User Responsibility

This Product will perform in conformity with the description thereof contained in this operating manual and accompanying labels and/or inserts, when assembled, operated, maintained and repaired in accordance with the instructions provided. This Product must be checked periodically. A defective Product should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, Datex-Ohmeda recommends that a telephonic or written request for service advice be made to the nearest Datex-Ohmeda Field Service Support Center. This Product or any of its parts should not be repaired other than in accordance with written instructions provided by Datex-Ohmeda and by Datex-Ohmeda trained personnel. The Product must not be altered without the prior written approval of Datex-Ohmeda’s Quality Assurance Department. The user of this Product shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, improper repair, damage, or alteration by anyone other than Datex-Ohmeda.

⚠️ CAUTION ⚠️ U. S. Federal and Canadian law restrict this device to sale by or on the order of a licensed medical practitioner. Outside the U. S. A. and Canada, check local laws for any restrictions that may apply.

Datex-Ohmeda products have unit serial numbers with coded logic which indicates a product group code, the year of manufacture and a sequential unit number for identification.

AAA  A  12345

This alpha character indicates the year of product manufacture and when the serial number was assigned; “Y” = 1995, “Z” = 1996, “A” = 1997, etc. “I” and “O” are not used.
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Warranty
1/Introduction

⚠️ WARNING Using an MRI system in conjunction with general anesthesia on cardiac patients, febrile patients, and patients with impaired ability to perspire may present a patient health hazard.

In this section

Introduction to the Excel MRI Compatible Anesthesia System 1-1

How to use this manual 1-2

Symbols used in the manual or on the equipment 1-3

Introduction to the Excel MRI Compatible Anesthesia System

The Datex-Ohmeda commitment to meeting your anesthesia needs continues with the Excel Magnetic Resonance Imaging (MRI) Compatible Excel Anesthesia System.

Basic features

The Excel MRI System includes:

- Three gases, oxygen, nitrous oxide, and air. All gases have pipeline and cylinder connections.
- The 5125 MRI Compatible O₂ Monitor with adjustable high and low O₂ alarms, and built in battery and hardware self tests.
- A two vaporizer manifold.

MRI Compatibility

The Excel MRI is constructed primarily of non-ferous materials to help prevent attraction to the cryogenic magnets in MRI systems.

The Excel MRI and attached accessories performed to specifications when tested together as a system directly next to an unshielded, 1.5 Tesla MRI unit with a magnetic fringe field below 0.23 Tesla (2300 Gauss).

Approved accessories

A wide variety of Datex-Ohmeda accessories have been approved for use in conjunction with the Excel MRI under test conditions:

⚠️ WARNING The MRI compatibility of these accessories applies to specific accessory models and is limited to use as part of the Excel MRI System. None of these accessories have been tested for stand alone use in an MRI environment or in magnetic fringe fields above 0.23 Tesla (2300 Gauss).

- Tec 4 or 5 vaporizers; keyed or funnel fill models.
- GMS Absorber, PEEP valve, and Bain Circuit adapter
- Waste Gas Scavenging Valve
- 121 Respirometer
- Standard or free flow suction regulator kits
- Auxiliary oxygen flowmeter
- Flip-up shelf
1/Introduction

- Storage cabinets
- Dovetail mounted accessories: a 1 x 3.5 inch post with two inch extension; a 12 inch IV Pole; a large case Tycos gauge; and holders and regulators for E-size O₂ and N₂O cylinders.

Because approval applies only to specific accessory models, consult the Illustrated Parts Section of this manual for Stock Numbers.

Safety features
The Excel MRI includes several important safety features:

- The Datex-Ohmeda Link 25 Proportion Limiting Control System limits the lowest oxygen concentration that can be delivered on the Excel MRI to a nominal 25% for O₂/N₂O mixtures at the common gas outlet.
- An audible low O₂ supply alarm alerts you if the O₂ pressure falls below a nominal 207 kPa (30 psig).
- N₂O and air flows stop if O₂ supply pressure falls below a nominal 138 kPa (20 psig).
- An interlock mechanism that helps prevent more than one Datex-Ohmeda Tec 4 or Tec 5 vaporizer from being “On” at once. An isolation system also helps prevent fresh gas from entering a vaporizer that is not switched “On.”
- Low battery alarms and built in self tests on the 5125 O₂ Monitor.
- Differentiated pipeline and cylinder gauges.
- Gas specific pipeline and cylinder connections.
- A guarded O₂ flush button.
- Color coded flow controls and pressure gauges.

Operator convenience
For your convenience, the Excel MRI also features:

- An O₂ power outlet
- Full length dovetail accessory mounting.
- A single action brake/footrest.
- Shelf space for additional monitoring.
- Large, easy-running casters and a compact frame.

How to use this manual
This manual covers the Excel MRI System and the MRI Compatible 5125 O₂ Monitor. Vaporizers, the GMS Absorber, the Waste Gas Scavenging Valve and other major accessories also have individual operation and maintenance manuals. A complete set of operation and maintenance manuals comes with the Excel MRI System. Datex-Ohmeda recommends that you keep this manual and all related manuals available for reference.

If you are using the system for the first time, read this manual first. Then read the operation and maintenance manuals for the system components. Before you go on to Chapter 2, “General Information,” make sure that you understand the symbols listed at the end of this chapter.

If you have used the Excel MRI before, complete the step-by-step set up procedure in Chapter 3. Then turn to Chapter 4 “Preoperative Checkout,” which is required before using the Excel MRI.
Before cleaning the Excel MRI, read Chapter 5, “Maintenance,” carefully. This section also tells you how to change the O₂ Monitor battery and assemble and service the O₂ sensor (sensor cartridge replacement, disassembly for cleaning).

Chapter 6, “Troubleshooting,” helps you solve problems that may occur with the Excel MRI or the 5125 O₂ Monitor. For example, how can you tell if a low pressure leak is due to a vaporizer that you can replace or an internal fault that requires a service call? (If the leak follows a particular vaporizer and the external o-ring is in place, replace the vaporizer.)

Chapter 7, “Illustrated Parts,” tells you how to order replacement parts and accessories. It also lists part numbers for all operation and maintenance manuals associated with the Excel MRI System.

The Appendix lists Excel MRI and 5125 O₂ Monitor specifications and describes the internal pneumatic circuitry of the Excel MRI.

Please also take a moment to review the User Responsibility Statement on the inside of the front cover; it describes what is expected of you to maintain the Excel MRI. Also read the Warranty on the back cover; it outlines Datex-Ohmeda’s responsibility in case of a functional defect.

Symbols used in the manual or on the equipment

⚠️ Warnings and ❞ Cautions tell you about dangerous conditions that can occur if you do not obey all of the instructions in this manual.

Warnings tell you about a condition that can cause injury to the operator or the patient. Cautions tell you about a condition that can cause damage to the equipment. Read and obey all warnings and cautions.

Other symbols replace words on the equipment or in Datex-Ohmeda manuals. No one device or manual uses all of the symbols. These symbols include:

- On (power)
- Off (power)
- Standby
- Standby or preparatory state for a part of the equipment
- “ON” only for part of the equipment
- “OFF” only for part of the equipment
- Direct Current
- Alternating Current
- Protective earth ground
1/Introduction

Earth Ground

Frame or chassis ground

Alarm silence button

Equipotential

Variability

Variability in steps

Plus, positive polarity

Minus, negative polarity

Lamp, lighting, illumination

Movement in one direction

Movement in both directions

Lock

Unlock

134°C Autoclavable

Non-autoclavable

Type B equipment

Type BF equipment

Type CF equipment

Caution, ISO 7000-0434

Attention, consult accompanying documents, IEC 601-1

This way up

Dangerous Voltage
1/Introduction

- Input
- Output
- REF
- Stock Number
- SN
- Serial Number

Systems with this mark agree with European Council Directive (93/42/EEC) for Medical Devices when they are used as specified in their Operation and Maintenance Manuals. The xxx is the certification number of the Notified Body used by Datex-Ohmeda’s Quality Systems.

