

Avalon FM40 Fetal/Maternal Monitor

Philips M2704A Technical Data Sheet

The Philips **Avalon FM40** fetal/maternal monitor offers a reliable, cost-effective, high-performance solution for external fetal monitoring needs in clinics and hospitals, from pre-natal check-ups to antepartum monitoring of high-risk pregnancies.

Incorporating innovative technology, including advanced transducers, a touchscreen interface, and triplets monitoring, the Avalon FM40 sets new standards for convenience, reliable performance, and ease of use.

Measurements

The **Avalon FM40** lets you monitor and document:

- Up to three fetal heart rates externally using

ultrasound

- Uterine activity using an external Toco transducer
- Maternal heart rate via ECG electrodes
- Maternal blood pressure and pulse oximetry

Features

- Touchscreen for intuitive, easy operation
- TFT color display with a wide viewing angle and large numerics
- Built-in 6-inch recorder, with paper guide incorporating tear-off edge, for automatic printing of fetal and maternal parameters on the trace
- Fetal Movement Profile (FMP) detects and automatically records gross fetal body movements
- Intelligent transducers are waterproof, light, comfortable to wear and easy to clean

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- Automatic channel management lets you connect any fetal transducer, patient module or remote event marker to any fetal sensor socket
- Cross-Channel Verification between *all* fetal and maternal heart rates
- The blue transducer Finder LED lets you identify at a glance which transducer is monitoring which measurement, while the position indicator shows you to which fetal sensor socket a transducer is connected
- Transmission of fetal and maternal parameters to an obstetrical surveillance system
- Network connectivity to an OB TraceVue¹ system via LAN connection using the optional system interface, where OB TraceVue controls all patient admit/discharge events
- Internal backup memory allows recovery of up to one hour of trace data, either to paper or to an OB TraceVue¹ system over a LAN connection
- Stored Data Recording lets you print a specific patient episode from memory
- Cordless monitoring using the award-winning Avalon CTS Cordless Fetal Transducer System²
- Dedicated rear connection for cordless monitoring using the award-winning Avalon CTS Cordless Fetal Transducer System³
- Comprehensive patient data presentation, including at-a-glance patient identification, and the choice to add user-configurable notes⁴
- Automatic screen layouts optimize size and presentation of measurements
- NST timer
- VGA output for connection to an external display (touch screen operation supported via optional MIB interface)
- Paper Save Mode for maternal measurements

Description of Main Components

TFT Color Display

The monitor has an integrated color TFT display with a wide viewing angle, providing high resolution data presentation. Fetal and maternal measurements are displayed as large, easy-to-read numerics.

Information such as patient identification (including the bed label when connected to a surveillance system such as OB TraceVue), date and time, alarm information, icons for recorder status, and prompt and error messages are also clearly shown.

1. OB TraceVue Revision E.00.00 or later.

2. Requires Avalon CTS interface cable M2731-60001, and monitor software revision D.00.00 or higher.

3. Requires Avalon CTS interface cable M2732-60001 for rear connection, or M2731-60001 for front connection), and monitor software revision D.00.00 or higher.

4. Using standard Roman-8 character sets.

Touchscreen User Interface



The monitor is operated using the touchscreen. All user functions (apart from the On/Off switch) are controlled directly from the screen, and the intuitive, color, graphical user interface not only makes it quick and easy to learn and use, but the lack of mechanical controls also makes cleaning the Avalon fetal monitor much quicker and simpler.

A number of configurable SmartKeys at the bottom of the main screen allow fast access to functions, for starting a recording, or resetting a Toco baseline, for instance.

Heart rate and alarm volume adjustment, with an indication of the current setting, are always available at the top of the screen.

Integrated Recorder

The Avalon fetal monitor has an integrated, high resolution thermal array recorder, with paper-out/-end detection.

Traces are recorded at either 1, 2 or 3 cm/min.

