Setup

Connect the BISx pod as shown in *Figure 26-1*. Refer to the sections that follow for descriptions of each part. Insert the BISx module into the Spacelabs Healthcare monitor.

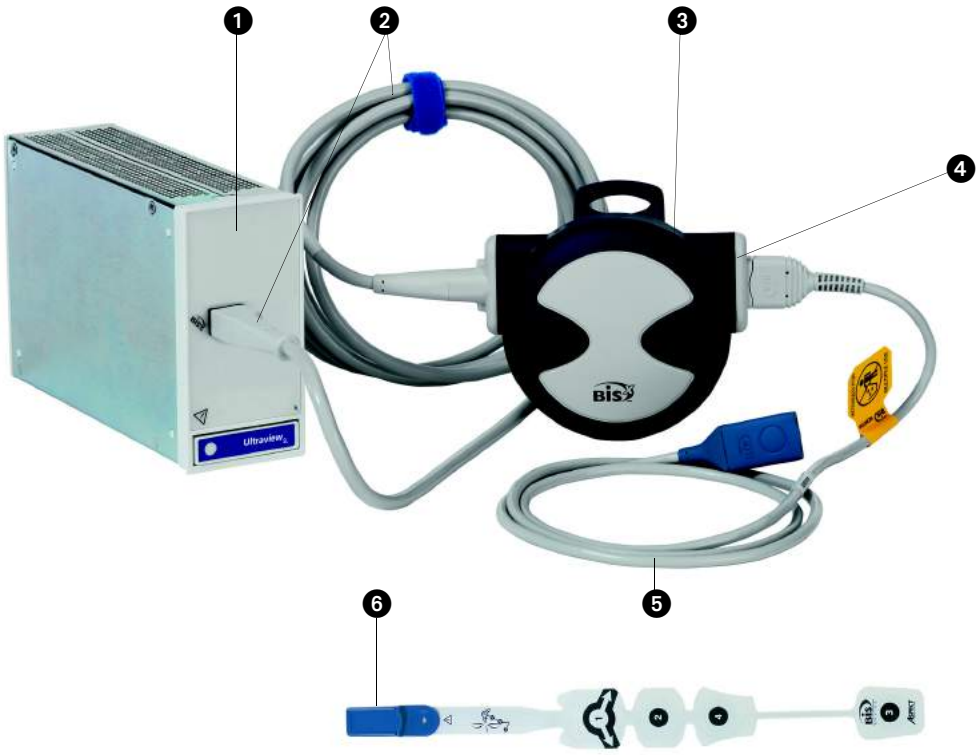

Figure 26-1: BISx system

1. BISx module
2. Host monitor cable (module to pod)
3. BISx pod
4. PIC connector
5. Patient interface cable (pod to BIS sensor)
6. BIS sensor

BISx Pod

The BISx pod contains the input connector, amplifiers, and digital signal converter. The pod receives the EEG input from the patient and converts it to digital information that is processed by the module. Plug the host monitor cable into the BISx module as shown in *Figure 26-1*.

To connect the BISx pod to the BISx module:

- Locate the host-monitor cable connector end.
- Plug the host monitor cable into the BISx module.

Note:

The BISx pod is protected against the effects of a cardiac defibrillation discharge (type BF defibrillation-proof applied part), and it is safe to use on patients with a cardiac pacemaker or other electrical stimulation.

