufacture	☐☐☐ ☐☐☐☐ ☐☐☐☐
3	Software Revision	☐☐☐ ☐☐☐☐ ☐☐☐☐
4	Transducer Check	☐☐☐ ☐☐☐☐ ☐☐☐☐
5	Switchover Pressure	☐☐☐ ☐☐☐☐ ☐☐☐☐
6	Auxiliary Settings	☐☐☐ ☐☐☐☐ ☐☐☐☐

SELF TEST WORKSHEET – Page 2

Test	Description	Data
7	Delivery Pressure Tolerance	☐☐☐ ☐☐☐☐ ☐☐☐☐
8	Delivery Regulator Alarm Delay	☐☐☐ ☐☐☐☐ ☐☐☐☐
9	Look Back TIme	☐☐☐ ☐☐☐☐ ☐☐☐☐
10	Switch Back Time	☐☐☐ ☐☐☐☐ ☐☐☐☐
11	Hysteresis	☐☐☐ ☐☐☐☐ ☐☐☐☐
12	Offset Values	☐☐☐ ☐☐☐☐ ☐☐☐☐
13	Calibration Values	☐☐☐ ☐☐☐☐ ☐☐☐☐

FACTORY DEFAULT

Additional Factory Default Values

Internal Intermediate Pressure Setting	155 PSI (for N_2O, CO_2) 240 PSI (for all other gases)
Look Back Time	30 min
Switchback Time	10 min
Delivery Pressure Tolerance	7 PSI
Delivery Regulator Alarm Delay	3 sec
Communication	RS-232
Units of Measure	PSI
Key Lock Security	Disabled
Allow Remote Setting	Disabled*
Reserve Gas Supply	Disabled**

* - This will be set to “ENABLED” if the Ethernet Option is included with the System.
** - This will be set to “ENABLED” if the Reserve Option is included with the System

FAIL SAFE SETTINGS

1. Loss of Electrical Power to System:

   Inlet Valves open allowing sourcing of gas from both the left and right inlets.

   Alarm outputs activate.

2. Operation in Calibration Mode

   a. Both the Left and Right inlet valves are opened providing gas from both sources.

   b. Gas supply to the output of the Medical IntelliSwitch is maintained.

Operation in Test Mode

   a. System will maintain gas flow while in Test Mode. If no keys are pressed for 5 minutes while in test mode the system will automatically return to normal operation

WARRANTY INFORMATION

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