Continuous traces are made for:

- Fetal Heart Rate(s)
- Maternal Heart Rate
- Fetal Movement
- Uterine Activity

The monitor prints the time, the date, trace identification symbols, the monitoring mode and the paper speed when first switched on, every ten minutes after, and whenever the monitoring modes change.

Maternal heart rate and the maternal pulse oximetry value is printed every 5 minutes. In the case of maternal noninvasive blood pressure measurement, the annotation is made at the end of the measurement.

You can print the ECG waveform in addition to viewing it on the screen.

Depending on the geography, there are two possible paper scales:

- FHR Scale:
 - Red paper: 30 to 240 bpm @ 30 bpm/cm
 - Green paper: 50 to 210 bpm @ 20 bpm/cm
- Labor Scale:
 - 0 to 100 units @ 25 units/cm

Alarms

When an alarm limit is exceeded, it is signalled by the monitor in the following ways:

- An alarm tone sounds
- An alarm message is shown on the screen
- The numeric of the alarming measurement flashes on the screen

Alarm categories:

- **Physiological Alarms** for fetal and maternal parameters (to indicate vital sign alarm limit violations, for instance)
- **Technical Alarms (INOPs)** are triggered by signal quality problems, equipment malfunction or equipment disconnect.

Alarm modes:

- **INOP only:** only INOPs are enabled, with audible and visual indication active. This is the default.
- **All:** patient alarms and INOPs are enabled, with audible and visual indicators active.

Alarm suspension:

- Alarms Off/Pause Alarms function
- Alarm pause period: indefinite, or one, two, or three minutes.

Alarm latching/non-latching:

- Visual
- Audible
- Visual and audible

Interfaces

LAN/RS-232 System Interface

The monitor has an optional LAN/RS-232 interface board with two fully-isolated ports:

- The LAN port is for connecting the monitor to an OB TraceVue obstetrical information and surveillance system on a network, or to a PC for configuration or upgrade using the Support Tool
- The RS232 port can be used for connecting the monitor to an obstetrical information and surveillance system, such as OB TraceVue

Input Device Interface (Dual PS/2 Interface)

This optional interface provides two PS/2 ports to enable the monitor to be connected to off-the-shelf, “plug-and-play” input devices:

- **Mouse:** any specified PS/2 mouse or trackball may be used for navigation and data entry.
- **Computer keyboard:** a PS/2 computer keyboard can be used

for data entry instead of the on-screen pop-up keyboard.

Dual MIB/RS232 Interface

The dual MIB/RS232 interface is for external medical grade touch screen connection.

Service Features

- The Support Tool helps technical personnel to
 - carry out configuration, upgrades and troubleshooting on an individual monitor.
 - share configuration settings between monitors.
 - back up the monitor settings.
- The Service Mode is password-protected and ensures that only trained staff can access service tests and tasks.
- The Configuration Mode is password-protected and allows trained users to customize the monitor configuration.
- The Demo Mode is password-protected and is intended for training and educational purposes.

Related Products



The monitor is compatible with the Avalon CTS Cordless Fetal Transducer System (M2720A), allowing expectant mothers to be continuously monitored without wires, whether in the bath or shower, in the bed, or while ambulating.

Refer to the Avalon CTS Data Sheet for further information, see “Accessory Options” on page 10 for the required Avalon CTS interface cable.

Regulatory and Standards Compliance

US Federal Law restricts this device to sale by or on the order of a physician.

The monitor is in conformity with the essential requirements of the European Medical Devices Directive 93/42/EEC and the following major international standards:

Safety, Performance

- EN 60601-1:1990+A1:1993+A2:1995/IEC 60601-1:1988+A1:1991+A2:1995

- EN 60601-1-1:2001/IEC 60601-1-1:2000
- EN 60601-1-6:2004/IEC 60601-1-6:2004
- EN/IEC 60601-2-27:1994
- EN/ISO 9919:2005
- EN 60601-2-30:2000/IEC 60601-2-30:1999
- EN/IEC 60601-2-37:2001+A1:2004
- EN 60601-2-49:2001/IEC 60601-2-49:2001
- UL 60601-1:2003
- CAN/CSA C22.2#601.1-M90
- AS/NZS 3200.1.0-1998

The possibility of hazards arising from hardware and software errors was minimized in compliance with ISO 14971:2000+A1:2003, EN60601-1-4:1996+A1:1999 and IEC 60601-1-4:1996+A1:1999.