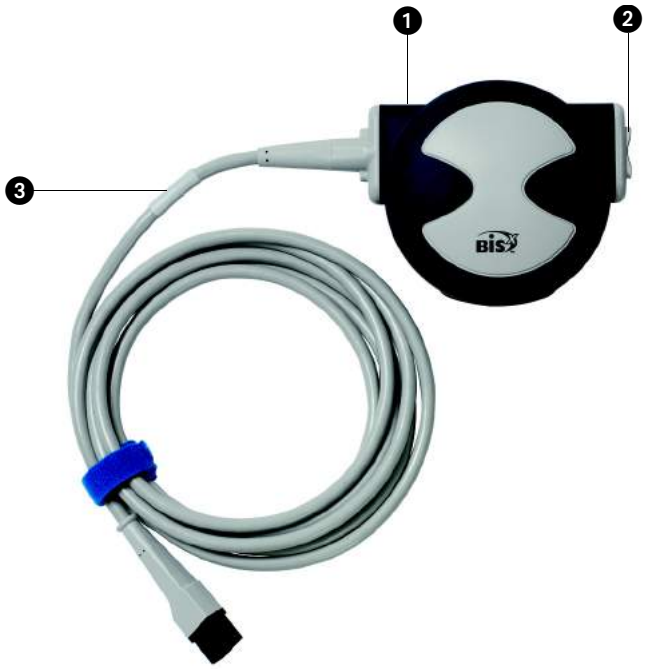

Figure 26-2: BISx pod

1. BISx pod
2. PIC connector
3. Host monitor cable (to module)

Pod Placement

The BISx pod includes a clip on the underside for attaching the pod. Clip the pod to an IV pole, a bed rail, or a bed sheet.

Caution:

Because of the elevated surface temperature of the BISx pod, do not place the pod in direct contact with the patient.

Patient Interface Cable (PIC)

The PIC provides connection between the BISx pod and the BIS sensor.

Figure 26-3: PIC

1. Sensor connector
2. Pod connector

Note:

The PIC is not a disposable cable. Do not dispose of it when you dispose of the attached BIS sensor (unless the cable is faulty or damaged).

To attach the PIC to the BISx pod:

- Locate the pod connector on the end of the PIC.
- Connect the pod connector to the pod's PIC connector, ensuring that it is fully seated.
- Clip the pod to an IV pole, bed rail, or bed sheet.

BIS Sensors

Caution:

Refer to Electrodes, Lead Wires, Sensors, and Sensor Cables on page 31-8 and page 31-9 for cautionary disclosures.

The BIS sensor is a patient-connected, single-use sensor that must be disposed of after each use. Dispose of the sensor according to your hospital protocol.

BIS sensors have electrodes numbered one to four that are applied in particular positions on the patient's forehead.

Note:

You can attach the BIS sensor to the PIC before or after the sensor is placed on the patient.

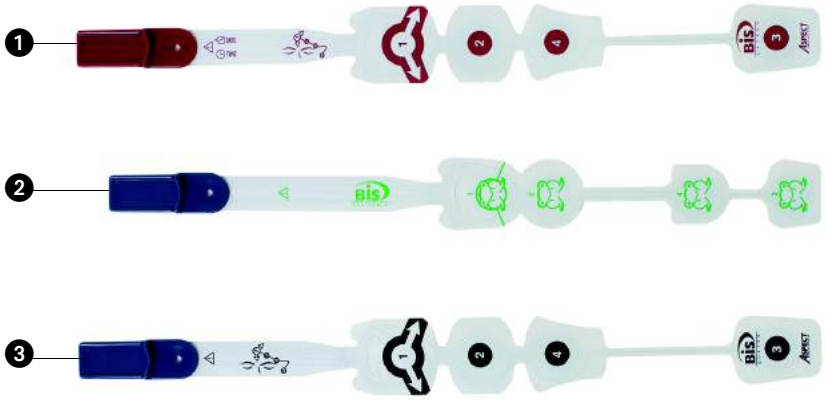

Figure 26-4: BIS sensors

1. BIS Extend sensor (red print)
2. BIS Pediatric sensor (green print)
3. BIS Quatro sensor (blue print)

Note:

The BIS Pediatric, Quatro, and Extend sensors and the PIC sensor connector are mechanically keyed to connect in only the correct way. BIS Standard sensors used with the 90482 BIS module should not be used with the 91482 BISx module.

To attach the BIS sensor to the PIC:

- Remove the BIS sensor from its packaging.
- Insert the sensor tab into the PIC the sensor connector (blue end).

Patient Preparation

Warning:

Do not expose the BIS sensor to surgical skin preparation solutions. This may result in harm to the patient's skin.