Read top of float
Vacuum inlet
Suction bottle outlet

O₂+ O₂ Flush button

Cylinder

Isolation transformer

Linkage system

Risk of Explosion

Low pressure leak test

Bag position/ manual ventilation

Open drain (remove liquid)

Close drain

Inspiratory flow

Expiratory flow

O₂% O₂ sensor connection

Mechanical ventilation
End case

The primary regulator is set to pressure less than 345 kPa

The primary regulator is set to pressure less than 414 kPa

European Union Representative

Low O₂ alarm limit switch

High O₂ alarm limit switch

Battery test

Circuit test

Test switch


## General Information

In this section

- Identifying Excel MRI components and controls 2-1
- Identifying 5125 \(O_2\) Monitor components and controls 2-6

⚠️ **WARNING** The Datex-Ohmeda Excel System must only be used with non-flammable anesthetic agents.

### Identifying Excel MRI components and controls

The figures in this chapter show control locations on Excel MRI System components. For more information on GMS Absorber or vaporizer controls, refer to the individual operation and maintenance manual.

#### Figure 2-1

Front view of Excel MRI

1. System Master Switch
2. Flush Button
3. Common Gas Outlet
4. Drawer Cabinet (Optional Accessory)
5. Brake Bar and Footrest
6. Absorber Arm Button
7. \(O_2\) Power Outlet
8. Flow Controls
9. 5125 \(O_2\) Monitor
Flow controls
With the system master switch set to “On,” turning a flow control counterclockwise increases flow, turning a flow control clockwise decreases flow. A linkage between the N₂O and the O₂ flow controls limits the lowest oxygen concentration that can be set on the Excel MRI to a nominal 25% for O₂/N₂O mixtures at the common gas outlet. Flow ranges are: O₂, 200 ml/min to 10 l/min (plus up to two additional turns of the knob); N₂O, 0 to 10 l/min (plus up to one additional turn of the knob); air, 0 to 15 l/min (plus up to one additional turn of the knob).

System master switch
Setting the system master switch to “On” allows gas to flow through the Excel MRI.

Flush button
Pressing the O₂ Flush button delivers 45-70 l/min of O₂ through the common gas outlet.

Common gas outlet
The common gas outlet delivers anesthetic gases to the patient circuit.

Brake
Push down to keep the Excel MRI from rolling. Lift up to release.

Absorber arm button
Press this button to adjust the height of the absorber arm.

O₂ power outlet
Provides drive gas for MRI compatible pneumatic equipment.
1. Cylinder Connection
2. Pipeline Connection

Figure 2-2
Excel MRI (rear)
Vaporizer concentration control
Press in the release and turn the concentration knob to the desired agent concentration. The locking lever must be fully clockwise (locked position) or the control will not turn.

Concentration control release
Pressing the release allows you to turn the concentration knob on the vaporizer.

Vaporizer locking lever
When the locking lever is completely counterclockwise, and the vaporizer concentration is set to “Off,” you can mount or remove the vaporizer. Turn the lever clockwise to lock the vaporizer in position.

Vaporizer fill port valve
Opens the fill port valve so that agent can be added or drained.

Vaporizer key lock lever
Holds the fill adapter from the agent bottle in place. To secure the adapter, lower the lever, insert the adapter, and raise the lever.

Vaporizer fill port (spout)
Unscrew and remove the plug to fill or drain vaporizers with funnel fill ports.

Drain Plug
Loosen (do not remove) with hex head portion of spout to drain agent. Tighten drain plug and install spout before use.

Figure 2-3
Tec 5 vaporizers

1. Vaporizer Concentration Control
2. Vaporizer Fill Port (Spout)
3. Drain Plug and Drain Port
4. Vaporizer Fill Port Valve
5. Vaporizer Fill Port (Keyed)
6. Vaporizer Key Lock Lever
7. Concentration Control Release
8. Vaporizer Locking Lever
Absorber drain plug
Unscrew and remove to drain condensate. Replace and tighten before use.

APL valve
This valve limits patient circuit pressure during manual ventilation (bagging).

Absorber check valves
Provide unidirectional flow through the absorber.

Airway pressure gauge
Absorber gauge to display inspiratory pressure.

Absorber release lever
This lever should always be in the lock position during use. The release position lowers the absorber base so that you can remove the canisters.

Absorber mounting knob
Turn completely clockwise to attach the absorber to the mounting pin. Turn counterclockwise to remove the absorber.

Bag/Ventilator switch
This switch on the absorber selects either the bag arm (Bag position) or the ventilator bellows (Vent position).

Figure 2-4
GMS Absorber
Identifying 5125 O₂ Monitor components and controls

Figure 2-5 identifies 5125 O₂ Monitor controls and major components.

1. Battery
2. Calibration Control
3. Test Switch
4. O₂ Alarm Limits
5. Display
6. Alarm LEDs
7. Battery Power Switch
8. Alarm Silence
9. Sensor Housing
10. O-Ring
11. Sensor Cartridge
12. O₂ Sensor Connection
13. Remote Connection (Refer to Appendix for Signal Specifications)
14. Front Panel

Figure 2-5
5125 O₂ Monitor controls
Test switch

Pressing down the top half of the switch (Batt Test) checks the battery condition. Holding down the bottom half of the switch (Circuit Test) checks the 5125 O₂ Monitor's electronic circuitry. For information about using the switch, refer to the section “5125 O₂ Monitor checks” at the end of Chapter 4.

Low O₂ alarm

Sets the lowest acceptable O₂ concentration. O₂ concentrations below 18% trigger a low O₂ alarm regardless of the alarm limit. Setting the limit below 18% also triggers an alarm.

High O₂ alarm

Sets the highest allowed O₂ concentration (0 to 99%). Setting the limit to 00% disables the alarm.

Display

Shows the measured O₂ concentration and any alarm messages.

Battery Power switch

Switches the 5125 O₂ Monitor “On” and “Off.”

Alarm Silence

Pressing the alarm silence button silences all audible alarms, except for low O₂, until the next occurrence. Low O₂ alarms are silenced for 30 seconds. While the alarm is silenced, any flashing LEDs stay on continuously.

O₂ sensor housing and cartridge

The 5125 O₂ Monitor uses the standard Datex-Ohmeda O₂ sensor. The sensor cartridge is not part of the O₂ sensor assembly and must be installed before use. For additional information refer to the section “O₂ sensor maintenance” in Chapter 5.

Battery

The 5125 O₂ Monitor uses a “C” size, non-magnetic, 3.9 Vdc lithium battery. During operation, the “BATT FAIL” alarm continuously monitors battery strength.

Calibration control

Use the calibration control (CAL) to calibrate the 5125 O₂ Monitor for 21% and 100% O₂. Refer to “5125 O₂ Monitor checks” at the end of Chapter 4.
3/Setup

In this section

Before starting to setup the system 3-1
Mounting gas cylinders 3-1
Mounting the 5125 O₂ monitor 3-2
Circuit and monitoring connections 3-4

Before starting to setup the system

⚠ WARNING  Remove the Excel MRI from the MRI room before starting the setup procedure. Do not add or remove any anesthesia system components while the Excel MRI System is in the MRI room.

1. Remove the Excel MRI System from the MRI room before starting the setup procedures.
2. Complete the setup procedure outside the MRI environment.
3. Do not move the Excel MRI System into the MRI room until you complete the first three sections of the checkout procedure (“MRI compatibility check,” “Initial checks,” and “Checking vaporizer mounting”).

Mounting gas cylinders

⚠ WARNING  Use only non-magnetic gas cylinders on the Excel MRI System.

1. Set the system master switch to “Off.”
2. Swing out the yoke clamp.
3. Unscrew the tee handle until the screw is flush with the inside of the clamp.
4. Make sure that the cylinder valve is not covered by a dust cap. Remove dust cap if present.
5. Remove the old cylinder gasket if present and install a new gasket.

Note: Make sure that the old gasket does not stick to the cylinder.

⚠ CAUTION  Use one cylinder gasket per yoke. Extra gaskets may cause a leak. Not using a cylinder gasket will also cause a leak.
6. Line the yoke index pins up with the cylinder post and swing the clamp closed.

7. Hand tighten the tee handle to secure the cylinder.

8. Install cylinder plugs and gaskets in all unused yoke positions.

9. Verify that the cylinder wrench is present.

⚠️ **WARNING** Always close the cylinder valve when you are using a pipeline supply. If a cylinder valve is open and the pipeline and regulated cylinder pressures are equal, both supplies may be used simultaneously, leaving an insufficient reserve in case of pipeline failure.