Alarm sounds are compliant with the draft ISO/IEC 9703-2 Standard.

Electromagnetic Compatibility

- EN/IEC 60601-1-2:2001+A1:2004
- ICES-001:1988

The Avalon fetal monitor is classified as electromagnetic emissions Class B, except whenever used with the IUP/ECG patient module M2738A, when it is classified as Class A.

This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB-001 du Canada.

Environmental Specifications

The monitor may not meet the given performance specifications if stored and used outside the specified temperature and humidity ranges.

| FM40 Monitor | | |
|-------------------|-----------|--|
| Temperature Range | Operating | 0°C to 45°C (32°F to 113°F) |
| | Storage | -20°C to 60°C (-4°F to 140°F) |
| Humidity Range | Operating | <95% relative humidity @ 40°C/104°F |
| | Storage | <90% relative humidity @ 60°C/140°F |
| Altitude Range | Operating | -500 to 3000 m/ -1640 to 9840 ft. |
| | Storage | -500 to 13100 m/ -1640 to 43000 ft. |

| Transducers (M2734A/M2736A/M2738A) | | |
|------------------------------------|-----------|--|
| Temperature Range | Operating | 0°C to 40°C (32°F to 104°F) |
| | Storage | -20°C to 60°C (-4°F to 140°F) |
| Humidity Range | Operating | <95% relative humidity @ 40°C/104°F |
| | Storage | <90% relative humidity @ 60°C/140°F |
| Altitude Range | Operating | -500 to 3000 m/ -1640 to 9840 ft. |
| | Storage | -500 to 13100 m/ -1640 to 43000 ft. |

Physical Specifications

| Monitor | | |
|---|---|--|
| Power | Supply Voltages | 100 VAC to 240 VAC ± 10% |
| | Supply Frequency Range | 50 Hz/60 Hz |
| | Power consumption (current) | 1.3 - 0.7 A |
| Dimensions and Weight | Size mm/(in) ±1%: W x H x D (without options) | 420 x 172 x 370 ±5% (16.5 x 6.8 x 14.6 in ±5%) |
| | Weight | < 9.0 kg/19.8 lbs |
| Degree of Protection Against Electrical Shock | Type CF | |
| Electrical Class | Class I equipment | |
| Mode of Operation | Continuous operation | |

| Monitor | | |
|--------------|---|--------------|
| Startup Time | Time taken from switching on the monitor to seeing the first parameter labels | < 30 seconds |

| Transducers (M2734A/M2736A) | | | |
|---|--|--|---------------------------------------|
| Shock Resistance | Withstands ten 1m drops to concrete surface with possible cosmetic damage only | | |
| Water Ingress Protection Code | M2734A/ M2735A/ M2736A | IP 68 (immersion up to 1 m water depth for 5 hours) | |
| | M2738A | IP 67 (immersion up to 0.5 m water depth for 30 minutes) | |
| Dimensions and Weight | M2734A/ M2735A/ M2736A | Size (diameter) | 83 mm/3.27 in |
| | | Weight (without cable) | < 220 g/7.8 oz. |
| | M2738A | Maximum size mm/ (in): W x H x D | 50 x 28 x 135 (2.0 x 1.1 x 5.3 in) |
| | | Cable length | 2.5 m |
| | | Weight | < 150 g/5.3 oz. |
| Water Ingress Protection Code | IP 68 (immersion up to 1m water depth of for 5 hours) | | |
| Degree of Protection Against Electrical Shock | Type CF | | |

Performance Specifications

Complies with EN/IEC 60601-2-37:2001+A1:2004. ECG measurement follows EN/IEC 60601-2-27:1994.