Caution:

- **The BIS sensor only functions when placed on the patient's forehead. It should not be used with any surgical procedure that precludes such placement.**
- **Make sure the patient's forehead skin surface is clean and dry before applying the sensor. Ensure that the sensor expiration date, which is printed on the sensor packaging, has not elapsed.**

To prepare the patient for monitoring:

- Wipe the patient's forehead with alcohol and then dry.
- Apply the sensor to the patient's forehead according to the sensor packaging.
- Insert the sensor tab into the PIC sensor connector (if not already connected).

Sensor Application

Refer to the sensor packaging and application instructions for directions on applying the BIS sensor to the patient.

Starting BIS Monitoring

When the module is powered ON, it will initiate a system test to verify that the equipment and connections are operating properly. If a problem occurs, the system will halt and display a status message. Refer to *BISx Troubleshooting and Status Messages* on page 26-18 for status messages.

Starting a Patient Case in the Operating Room

The BISx module matches its case with the Spacelabs monitor it is being used with. When used with monitors that do not support START CASE/END CASE, BIS monitoring begins when the patient connection is made.

When used with a monitor that supports START CASE, ensure that all patient and equipment connections have been made, and then touch the START CASE key on the monitor.

To start a BIS case in the operating room:

- Ensure all patient connections have been made.
- Touch START CASE (if necessary).

Note:

The label of this key on the supporting monitor toggles between START CASE and END CASE with each touch.

Starting a Patient Case in the Intensive Care Unit

Monitors used in an ICU or other critical care setting may not support the START CASE/END CASE function.

When used with monitors that do not support START CASE/END CASE, BIS monitoring begins when the patient connection is made.

The module will automatically perform an impedance check. An electrode status display appears under SENSOR CHECK on the right of the display (refer to *Figure 26-5*). Refer to *Impedance Check* on page 26-13 for more information.

Note:

It is not necessary to touch SENSOR CHECK to test electrode placement, because a sensor check is performed automatically when the sensor is connected to the BISx module.

Suspending and Resuming BIS Monitoring

When you press SUSPEND PROCESSING, the message displays with a YES/NO confirmation. The key changes to RESUME PROCESSING when processing is suspended.

To suspend BIS monitoring:

- Touch BIS.
- Touch SUSPEND PROCESSING.
- Touch YES or NO.

To resume BIS monitoring:

- Touch BIS.
- Touch RESUME PROCESSING.
- Touch YES or NO.

Display Detail

You can select to display the three-zone display (refer to *Figure 26-5*) or the one-zone display (refer to *Figure 26-6*). The three-zone display shows the BIS and EMG trends.

The factory default display setting is AUTO ZONE. AUTO ZONE switches between the three-zone display when the you touch the BIS parameter key and the one-zone display when the BIS key is not selected.

When monitoring BIS on a monitor limited to three or four waveforms, BIS should be set to the one-zone display.

Refer to *Entering Setup Information* on page 26-15 for information on selecting a display format.