**Mounting the 5125 O₂ monitor**

1. Tighten the thumb screw on the mounting post. This pushes a spring loaded plate in, reducing the width of the block.

2. Fit the mounting block into the mounting track on the left hand side of the Excel MRI. Loosen the thumb screw. This wedges the plate against the sides of the mounting track.
3/Setup

1. O₂ Monitor
2. O₂ Sensor Connection
3. Nut
4. Clamp
5. Thumb Screw
6. Plate
7. Utility Post
8. Mounting Track

Figure 3-2
Mounting the 5125 O₂ Monitor

3. Make sure that the utility post is secure and that both sides of the block are wedged into the rail.

4. Screw the clamp into the threaded hole in the back of the 5125 O₂ Monitor.

5. Attach the clamp to the utility post.

6. To adjust the angle of the 5125 O₂ Monitor, loosen the nut behind the monitor, reposition the monitor and tighten the nut.

7. Connect the O₂ sensor to the 5125 O₂ Monitor. Refer to the section “O₂ sensor maintenance” in Chapter 5 for O₂ sensor assembly instructions.
Circuit and monitoring connections

Use this section as a quick reference if you are already familiar with system connections. For detailed information and accessory part numbers, refer to the individual operation and maintenance manual.

⚠️ WARNING ⚠️ Use only Datex-Ohmeda specified cables, hoses, and tubing for external connections. Alternative cables, hoses, or tubing could cause false sensor readings or damage to the system.

1. Set the system master switch to “Off.”
2. Make sure that the absorber and the 5125 O₂ Monitor are securely mounted.
3. Make the monitoring connections:

⚠️ WARNING ⚠️ Figure 3-3 and 3-4 show the only approved use of the 121 Respirometer with the Excel MRI.

- Refer to Figure 3-3 if you have a GMS absorber
- Refer to Figure 3-4 if you do not have a GMS absorber

![Diagram of connections]

1. O₂ Sensor
2. GMS Absorber
3. Absorber Expiratory Port
4. 121 Respirometer
5. 5125 O₂ Monitor

**Figure 3-3**
O₂ sensor connection to a GMS Absorber
\section*{3/Setup}

\textbf{WARNING} Any absorber used in an MRI environment must be MRI compatible.

\textbf{CAUTION} The cable on the $O_2$ sensor must point up to help keep the front (sensing portion) of the cartridge free of condensate.

1. $O_2$ Sensor
2. Adapter (22 mm Inner Diameter)
3. Absorber Inspiratory Port
4. Absorber Expiratory Port
5. 121 Respirometer
6. 5125 $O_2$ Monitor

\textbf{Figure 3-4} $O_2$ sensor connection to a MRI compatible absorber other than the GMS

4. Determine if the $O_2$ sensor is ready for immediate use or if it must be allowed to stabilize:

a. The $O_2$ sensor is ready for immediate use if it has not been disconnected since the last time you used the Excel System.

b. If you just installed a new $O_2$ sensor cartridge directly from its sealed protective packaging, it must be connected and allowed to stabilize for five minutes before it can be used.
c. If the O₂ sensor was disconnected or a new O₂ sensor was previously removed from its protective packaging, it must be connected and allowed to stabilize. Allow the O₂ sensor to stabilize for as many hours as it was disconnected or removed from its package (up to a maximum of 24 hours).

⚠️ **WARNING** Any ventilator used with the Excel must have a high pressure alarm and relief system for the patient circuit.

5. Make the fresh gas and gas scavenging connections:

⚠️ **WARNING** The fresh gas hose must be securely connected to the common gas outlet and the absorber.

- Fresh gas input from the Excel MRI common gas output to the absorber input.

⚠️ **WARNING** Do not connect the exhaust directly to a vacuum source. The vacuum may draw necessary gases from the patient circuit. Refer to the operation and maintenance manual for the waste gas scavenging valve for additional precautions and information.

- From the excess gas outlet on the absorber to a gas scavenging system. Use 19 mm corrugated tubing.

Figure 3-5
Excel MRI fresh gas connection

6. Verify that an O₂ cylinder is installed.

7. Set the Ventilator/Bag selector switch to the “Bag” position and install a breathing bag on the bag arm.

8. Turn all flow controls completely clockwise (minimum flow).

9. Continue with Chapter 4, “Preoperative Checkout.”
4/Preoperative Checkout

In this section

Before starting the checkout 4-1
MRI compatibility check 4-1
Initial Checks 4-2
Checking vaporizer mounting 4-3
Checking cylinder and pipeline supplies 4-3
Checking vaporizer back pressure 4-4
Leak checking the low pressure circuitry 4-4
Checking the gas flow controls 4-6
Breathing system checks 4-7
5125 O2 Monitor checks 4-7

Before starting the checkout

This section—“Preoperative Checkout”—describes the minimum checks that should be made before the Datex-Ohmeda Excel MRI System is used on a patient. Do not use the system if it does not function correctly, as described in the preoperative checkout procedures; instead call a qualified service representative.

⚠️ WARNINGS ⚠️ Always complete the preoperative checkout procedures in this section before using the Excel MRI System on a patient.

⚠️ Make sure that you understand the correct connection, use and necessary precautions for all system components before using the Excel MRI System. For additional precautions and information, refer to the operation and maintenance manuals for each component.

MRI compatibility check

⚠️ WARNINGS ⚠️ Do not move the Excel MRI into the MRI room until you have completed the first three sections of this chapter “MRI compatibility check,” “Initial checks” and “Checking vaporizer mounting.” Complete the rest of the checkout using the actual room, pipeline and electrical supplies and gas cylinders that will be used during the case.

⚠️ Datex-Ohmeda strongly recommends using only monitor sensors that are compatible with MRI applications. Use of monitoring device sensors (ECG monitor leads, oximeter probes, etc.) in an MRI environment can cause injury. Check sensor locations on the patient’s body for signs of discomfort, heating or warming.

1. Check that the gas cylinders are non-magnetic.
2. Open any drawers and check that they contain only MRI compatible items. Test any suspect items. Remove any items that are not MRI compatible.
3. If a ventilator is connected that is not MRI compatible (e.g. a Datex-Ohmeda 7000 or a 7800 Ventilator), remove it from the Excel MRI. Any ventilator used must be MRI compatible.

⚠️ WARNING ⚠️ Use only MRI compatible accessories with the Excel MRI. This includes monitors.

4. Remove any other accessories that are not MRI compatible.
Initial checks

⚠️ **CAUTION**  Do not exceed the following shelf weight limits: top shelf, 23 kg (50 lbs); middle shelf, 11 kg (24 lbs). Verify that all equipment on the top shelf is securely strapped in place.

1. Check the overall integrity of the machine. Make sure that:
   - The casters are securely attached
   - All accessories are properly mounted
   - Setting the brake helps prevent the front casters from turning

2. Make sure the breathing circuit is complete, undamaged, and, if appropriate, contains adequate CO₂ absorbent.

⚠️ **WARNING**  Ensure that all hoses, tubing, and other circuit connections are made properly before using this anesthesia system. Failure to do so may result in patient injury. Refer to the operation and maintenance manuals for these devices.

3. Make sure that the following are not damaged:
   - Cylinder yokes
   - Pipeline inlets
   - Flowmeters and flow control valves
   - Pressure gauges
   - Vaporizers
   - Monitors and cables
   - All hoses and tubing

4. Make sure the breathing circuit is closed and connected to a gas scavenging system.

5. Check that the cylinders are properly installed.

6. Check that the vaporizers are properly installed.

7. Check that the cylinder wrench is available.

8. Check that the brake is set.

9. Make sure that required emergency equipment is available and in good working order.
Checking vaporizer mounting

You can use both Tec 4 and Tec 5 vaporizers with the Excel MRI System. If a Tec 4 and a Tec 5 vaporizer are used together, the interlock system still helps prevent more than one vaporizer from being switched “On” at the same time.

⚠️ WARNING Do not attempt to modify the system to accept Datex-Ohmeda Tec 3 vaporizers. Tec 3 vaporizers are not MRI compatible.

1. Make sure that the tops of the vaporizers are parallel to the top edge of the manifold. Remount any vaporizers that are out of line.

2. Make sure the vaporizers are locked in place. Check the vaporizers’ locking knobs to ensure that the vaporizers are locked in place.