Fetal / Maternal

| Fetal/Maternal Performance Specifications | | | |
|---|---------------------------|---|--|
| Ultra-sound | Measurement Method | | Ultrasound Pulsed Doppler |
| | Measurement Range | US | 50 to 240 bpm |
| | Resolution | Display | 1 bpm |
| | | Printer | 1/4 bpm |
| | Jitter @ 200 bpm | | ≤ 3 bpm |
| | Display Update Rate | | 1 / second |
| | US Intensity | Average output power | $P = (4.3 \pm 0.4) \text{ mW}$ |
| | | Peak-negative acoustic pressure | $p_- = (33.9 \pm 3.6) \text{ kPa}$ |
| | | Output beam intensity (I_{ob}) (= spatial average - temporal average intensity) | $I_{sata} = (2.38 \pm 0.75) \text{ mW/cm}^2$ |
| | | Spatial-peak temporal average intensity | $I_{spta} = (10.3 \pm 2.2) \text{ mW/cm}^2$ |
| | | Effective radiating area @ -6 dB | 1.81 cm ² |
| | Signal Quality Indication | Poor | Empty |
| | | Acceptable | Two-thirds full |
| | | Good | Full |

| Fetal/Maternal Performance Specifications | | | |
|---|---|--|---|
| Ultra-Sound | Beat to Beat Change (max.) for Ultrasound | | 28 bpm |
| | US Frequency | | 1 MHz \pm 100 Hz |
| | US Signal range | | 3.5 μ Vpp to 350 μ Vpp @ 200 Hz |
| | US Burst | Repetition Rate | 3.0 kHz |
| | | Duration | \leq 100 μ s |
| | US LF Frequency Passband @ -3dB | | 100 to 500 Hz \pm 20% |
| | FMP Signal Range @ 33 Hz | | 200 μ Vpp to 40 mVpp |
| | FMP Frequency Passband @ -3dB | | 10 to 100 Hz |
| Toco | Measurement Method | | Strain Gauge Sensor Element |
| | Sensitivity | | 1 unit = 2.5 g |
| | Resolution | Display | 1 unit |
| | | Printer | 1/4 unit |
| | Measurement Range | | 400 units |
| | Signal Range | | 0 to 127 Units |
| | Maximum Offset Range | | -300 units |
| | Baseline Setting | | 20 units |
| | Update Rate | Display | 1 / second |
| | | Printer | \sim 4 / second |
| Auto Offset Correction | | 3 seconds after connecting the transducer, the TOCO value is set to 20 units | |
| Auto Zero Adjust | | TOCO value is set to zero following a negative measurement value for 5 seconds | |
| Maternal Heart Rate | Measurement Range | | 30 to 240 bpm |

| Fetal/Maternal Performance Specifications | | | |
|---|------------|--|---|
| | Resolution | Display | 1 bpm |
| | | Recorder | 1/4 bpm |
| | | Accuracy | \pm 1 bpm or 1%, whichever is greater |
| | | Filter Bandwidth | 0.8 to 80 Hz |
| | | Inop Auxiliary Current (Leads Off Detection) | < 100 μ A |
| | | Input Signal Range (derived from RA and LA electrodes) | 150 μ Vpp to 6 mVpp |
| | | Defibrillator Protection | None |
| | | ESU Protection | None |

| Fetal Heart Rate (Ultrasound) Alarm Specifications | | | |
|--|-------|--------------------------------|--|
| FHR Alarm Limits | Range | Bradycardia (low limit) | 60 to 200 bpm adjustable in 10 bpm steps Default: 110 bpm |
| | | Tachycardia (high limit) | 60 to 210 bpm adjustable in 10 bpm steps Default: 170 bpm |
| FHR Alarm Delay | Range | Bradycardia (low limit) Delay | 10 to 300 seconds in steps of 10 s Default: 240 s |
| | | Tachycardia (high limit) Delay | 10 to 300 seconds in steps of 10 s Default: 300 s |
| | | Signal Loss Delay | 10 to 300 seconds in steps of 10 s |