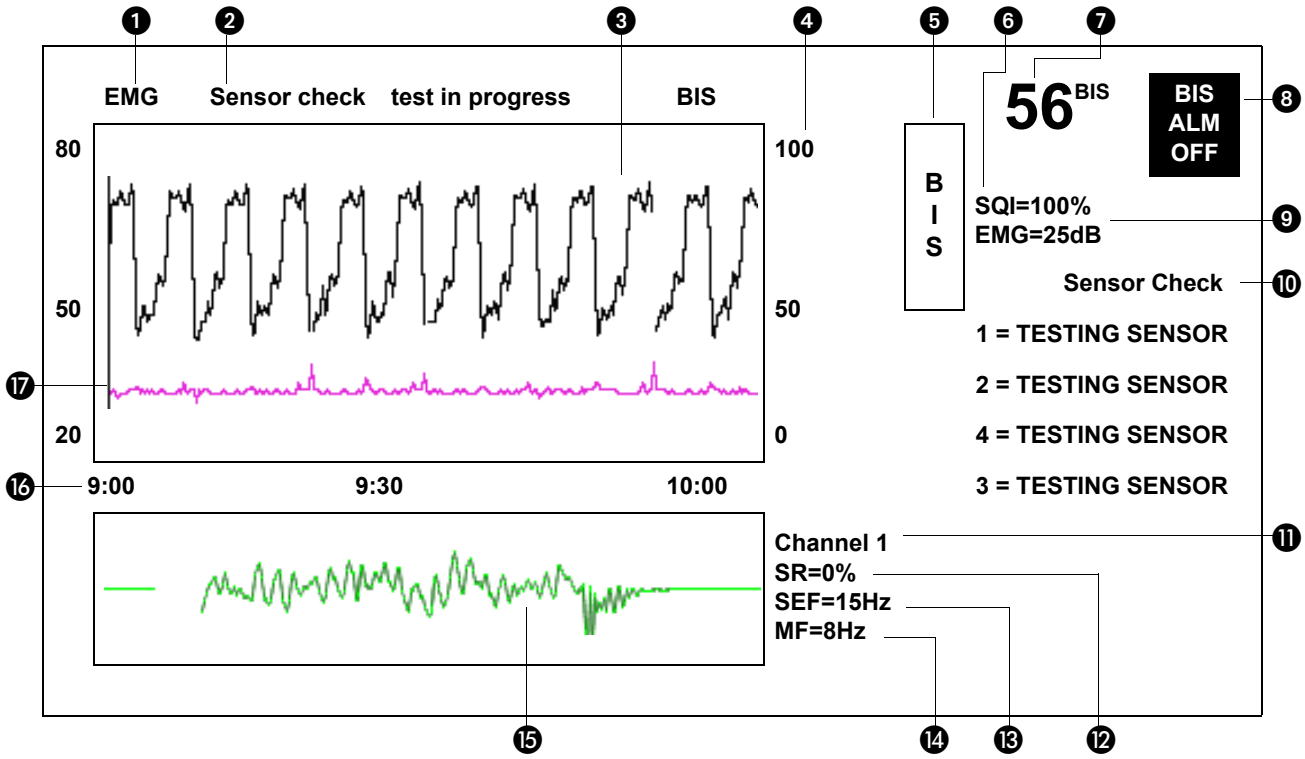

Figure 26-5: Bedside monitor (three zones) during impedance test

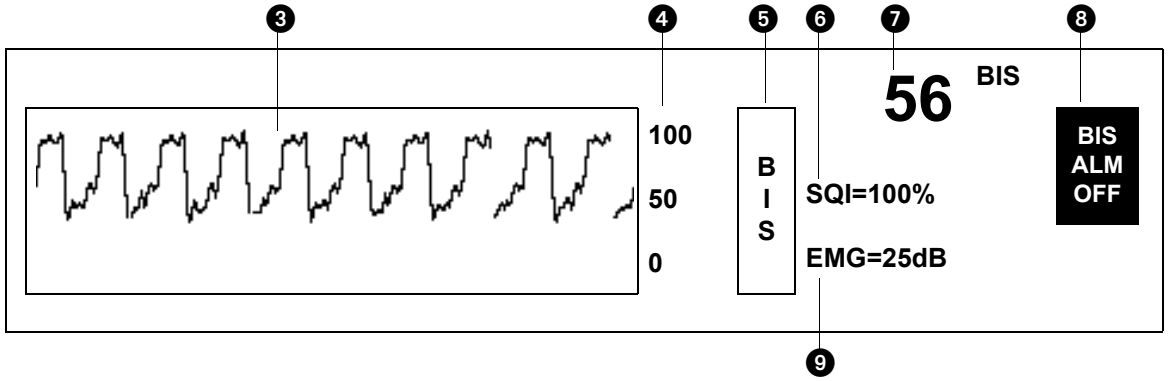

Figure 26-6: Bedside monitor (one zone) and remote view display

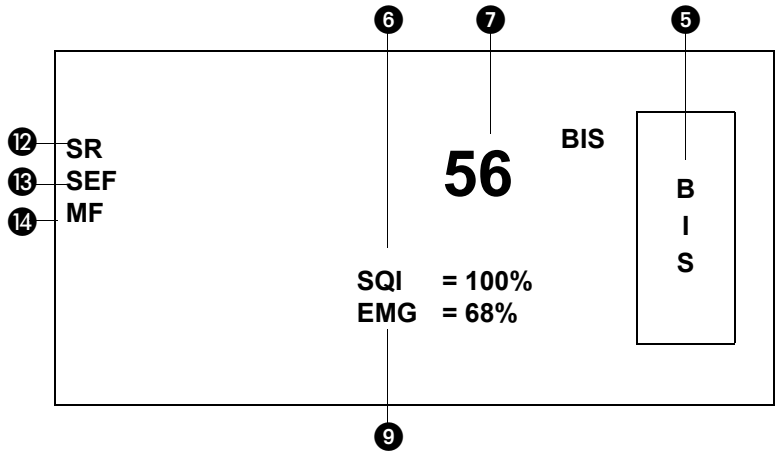

Figure 26-7: Central monitor split-view display

1. EMG scale range
2. Status message
3. BIS trend
4. BIS scale range
5. BIS parameter key
6. SQI (Signal Quality Index)
7. BIS value
8. BIS alarm status — BIS ALM OFF appears when alarms are turned OFF. The high and low alarm limit values appear when alarms are turned ON.
9. EMG (Electromyogram)
10. Electrode Status — This message appears when a sensor impedance check is in progress. Refer to *Impedance Check* on page 26-13.
11. EEG Channel 1/Channel 2 — Details which of the two available waveforms are displayed.

⓬ SR (Suppression Ratio)

⓭ SEF (Spectral Edge Frequency)

⓮ MF (Median Power Frequency)

⓯ EEG real-time waveform

⓰ Time axis

⓱ EMG trend

Averaging Time

The BIS trend can appear jagged, with many peaks or artifacts. Select a longer averaging time to smooth the appearance of the trend. Select a shorter averaging time for a more responsive BIS value.

To change the averaging time:

- Touch BIS.
- Touch SETUP.
- Touch DISPLAY FORMAT.
- Touch AVG TIME.
- Select the desired averaging time (10 SEC, 15 SEC, 30 SEC).

Remote View Display Format

The Remote View option enables you to view the BIS parameter from a remote monitor. One screen zone is used to display the BIS information, regardless of the type and the number of zones that are in use at the bedside monitor. EEG waveforms are not available in this mode (refer to *Figure 26-6*).

When viewing the BIS parameter from a remote monitor, the lower part of the BIS trend is not visible because remote monitors use this area to display the bed name and patient identification information.

Note:

In the remote view, only the ALARM LIMITS, SETUP, and PRINT keys are active. All other keys are disabled.