3. Attempt to lift each vaporizer off of the manifold. Remount any vaporizer that is not securely locked in place.

⚠️ WARNING Do not use a vaporizer that continuously lifts off the manifold when its locking lever is in the lock position.

4. Check that the interlock rods are aligned. Attempt to switch “On” more than one vaporizer at a time. Try every combination that is possible with your system. If more than one vaporizer can be switched “On” at a time, remount the vaporizers and repeat this step.

⚠️ WARNING Do not use the system if the vaporizer interlock system allows more than one vaporizer to be switched “On” at a time.

5. Fill the vaporizers as described in the vaporizer operation and maintenance manual.

Checking cylinder and pipeline supplies

Complete this section and the rest of Chapter 4 in the MRI room. The MRI System should be switched “On” during this portion of the checkout procedure.

1. With the cylinders closed, make sure the cylinder gauges read zero.

   If the cylinder gauges do not read zero, the cylinders may have been previously opened. Briefly set the system master switch to “On” and open the flow control valves to bleed pressure.

⚠️ CAUTIONS Open cylinder valves slowly to help avoid damaging the regulators.

⚠️ Forcing the flow controls can cause serious damage to the Excel MRI.

2. Close all flow control valves and open the cylinders. Check that the cylinder gauges show adequate pressure.

3. Close all of the cylinder valves and note the value on each cylinder pressure gauge. The gauges must show less than a 690 kPa (100 psig) pressure drop in a five minute period. If the pressure drop exceeds this limit, the high-pressure circuit has an unacceptable leak.
If there is an unacceptable leak:

a. Check for a defective cylinder gasket, an extra cylinder gasket, or a loose tee handle. Replace the gasket(s) with a single, undamaged gasket or tighten the tee handle.

b. Repeat the leak check. If the circuit still leaks, do not use the system for clinical applications. Call a qualified service representative for repairs.

4. Connect pipeline supplies and check that pipeline pressure gauges read approximately 310-345 kPa (45-50 psig).

Checking vaporizer back pressure

⚠️ **WARNING** Follow the appropriate agent evacuation/collection procedures. Use the hospital gas evacuation system.

⚠️ **CAUTION** Sudden surges can damage the flow control assembly. Make sure that all flow controls are fully clockwise (minimum flow or off) before setting the system master switch to “On.”

1. Set the system master switch to “On” and adjust the O₂ flow to 6 l/min. Verify that the O₂ float does not oscillate or stick.

   Note: The pneumatic alarm sounds briefly when the Excel MRI is switched “On.”

2. Adjust vaporizer concentration from 0 to 1% click by click and observe the O₂ flow.

3. Return the vaporizer to “Off.” If O₂ flow dropped by more than 1 l/min during step 2, contact qualified service personnel.

   Note: If replacing the vaporizer allows the Excel MRI System to pass the vaporizer back pressure test, the fault is in the original vaporizer. Remove the original vaporizer from use and contact qualified service personnel to repair it.

4. Repeat steps 2 and 3 for each mounted vaporizer.

Leak checking the low pressure circuitry

1. Check the low pressure leak test device:
   - Block the inlet and squeeze the bulb until it is fully collapsed.
   - If the bulb inflates in less than 60 seconds, replace the leak test device.

2. Set the system master switch to “Off.”

   Note: The pneumatic alarm sounds when the Excel MRI is switched “Off.”

3. Verify that all vaporizers are “Off.” This changes gas routing.

4. Leak check the low pressure circuitry:
**4/Preoperative Checkout**

⚠️ **WARNING** A low pressure leak means that metabolic gases and anesthetic agent are leaking into the atmosphere instead of going into the patient circuit. Low pressure leaks must be repaired before the Excel MRI is used.

Note: Gas supplies can be left “On” without affecting test results. With the system master switch set to “Off” there should be no flow through the system.

a. Turn the flow controls one and a half turns counter-clockwise.

b. Connect the low pressure leak check device to the common gas outlet.

c. Repeatedly squeeze and release the bulb until it collapses.

Note: The vacuum from the leak check device may cause the floats to rise slightly. This is normal.

d. If the bulb inflates again in 30 seconds or less, there is an unacceptable leak in the low pressure circuitry.

e. Disconnect the low pressure leak test device.

f. Set one of the mounted vaporizers to 1% and repeat steps b through d.

g. Remove the test device to relieve the vacuum. Then, switch the vaporizer “Off.”

h. Set the second mounted vaporizers to 1% and repeat steps b through d.

i. Remove the test device to relieve the vacuum. Then, switch the vaporizer “Off.”

j. Store the test device in the Excel MRI drawer.

k. Turn all flow controls completely clockwise (minimum flow). Do not over tighten.

⚠️ **CAUTION** Verify that all vaporizers are “Off” before continuing.

⚠️ **WARNING** After performing the low pressure leak test, do not use the anesthesia system until the system has been purged with oxygen. Using a system that has not been purged with oxygen may result in incorrect gas mixtures and injury to the patient.

5. Reconnect the common gas outlet to the breathing circuit and the scavenging system, set the system master switch to “On,” adjust the O2 flow to 1 l/min and purge the Excel MRI with O2 for one minute.

6. Return the system master switch to “Off.”
Checking the gas flow controls

⚠️ WARNING The Link 25 Proportion Limiting Control System sets a minimum O₂ concentration in the fresh gas stream when only O₂ and N₂O are used. Recirculating through an absorber or using a third gas may still cause a hypoxic mixture to be delivered, especially at low O₂ flow rates.

1. Either connect the pipeline supplies or slowly open the cylinder valves.

2. Set the system master switch to “On” and turn all flow control valves completely clockwise (minimum flow).

3. The oxygen flowmeter should show about 200 ml/min. The other flowmeters should show no gas flow.

4. Use the Link 25 Proportion Limiting Control System to check the N₂O flow control. Observe the following precautions:
   - Adjust only the N₂O flow control.
   - Start with the N₂O and O₂ flow controls at the minimum setting.
   - Increase the N₂O flow as specified in the table and make sure that the O₂ flow is in the allowed range.
   - If you overshoot a setting, turn the O₂ flow control clockwise until the N₂O flow decreases to the previous level.

<table>
<thead>
<tr>
<th>Set the N₂O flow control to (l/min):</th>
<th>The O₂ flow must be (l/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9</td>
<td>0.24 0.36</td>
</tr>
<tr>
<td>1.5</td>
<td>0.40 0.61</td>
</tr>
<tr>
<td>3.0</td>
<td>0.79 1.22</td>
</tr>
<tr>
<td>6.0</td>
<td>1.58 2.44</td>
</tr>
<tr>
<td>9.0</td>
<td>2.37 3.66</td>
</tr>
</tbody>
</table>

⚠️ WARNING During operation, always use the O₂ Flow control to increase total gas flow and the N₂O flow control to decrease total gas flow.

5. Test link system tracking. Observe the following precautions:
   - Start with the N₂O flow control set to 9.0 l/min. Adjust only the O₂ flow control.
   - Start with an initial O₂ flow between 2.40 and 3.66 l/min and go from higher to lower flow rates.
   - If you overshoot a setting, turn the N₂O flow control counterclockwise until the O₂ flow rises to the previous level.

<table>
<thead>
<tr>
<th>Set the O₂ flow control to (l/min):</th>
<th>The N₂O flow must be (l/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>7.36 11.41</td>
</tr>
<tr>
<td>1.0</td>
<td>2.46 3.80</td>
</tr>
<tr>
<td>0.5</td>
<td>1.23 1.90</td>
</tr>
<tr>
<td>0.3</td>
<td>0.74 1.14</td>
</tr>
</tbody>
</table>
4/Preoperative Checkout

⚠️ WARNING Do not use the anesthesia system if the Datex-Ohmeda Link 25 Proportion Limiting Control System does not operate within permitted ranges. Using an incorrectly operating control system may result in incorrect gas mixtures, and injury to the patient.

6. Adjust all of the gas flows to mid scale. While you are turning the flowmeter knobs, the flowmeter floats must move smoothly.

7. Shut “Off” the oxygen supply either by closing the oxygen cylinder valve, or by disconnecting the oxygen pipeline supply. As pressure bleeds off:
   - The oxygen-supply failure alarm must sound.
   - All gas flow must fall to zero, with oxygen being the last gas to stop flowing.