| Maternal Heart Rate Alarm Specifications | Range | Adjustment |
|--|--|---|
| MECG Alarm Limits | High Range: 31 to 240 Default: 120 bpm | 1 bpm steps (30 to 40 bpm) 5 bpm steps (40 to 240 bpm) |
| | Low Range: 30 to 235 Default: 50 bpm | |
| Tachycardia | Difference to high limit: 0 to 50 bpm Default: 20 bpm | 5 bpm steps |
| | Clamping at: 150 to 240 bpm Default: 200 bpm | 5 bpm steps |
| Bradycardia | Difference to low limit: 0 to 50 bpm Default: 20 bpm | 5 bpm steps |
| | Clamping at: 30 to 100 bpm Default: 40 bpm | 5 bpm steps |

Noninvasive Blood Pressure

Measurement Validation: In adult mode, the blood pressure measurements determined with this device comply with the American National Standard for Electronic or Automated Sphygmomanometers (ANSI/AAMI SP10 - 1992) in relation to mean error and standard deviation, when compared to intra-arterial or auscultatory measurements (depending on the configuration) in a representative patient population. For the auscultatory reference the 5th Korotkoff sound was used to determine the diastolic pressure.

Complies with IEC 60601-2-30:1999/EN60601-2-30:2000.

| Noninvasive Blood Pressure Performance Specifications | | |
|---|------------------|--------------------------------|
| Measurement Ranges | Systolic | 30 to 270 mmHg (4 to 36 kPa) |
| | Diastolic | 10 to 245 mmHg (1.5 to 32 kPa) |
| | Mean | 20 to 255 mmHg (2.5 to 34 kPa) |

| Noninvasive Blood Pressure Performance Specifications | | |
|---|---|---|
| Accuracy | | Max. Std. Deviation: 8 mmHg (1.1 kPa) Max. Mean Error: ±5 mmHg (±0.7 kPa) |
| Pulse Rate | Range | 40 to 300 bpm |
| | Accuracy (average over non-invasive blood pressure measurement cycle) | 40 to 100 bpm: ±5 bpm |
| | | 101 to 200 bpm: ±5% of reading 201 to 300 bpm: ±10% of reading |
| Measurement Time | | Typical at HR > 60bpm Auto/manual: 30 seconds (adult) Maximum time: 180 seconds (adult) |
| Cuff Inflation Time | | Typical for normal adult cuff: Less than 10 seconds |
| Initial Cuff Inflation Pressure | | 165 ±15 mmHg |
| Auto Mode Repetition Times | | 1, 2, 2.5, 3, 5, 10, 15, 20, 30, 45, 60 or 120 minutes |
| Venipuncture Mode Inflation | | |
| Inflation Pressure | | 20 to 120 mmHg (3 to 16 kPa) |
| Automatic deflation after | | 170 seconds |

| Alarm Specifications | Range | Adjustment |
|----------------------|---------------------------------------|---|
| Systolic | Adult: 30 to 270 mmHg (4 to 36 kPa) | 10 to 30 mmHg: 2 mmHg (0.5 kPa) > 30 mmHg: 5 mmHg (1kPa) |
| Diastolic | Adult: 10 to 245 mmHg (1.5 to 32 kPa) | |
| Mean | Adult: 20 to 255 mmHg (2.5 to 34 kPa) | |

| Overpressure Settings | Adjustment |
|-----------------------------|---------------------|
| > 300 mmHg (40 kPa) > 2 sec | not user adjustable |

SpO₂

Maternal pulse oximetry provides numerics and pulse trace for oxygen saturation (SpO₂) of functional maternal arterial hemoglobin. Heart rate is measured from maternal ECG electrodes (if connected).

Otherwise, the pulse rate is derived from pulse oximetry.

Complies with EN/ISO 9919:2005 (except alarm system; alarm system complies with IEC 60601-2-49:2001).