Impedance Check

An impedance ground test automatically occurs every 10 minutes. You can perform an impedance check during BIS monitoring without losing your trended data.

To initiate a sensor impedance test:

Touch SENSOR CHECK.

During an impedance check, an electrode status display appears under **Sensor Check** on the right of the display (refer to *Figure 26-5*), and the IMPEDANCE TEST IN PROGRESS message appears.

The electrode status displays the following:

- The individual sensor electrode (1, 2, 3, or 4);
- The status (PASS/HIGH/LEAD OFF/CLIP); and
- The impedance value for that electrode (in kΩ).

Note:

All processing is suspended until the impedance test stops and the SENSOR CHECK key is available again.

When an impedance value exceeds the threshold, the value flashes on the screen. If the impedance value is too high, it may indicate that the BIS sensor is no longer making good contact and needs to be examined or replaced.

Note:

The user cannot control the impedance thresholds.

The SENSOR CHECK key is unavailable during impedance testing. The impedance test automatically concludes when all electrodes complete impedance testing.

Automatic impedance testing can be turned OFF if it is causing interference with other devices, such as an EEG module.

Caution:

If background impedance checking is turned OFF, the BISx system will not detect any BIS sensor-related faults.

To turn OFF automatic impedance testing:

- Touch SETUP.
- Touch IMPED CHK /OFF.

Enabling and Adjusting Alarms

Touch ALARM LIMITS to display the **Alarm Limits** menu.

From this menu, you can:

- Turn the BIS alarms ON or OFF
- Set the upper and lower BIS alarm limits
- Turn the CAUTION alarm ON or OFF

Refer to *Setting Alarm Limits on page 7-7* for details on operating system alarms.

The BIS HI and LO alarm limits display as numeric values when alarms are ON. The messages BIS ALM OFF displays in place of the alarm values when alarms are OFF.