8. Turn all of the flow control valve knobs completely clockwise to the minimum flow or closed position. Do not over tighten the valves.

Breathing system checks

Note: Refer to the GMS Absorber Operation and Maintenance Manual for additional information. A condensed version of the checkout is found on the back of the GMS Absorber.

1. Complete the GMS absorber checkout procedure.

2. Reconnect the unit for manual ventilation. Remove all occlusions from the circuit. Remove the test plug from the “Y” piece and connect a test lung. Press the Flush button to fill the breathing bag. Set the Bag/Ventilator switch to the “Bag” position and adjust the APL valve to relieve at the desired pressure.

3. If the Excel MRI will not be used immediately, set the system master switch to “Off” and close all gas cylinder valves.

5125 O₂ Monitor checks

1. Switch the O₂ Monitor “On.”

Note: To avoid a long stabilization period, install a new cartridge (five minute stabilization time if just removed from package).

2. Set the \( O₂\% \) alarm switch to 20% and the \( O₂\% \) alarm switch to “00.”

3. Press down and release the \( \text{TEST} \) switch. Check that the “BATT OK” message appears for at least five seconds.

4. Press down and hold the \( \text{CIRCUIT TEST} \) switch. Check that:
   - The alarm speaker beeps once.
   - All four messages appear (Figure 4-1).
   - An oxygen concentration between 88 and 102% is displayed.
   - Both alarm LEDs illuminate.
   - When you release the switch “BATT OK” remains for approximately five seconds.
5. Calibrate the O₂ Monitor at 21% O₂:
   - Expose the O₂ sensor to room air and allow the reading to stabilize for two minutes as room air fills the sensor housing.
   - If necessary, remove the two corner screws, open the lower front panel, and adjust the calibration control (CAL) until the display reads 20%. Then, adjust the CAL control until the display just indicates 21%.
   - If you cannot calibrate the O₂ Monitor, replace the sensor cartridge. Refer to “O₂ sensor maintenance,” in Chapter 5.

6. Set the $\text{O}_2\%$ alarm switch to 22% (1% over the display reading) and check that:
   - The red LED flashes.
   - LOW O₂ appears in the display.
   - A two-pitch alarm sounds.
   - Pressing the button stops the audible alarm for 30 seconds.
   - Adjusting the $\text{O}_2\%$ alarm switch to 20% (1% below the display reading) stops the alarm.

7. Set the $\text{O}_2\%$ alarm switch to 20% (1% below the display reading) and check that:
   - The yellow LED flashes.
   - HIGH O₂ appears in the display.
   - An intermittent alarm sounds.
   - Adjusting the $\text{O}_2\%$ alarm switch to 22% (1% over the display reading) stops the alarm.

8. At least once a month and following sensor cartridge replacement, calibrate the O₂ Monitor for 100% O₂: $\text{O}_2\%$
   - Adjust the $\text{O}_2\%$ alarm switch to 00% (alarm disabled).
   - Expose the O₂ sensor to pure oxygen and allow the display to stabilize for two minutes as oxygen fills the patient circuit.
   - Remove the two corner screws, open the lower front cover, and adjust the calibration control (CAL) until the display reads 99%.
   - Expose the O₂ sensor to room air and allow the display to stabilize for two minutes as room air fills the sensor housing. If the final reading is outside the allowed range 21 ± 3% (18 to 24%), the sensor cartridge is no longer linear and must be replaced. Refer to “O₂ sensor maintenance,” in Chapter 5.

9. If the system will not be used immediately, switch the 5125 O₂ Monitor “Off.”
5/Maintenance

In this section

Maintenance schedule 5-1
Cleaning and sterilization 5-2
  Cleaning 5-2
  Sterilization 5-3
  Special precautions for rubber articles 5-3
O₂ sensor maintenance 5-3
  Installing a cartridge or disassembling the O₂ sensor for cleaning 5-3
Cleaning and sterilization 5-6
Replacing the 5125 O₂ Monitor battery 5-7

⚠️ WARNINGS

This manual specifies Krytox® as an oxygen service lubricant. Do not use any lubricant on the Excel MRI that is not specifically approved for use on anesthesia or oxygen equipment. Oil and grease based lubricants burn violently and may explode in the presence of oxygen.

⚠️ Static electricity is a fire hazard. Use only anti-static materials to cover the Excel MRI System and its components.

Maintenance schedule

This schedule lists the minimum maintenance required, based on normal use and typical environmental conditions. Heavier use or unusual environments may require more frequent maintenance. Before any cleaning or sterilization procedure check the section labeled “Cleaning and sterilization.”

**Before each use**

Perform preoperative checkout procedure (includes 21% O₂ calibrations).

**Daily**

Clean the external surfaces.

**Every two weeks**

Drain and discard anesthetic agent from vaporizers. Less frequent changes may be required if the agent does not contain additives or stabilizing agents.

**Monthly**

Calibrate the O₂ Monitor with 100% O₂.

Apply Krytox to the threads on the yoke tee handle. Do not lubricate the absorber post assembly.

**Every three months**

Contact trained service personnel to perform a full checkout and scheduled service maintenance on the Excel MRI System (Excel MRI, absorber, and O₂ monitor).

**Annually**

Replace the external vaporizer port o-rings.

Service Datex-Ohmeda Tec 4 vaporizers at an authorized Datex-Ohmeda service center.

Replace the O₂ sensor cartridge. Cartridge life expectancy is one year at 50% O₂ and 25°C (77°F). Different operating condition (higher O₂ concentration, high temperature, etc.) can shorten cartridge life expectancy. Freezing may damage the sensor cartridge.

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Every three years
Service Datex-Ohmeda Tec 5 vaporizers at an authorized Datex-Ohmeda service center.

As required
Install new cylinder gaskets.
Replace the absorbant in the GMS.
Replace the oxygen monitor battery.

Cleaning and sterilization

⚠️ CAUTIONS
Do not sterilize the Excel MRI or the 5125 O₂ Monitor.

⚠️ Following ethylene oxide sterilization, quarantine the items in a well ventilated area to allow dissipation of absorbed ethylene oxide gas. Follow the sterilizer manufacturer’s recommendations for specific sterilization periods.

Cleaning
Use this section as a quick reference once you are familiar with the cleaning procedures found in the individual operation and maintenance manuals.

External surfaces
To clean external surfaces use a damp cloth and a mild detergent.

Use the minimum amount of liquid necessary since excess liquid may leak into monitoring connections or other electrical components.

Sensor cleaning precautions
Wipe the O₂ sensor cable and housing with a damp cloth. Never immerse the O₂ sensor assembly in liquid. Exposure to liquids can damage the electrical contacts.

The O₂ sensor must be disassembled and the sensor cartridge removed for separate cleaning. The housing can be cleaned with a damp cloth (water, detergent solution or isopropyl alcohol). Corrosion from leaked sensor electrolyte can be removed with white vinegar under a fume hood.

The O₂ sensor cartridge contains an electrolyte (caustic). It can be wiped clean with a damp cloth (water, liquid disinfectant, or white vinegar; do not use alcohols). Special precautions are required. Refer to the “O₂ sensor maintenance” section in this chapter for detailed instructions.

Precautions for painted, metal, or plastic surfaces
Do not use abrasive cleaners. They can mar the finish.

Do not use anesthetic agent or glass cleaners on plastic or painted surfaces. They can mar the surface finish.

Always check cleaning product information to make sure that it is safe for aluminum, painted, or plastic surfaces.
Sterilization

Use this section as a quick reference once you are familiar with the sterilization procedures found in the individual operation and maintenance manuals.

**Items that cannot be sterilized by any method**

Excel MRI; 5125 O₂ Monitor

**Items that can be sterilized with ethylene oxide**

These items can be sterilized with ethylene oxide: the front half of the oxygen sensor housing and rubber and plastic articles. Refer to individual operation and maintenance manuals for disassembly instructions and additional information.

**Items that can be sterilized with liquid agents**

The rubber and plastic articles can be sterilized with a cold germicidal solution.

**Special precautions for rubber articles**

Rubber goods deteriorate over time and are considered expendable. The presence of oxygen, ozone, ether, mineral or vegetable oils, phenols, cresols, terpenes, hydrocarbon solvents, chlorinated hydrocarbons, esters, or oxidizing agents will hasten deterioration.

Check rubber articles regularly. Replace them when any of the following signs of deterioration appear, swelling, tackiness, or cracking.

Conductive rubber goods lose their electrical conductivity with age.

To extend the useful life of rubber articles:

- Remove metal connectors immediately after use.
- Store rubber articles in the dark away from ozone sources (fluorescent light fixtures, electric motors, and diathermy machines).

⚠️ **WARNING**

Do not use talc, zinc stearate, calcium carbonate, corn starch or similar substances to prevent tackiness on rubber articles. Any substances used could contaminate or irritate the patient’s respiratory tract.

**O₂ sensor maintenance**

**Installing a cartridge or disassembling the O₂ sensor for cleaning**

⚠️ **WARNING**

Use protective gloves and eyewear when you open the O₂ sensor in case the cartridge is leaking. The sensor cartridge contains an electrolyte (caustic).

After servicing the O₂ sensor, complete the checkout procedure “5125 O₂ Monitor checks” at the end of chapter 4.
Note: The oxygen sensor cartridge is located inside the sensor housing. Handle the sensor cartridge with care to avoid damage.

Figure 5-1
Hold the sensor housing, and depress the locking latch using a tool.

Figure 5-2
Twist to open, and unscrew the top half of the sensor housing. Lift the old sensor out.

Figure 5-3
Install the new sensor cartridge with the circular contacts toward the rear of the sensor housing. Verify that the top half of the housing is unobstructed to ensure proper flow.
Figure 5-4
Twist to close, and tighten the housing to form a gas-tight seal.

Figure 5-5
If necessary, immediately connect the O₂ sensor to the 5125 O₂ Monitor.

⚠️ WARNING ⚠️ Perform the 5125 O₂ Monitor Checks in chapter 4 after replacing the sensor cartridge to ensure the monitor is working properly. Allow at least 5 minutes for the sensor to stabilize.
5/Maintenance

Cleaning and sterilization

⚠️ WARNINGS Use protective gloves and eyewear when you open the O₂ sensor in case the cartridge is leaking. The sensor cartridge contains potassium acetate (caustic).

⚠️ Do not inhale any fumes generated by the oxygen sensor cleaning procedure. Such fumes can cause respiratory system or skin damage. The sensor cartridge contains potassium acetate (caustic).

![Image of cleaning and sterilization methods](image)

**Figure 5-6**
Cleaning and sterilization methods

*Use the following methods to clean and sterilize the parts as labeled in Figure 5-6.*

**Method A:** Wipe with damp cloth (liquid disinfectant, mild detergent solution, isopropyl alcohol); do not immerse, autoclave or gas sterilize; remove leaked electrolyte under a fume hood with vinegar.

**Method B:** Gas sterilize with ethylene oxide or clean with liquid disinfectant, mild detergent solution, isopropyl alcohol.

⚠️ CAUTION Following ethylene oxide sterilization, quarantine the items in a well ventilated area to allow dissipation of absorbed ethylene oxide gas. Follow the sterilizer manufacturer’s recommendations for specific sterilization periods.

**Method C:** Wipe with damp cloth (water, white vinegar, liquid disinfectant).
Replacements the 5125 O₂ Monitor battery

⚠️ WARNING ⚠️ Use only the specified Datex-Ohmeda, non-magnetic batteries. Standard batteries are magnetic and can cause injuries if used in an MRI environment. Refer to the “Illustrated Parts” section for Stock Numbers.

The 5125 O₂ Monitor uses a non-magnetic, 3.9 Vdc lithium battery. The O₂ monitor batteries are not rechargeable.

The battery compartment is located behind the front cover. Remove the two corner screws and open the cover to gain access to the battery.

After replacing the battery, complete the checkout procedure “5125 O₂ Monitor checks” at the end of chapter 4.

Figure 5-7
Replacing the battery
**6/Troubleshooting**

**In this section**

- Repair policy 6-1
- Problems with the 5125 O₂ Monitor 6-1
  - Calibration and drift 6-1
- 5125 O₂ Monitor alarms 6-2
- Pneumatics problems 6-3

**Repair policy**

Do not use malfunctioning equipment. Make all necessary repairs, or have the equipment serviced by an Authorized Datex-Ohmeda Service Representative. After repair, test the equipment to ensure that it is functioning properly, in accordance with the manufacturer’s published specifications.

To ensure full reliability, have all repairs and service done by an Authorized Datex-Ohmeda Service Representative. If this cannot be done, replacement and maintenance of those parts listed in this manual may be undertaken by a competent, trained individual having experience in the repair of devices of this nature.

⚠️ **CAUTION** No repair should ever be attempted by anyone not having experience in the repair of devices of this nature.

Replace damaged parts with components manufactured or sold by Datex-Ohmeda. Then test the unit to ascertain that it complies with the manufacturer’s published specifications.

Contact the nearest Datex-Ohmeda Service Center for service assistance. In all cases, other than where Datex-Ohmeda’s warranty is applicable, repairs will be made at Datex-Ohmeda’s current list price for the replacement part(s) plus a reasonable labor charge.

**Problems with the 5125 O₂ Monitor**

- Calibration and drift
- **Cannot calibrate monitor**
  
  Replace the O₂ sensor cartridge. Refer to “O₂ sensor maintenance,” in Chapter 5.

- **Drift in O₂ readings**
  
  Monitor O₂ readings. If O₂ readings fail to stabilize, replace the sensor cartridge.
5125 O₂ Monitor alarms

Note: When one message covers multiple conditions, the distinguishing feature is highlighted.

**HIGH O₂**

O₂ Display Shows: O₂ concentration
Alarm LED: Flashing Yellow
Alarm Silence: Until next occurrence

Measured O₂ concentration is above the alarm limit. Set the alarm limit to “00” to disable high O₂ monitoring.

**LOW BATT**

(two alarms)

O₂ Display Shows: — blank —
Alarm LED: Flashing Yellow
Alarm Tone: Intermittent

Immediate battery replacement required.

O₂ Display Shows: O₂ concentration
Alarm LED: Continuous Yellow
Alarm Tone: Three Beep Sequence

Battery is weak. Replace the battery before starting the case.

**LOW O₂**

O₂ Display Shows: Oxygen concentration
Alarm LED: Flashing Red
Alarm Silence: 30 seconds

Measured oxygen concentration is below the alarm limit.

- none -
(three alarms)

O₂ Display Shows: Oxygen concentration
Alarm LED: Continuous Yellow
Alarm Tone: Three Beep Sequence

The low O₂ alarm limit is set at or below 18%. This is not allowed. Set a higher low O₂ alarm limit.

O₂ Display Shows: 00
Alarm LED: Flashing Yellow
Alarm Tone: Intermittent

The O₂ sensor is disconnected or has malfunctioned. If the sensor is connected, flex the cable to check for broken wires. If the cable appears to be intact, replace the sensor cartridge. If the problem persists, contact qualified service personnel.

O₂ Display Shows: — blank —
Alarm LED: Continuous Yellow
Alarm Tone: Continuous

Internal monitor malfunction. Contact qualified service personnel.
## 6/Troubleshooting

### Alarm summary table

<table>
<thead>
<tr>
<th>Message</th>
<th>O₂ Display</th>
<th>Alarm LED</th>
<th>Alarm Tone</th>
<th>Alarm Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW O₂</td>
<td>0₂ %</td>
<td>Flashing Red</td>
<td>Alternating Pitch</td>
<td>O₂% &lt; low limit or 18%</td>
</tr>
<tr>
<td>HIGH O₂</td>
<td>0₂ %</td>
<td>Flashing Yellow</td>
<td>Intermittent Tone</td>
<td>O₂% &gt; high limit</td>
</tr>
<tr>
<td>-- none --</td>
<td>0₂%</td>
<td>Continuous Yellow</td>
<td>Three Beep Sequence</td>
<td>Low O₂ limit &lt; 18%</td>
</tr>
<tr>
<td>LOW BATT</td>
<td>0₂%</td>
<td>Continuous Yellow</td>
<td>Three Beep Sequence</td>
<td>Weak Battery</td>
</tr>
<tr>
<td>LOW BATT</td>
<td>--blank--</td>
<td>Flashing Yellow</td>
<td>Intermittent Tone</td>
<td>Dead Battery</td>
</tr>
<tr>
<td>-- none --</td>
<td>00</td>
<td>Flashing Yellow</td>
<td>Intermittent Tone</td>
<td>O₂ sensor disconnection or malfunction</td>
</tr>
<tr>
<td>-- none --</td>
<td>--blank--</td>
<td>Continuous Yellow</td>
<td>Continuous</td>
<td>Monitor Malfunction</td>
</tr>
</tbody>
</table>

### Pneumatics problems

**Low pressure leak test fails when vaporizer “On”**

Check for correct vaporizer mounting. Tighten the vaporizer fill caps.

Make sure that there are external o-rings on all vaporizer manifold ports. Replace missing or damaged o-rings.

If the leak continues, move the vaporizer to another port. If the leak follows the vaporizer, use a different vaporizer. Do not use the leaking vaporizer until it has been serviced. If the leak stays with the port, i.e. any vaporizer put on that port leaks and the external o-rings are installed, contact qualified service personnel to repair the vaporizer manifold.

**High pressure leak or inadequate ventilator gas supply**

Make sure that the gas cylinder is correctly aligned and the tee handle is tight. Check that there is only one cylinder gasket and it is in good condition. Check external hose connections to the O₂ power outlet.

**High pressure leak at gas block**

Make sure that the cylinder is correctly aligned and the tee handle is tight. Install yoke plugs as required. Check that there is only one cylinder gasket and it is in good condition.

**Low O₂ alarm (pneumatic)**

This alarm sounds briefly when the Excel is first switched “On.”

If it occurs during operation, check the gas supply pressure (cylinder or pipeline). If necessary, switch to a reserve cylinder.
In this section

Excel specific parts  7-1

MRI Compatible accessories  7-1

5125 O₂ Monitor accessories  7-2

Where to find additional part numbers  7-2

This manual lists only customer replaceable parts used directly by the Excel or the 5125 O₂ Monitor. To locate additional part information find the part description in the section titled “Where to find additional part numbers.”

Excel specific parts

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1102-3016-000</td>
<td>Vaporizer port o-rings, external (six)</td>
</tr>
<tr>
<td>0236-0042-801</td>
<td>Fresh gas hose</td>
</tr>
<tr>
<td>0219-3372-600</td>
<td>Yoke tee handle</td>
</tr>
<tr>
<td>0206-7129-525</td>
<td>Yoke plug</td>
</tr>
<tr>
<td>0210-5022-300</td>
<td>Cylinder gasket</td>
</tr>
<tr>
<td>0219-7210-300</td>
<td>Test lung</td>
</tr>
<tr>
<td>1001-3854-000</td>
<td>Krytox</td>
</tr>
<tr>
<td>0309-1318-800</td>
<td>Low pressure leak test device</td>
</tr>
<tr>
<td>2900-0001-000</td>
<td>Test plugs, bag port</td>
</tr>
<tr>
<td>0216-6764-870</td>
<td>GMS Mounting Pin (older style)</td>
</tr>
<tr>
<td>Included with Absorber</td>
<td>GMS Mounting Pin (New style)</td>
</tr>
</tbody>
</table>

MRI compatible accessories

⚠️ WARNING  The MRI compatibility of these accessories applies to specific accessory models and is limited to use as part of the Excel MRI System. None of these accessories have been tested for stand alone use in an MRI environment or in magnetic fringe fields above 0.23 Tesla (2300 Gauss).

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001-8968-000</td>
<td>Add on cylinder, O₂ DISS</td>
</tr>
<tr>
<td>1001-8970-000</td>
<td>Add on cylinder, N₂O DISS</td>
</tr>
<tr>
<td>1603-3000-000</td>
<td>Respirometer 121 style</td>
</tr>
<tr>
<td>1010-8015-000</td>
<td>Suction regulator kit</td>
</tr>
<tr>
<td>1010-8016-000</td>
<td>Free flow suction regulator kit</td>
</tr>
<tr>
<td>1010-8021-000</td>
<td>Bracket for suction regulator</td>
</tr>
<tr>
<td>1010-8017-000</td>
<td>Auxiliary O₂ flowmeter</td>
</tr>
</tbody>
</table>
7/Illustrated Parts

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001-8930-000</td>
<td>Flip-up shelf</td>
</tr>
<tr>
<td>0216-6819-800</td>
<td>1&quot; x 3.5&quot; Post dovetail mount</td>
</tr>
<tr>
<td>0216-6814-800</td>
<td>12&quot; IV Pole Dovetail mount</td>
</tr>
<tr>
<td>1001-8957-000</td>
<td>Large Tycos Case Dovetail mount</td>
</tr>
<tr>
<td>0211-1100-300</td>
<td>BP adult inflation system Tycos</td>
</tr>
<tr>
<td>0207-8022-801</td>
<td>Bag to ventilator switch valve</td>
</tr>
</tbody>
</table>

5125 O₂ Monitor accessories

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001-3741-000</td>
<td>Non-magnetic lithium 3.9 Vdc C size battery</td>
</tr>
<tr>
<td>0237-2034-700</td>
<td>O₂ sensor cartridge</td>
</tr>
<tr>
<td>6050-0005-406</td>
<td>O₂ sensor (without cartridge)</td>
</tr>
<tr>
<td>6050-0005-438</td>
<td>O₂ sensor front housing w/ o-ring</td>
</tr>
<tr>
<td>0210-0499-300</td>
<td>O-ring small</td>
</tr>
<tr>
<td>0212-0763-100</td>
<td>Sensor adapter</td>
</tr>
</tbody>
</table>

Where to find additional part numbers

**System operation and maintenance manuals**

All major system components have individual operation and maintenance manuals:

- GMS Absorber 0178-1742-000
- GMS Bain Circuit Adapter 0178-1752-000
- GMS PEEP Valve 0178-1753-000
- Tec 4 Vaporizer 0205-7106-300
- Tec 5 Vaporizer 1105-0100-000
- Waste Gas Scavenging Valve 0178-1728-000

**Parts listed in the GMS Absorber Operation and Maintenance Manual**

Look the following parts up in the GMS Absorber Operation and Maintenance Manual:

- Unidirectional (inspiratory and expiratory) check valve components
- Pressure gauge and inspiratory pressure sensing tee
- Drain plug
- O-rings
- Canister gaskets, screens, hose connections and seals
Excel MRI Pneumatics

The Excel Gas Machine consists of the gas supply modules, the flow tubes and controls responsible for gas concentration, the vaporizer assemblies, and specialized alarm and “On” /“Off” functions provided by the oxygen supply. Most of the pneumatic circuitry is located underneat the tabletop.

The Excel MRI comes with gas supply modules for nitrous oxide, oxygen, and air.

Gas supply modules contain two parallel branches, pipeline and cylinder. The pipeline supply branch consists of a filtered pipeline connection and a pipeline pressure gauge. The cylinder branch consists of a filtered cylinder connection, a cylinder gauge, and a high pressure gas regulator that reduces cylinder pressure to a nominal 311 kPa (45 psig). When only one source is connected or switched “On,” check valves keep gas from leaking out through the unused branch. When both pipeline and cylinder supplies are connected, make sure that the cylinder valve is closed. Otherwise, cylinder gas could be depleted since the pipeline pressure is almost the same as the regulated cylinder pressure. A pressure relief valve in each gas supply module limits maximum pressure to 518 kPa (75 psig).

Shut-off valves control the flow of the nitrous oxide and the air. When the system master switch is set to “Off,” these valves are closed. When the system master switch is set to “On,” the pilot oxygen pressure holds them open. As long as the pilot pressure remains above the critical level, approximately 138 kPa (20 psig), the valves remain open. If the oxygen pilot pressure drops below this level, the shut-off valves close, stopping the flow of nitrous oxide and the air. You should notice the pilot oxygen flow through the oxygen flow tube whenever the system master switch is “On,” even if the oxygen flow control is turned completely clockwise (minimum flow).

Secondary regulators reduce the oxygen and nitrous oxide pressures to the levels required by the flow controls. The air goes directly from the primary regulator to the flow control. A gear linkage on the nitrous oxide and oxygen flow control knobs helps limit the lowest O₂ flow control setting to a nominal 25% of the N₂O flow control setting. A system of mechanical stops sets the maximum flows.

The mixed gas output of the flowmeter assembly goes through the selected vaporizer and into the patient circuit. A pressure relief valve on the common gas outlet limits pressure to approximately 27.6 to 38 kPa (4 to 5.5 psig) at 200 ml/min.

Pressing the “Flush” button connects pipeline or regulated cylinder oxygen directly to the gas machine outlet regardless of the position of the system master switch.

The same pilot pressure that opens the shut-off valves pressurizes the alarm canister. A regulator keeps the oxygen in the canister as long as supply pressure exceeds approximately 207 kPa (30 psig); range: 186 to 228 kPa (27 to 33 psig). If the oxygen supply pressure falls below this level, gas exits the canister through a reed alarm.
Figure A-1
Typical Excel pneumatic circuitry
Appendix

Key to Subassembly Abbreviations

| CGO | Common Gas Outlet |
| CYL | Cylindery Yoke |
| GSM | Gas Supply Module (O2, N2O, Air) |
| FM | Flowmeter |
| PA | Pneumatic Alarm (triggers between 186 and 228 kPa [27 and 33 psig]) |
| PL | Pipeline Connection (nominal 345 kPa [50 psig]) |
| PO | Power Outlet (O2 for ventilator Drive gas) |
| VM | Vaporizer Manifold |

Key to Numbered Components

1. Pipeline Pressure Gauge
2. Regulators
   a. Primary Regulator
   b. Alarm Regulator (set threshold)
   c. Flow Regulator (alarm duration)
   d. Secondary Regulators (262 ± 3.5 kPa for N₂O; 143 ± 26 kPa for O₂ at 2 l/min [38 ± 0.5 psig for N₂O; 20.75 ± 3.75 psig for O₂ at 2 l/min])
3. Cylinder Pressure Gauge
4. Pressure Relief Valves
   a. 517 kPa (75 psig)
   b. 27.6 to 38 kPa (4 to 5.5 psig) at 200 ml/min
5. Switches
   a. System Master Switch
   b. Vaporizer Selector Switch
6. Alarm Reservoir
7. Whistle
8. Shut-Off Valve
9. Secondary Regulator Test Points
10. Flow Control Needle Valves
    (maximum flows: 10-14 l/min O₂; N₂O 10-12 l/min; Air 15-17 l/min.)
    (minimum flows: 180 to 220 ml O₂; 0 ml all other gases)
11. Flowtube Assembly
12. Anesthesia Vaporizer
13. Flush Button/Valve

Key to Unnumbered Symbols

- Filter
- Check Valve
- Gas Circuit Fitting
- Gas Circuit Connection
- Direction of Gas Flow
Appendix

Excel MRI System Specifications

Note: All specifications are nominal and subject to change without notice.

Dimensions

Weight:

Excel 210: 93.5 kg (206 lbs)
Options: Vaporizer, 17.6 kg (17 lbs); Absorber; 9.6 kg (21 lbs)

Dimensions:

Height: 168 cm (66 in) floor to upper most part of top shelf.
Depth: 76 cm (30 in) with casters and brake bar.
Width: 73.6 cm (29 in)

Shelves and drawers:

Middle Shelf:
Size: 29 x 31 cm (11.4 x 12.4 in)
Height: 19.8 cm (7.8 in)
Maximum Load: 11 kg (24 lb)

Top Shelf:
Size: 59.7 x 36 cm (23.5 x 14.2 in)
Maximum Load: 23 kg (50 lb)

Table-Top:
Height (above floor): 84 cm (33.5 in)
Size: 55.0 x 29.0 cm (21.7 x 11.7 in)

Drawer Cabinet (option):
Contains two 39.4 x 26.7 x 10.2 cm (15.5 x 10.5 x 4 in) drawers.

Absorber post mounting assembly:
Absorber Arm Length (varies slightly with arm style): 35.5 cm (14 in)
Vertical Adj (above floor): 25.4 to 66 cm (10 to 26 in)
Horizontal Adj: 16.5 to 27.9 cm (6.5 to 11 in)

Casters:
12.7 cm (5 in) diameter; front casters have a foot-operated brake-bar lock.

Common gas outlet:
Equipped with a latching, positive engagement, bayonet type connector. The common gas outlet connector will also accept standard 22 mm OD or 15 mm ID conical friction fit connectors.

Pneumatics

Pipeline input:
345 kPa (50 psig) pipeline supply required
DISS indexed connections for O₂, N₂O and air
Pipeline filter and check valve
Cylinder input:
CGA pin indexed yokes
Input filter and check valve
Primary regulator output: nominal 310 kPa (45 psig)
Primary regulator diaphragm min burst pressure: 1,750 kPa (250 psig)

Maximum output:
Pressure relief valve set to: 517.5 kPa (75 psig)

Shut-off valves:
Shut-off valves stop all other gas flows if oxygen supply pressure falls to approximately 138 kPa (20 psig).

Flowmeter module:
Flow ranges:
- O₂ Double Tube 0.2-0.95 l/min and 1.0 l/min-10 l/min.
  Minimum O₂ flow 200 ml/min.
- N₂O Double Tube 0.04-0.9 l/min and 1.0 l/min-10 l/min.
- Air Single Tube 1-15 l/min.

Flowtube assembly calibration:

<table>
<thead>
<tr>
<th>Percent of Flow (Full Scale)</th>
<th>Accuracy (% of Reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>±1.60%</td>
</tr>
<tr>
<td>90</td>
<td>±1.64%</td>
</tr>
<tr>
<td>80</td>
<td>±1.70%</td>
</tr>
<tr>
<td>70</td>
<td>±1.77%</td>
</tr>
<tr>
<td>60</td>
<td>±1.86%</td>
</tr>
<tr>
<td>50</td>
<td>±2.00%</td>
</tr>
<tr>
<td>40</td>
<td>±2.20%</td>
</tr>
<tr>
<td>30</td>
<td>±2.53%</td>
</tr>
<tr>
<td>20</td>
<td>±3.20%</td>
</tr>
<tr>
<td>10</td>
<td>±5.20%</td>
</tr>
</tbody>
</table>

Note: Flowtube assemblies are calibrated at 20°C (68°F) and 101.3 kPa (760 mm Hg). Different breathing circuit pressures, barometric pressures or temperatures will affect flowtube accuracy. In some cases, deviations due to different conditions may exceed the specified tolerances.

Common gas outlet relief valve:
27.6 to 38 kPa (4.0 to 5.5 psig) at minimum flow.

Low O₂ pressure alarm:
An alarm sounds for at least seven seconds if the O₂ supply falls below approximately 207 kPa (30 psig); range: 186 to 228 kPa (27 to 33 psig).

Oxygen flush button:
Recessed, self-closing push button provides a flow of 45-70 l/min when fully depressed.
Appendix

5125 O₂ Monitor specifications

Range:
0-100% O₂

Display resolution:
1%

Display update:
Three times per second

Alarms:
Audible and visual alarms for: high and low O₂, low battery, sensor malfunction or disconnection, internal malfunction.

Response time:
Typically 20 seconds for 90% of total change in O₂ concentration at 25°C (77°F).

Drift range:
±1% in eight hours

Linearity:
±1% of full scale

Accuracy:
±3% of full scale

Sensor cartridge life:
One year at 50% O₂; six months at 100% O₂ at 25°C (77°F)

Exposure to high CO₂ concentrations or elevated temperatures will shorten sensor life.

Battery:
Non-magnetic, 3.9 Vdc lithium battery

Nominal battery life expectancy is 600 hours.

Self tests:
Manual (test switch) and automatic

Remote connection:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analog ground</td>
</tr>
<tr>
<td>2</td>
<td>Shield</td>
</tr>
<tr>
<td>3 &amp; 4</td>
<td>Normally open switch connection for remote alarm silence. High to low transition silences alarm.</td>
</tr>
<tr>
<td>5</td>
<td>% O₂; 10 mv = 1% O₂ at 10 KΩ load impedance</td>
</tr>
<tr>
<td>6</td>
<td>Alarm status: high (&gt;4.5 Vdc) = normal, no alarm; 10 msec pulse = alarm in progress; number of pulses in 320 msec specifies the highest priority alarm (1 = low O₂; 2 = high O₂; 3 = sensor malfunction/disconnection; 4 = dead battery; 5 = low O₂ limit &lt;18%; 6 = weak battery) alarm line stays low for remainder of 320 msec.</td>
</tr>
</tbody>
</table>
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