Measurement Validation: The SpO₂ accuracy has been validated in human studies against arterial blood sample reference measured with a CO-oximeter. Pulse oximeter measurements are statistically distributed, only about two-thirds of the measurements can be expected to fall within the specified accuracy compared to CO-oximeter measurements. Display Update Period: Typical: 2 seconds, Maximum: 30 seconds. Max. with noninvasive blood pressure INOP suppression on: 60 seconds.

| SpO ₂ Performance Specifications | | |
|--|------------|--|
| SpO ₂ The specified accuracy is the root-mean-square (RMS) difference between the measured values and the reference values | Range | 0 to 100% |
| | Accuracy | Philips Reusable Sensors: M1191A/B, M1191AL/BL, M1191ANL, M1192A, M1192AN = 2% (70% to 100%) M1191T, M1192T, M1194A, M1194AN, M1196A, M1196T = 3% (70% to 100%) Philips Disposable Sensors with M1943A(L): M1131A, M1901B, M1903B, M1904B = 3% (70% to 100%) NellcorPB[®] Sensors with M1943A(L): MAX-A, MAX-AL, MAX-P, MAX-N, D-25, D-20, N-25, OxiCliq A, P, N = 3% (70% to 100%) |
| | Resolution | 1% |
| Pulse | Range | 30 to 300 bpm |
| | Accuracy | ±2% or 1 bpm, whichever is greater |
| | Resolution | 1 bpm |

| SpO ₂ Performance Specifications | | |
|---|----------------------|--|
| Sensors | Wavelength range | 500 to 1000 nm. Information about the wavelength range can be especially useful to clinicians (for instance, when photodynamic therapy is performed). |
| | Emitted Light Energy | ≤ 15mW |
| Pulse Oximeter Calibration Range | | 70% - 100% |

Recorder Specifications

| Built-in Thermal Array Fetal Trace Recorder | | |
|---|---|------------------------------|
| Mechanism | Thermal Array Recorder | |
| Paper & Printing | Type | Standard Z-fold paper |
| | Standard Speeds (real-time traces) | 3 cm/min, 2 cm/min, 1 cm/min |
| Stored Data Recording/Trace Recovery Printout | Print speed is variable up to 20 mm/s and depends on the print load | |
| | Paper Advance | Up to 20 mm/s |
| Sensing | Optical Reflex Sensor for black page marks | |
| Accuracy @ 3 cm/min, 2 cm/min, 1 cm/min | ±5 mm/page | |
| Usable Print Width | 128 mm | |
| Resolution | 8 dots/mm (200 dpi) | |
| Time Delay to see trace on paper | <30s @ 1 cm/min | |

| Built-in Thermal Array Fetal Trace Recorder | | | |
|--|---------|----------|------------------------------|
| Trace Separation Offset for FHR (Ultrasound) | Twin | Standard | FHR2 +20 bpm |
| | | Classic | FHR1 +20 bpm |
| | Triplet | Standard | FHR2 +20 bpm FHR3 -20 bpm |
| | | Classic | FHR1 +20 bpm FHR3 -20 bpm |

Ordering Guide and Accessory Options

You can order the Avalon FM40 fetal monitor under the product number **M2704A**. To order, precede the required option number with **M2704A** (for example, **M2704A** adds the noninvasive blood pressure measurement). “K” options let you modify your order. Below you will find tables giving you a quick overview of the monitor’s standard capabilities, and what is available as options. Refer to “Standard Accessories Included” on page 11 for a list of items shipped as part of the standard configuration. Start-up quantities of fetal supplies are available in five convenient kits.

All features listed as options can be added at a later time (see “Upgrade Options” on page 15).

Standard Measurements

| Type | Description | Recommended Accessory Option (See “Accessory Options” on page 10) |
|---------------------------------|---|---|
| Standard Fetal Measurements: | Fetal Heart Rate (FHR) via ultrasound | - |
| | Twins monitoring via ultrasound | K02 |
| | Fetal Movement Profile* (FMP) | - |
| | Toco | - |
| Standard Maternal Measurements: | Maternal Heart Rate via MEGG electrodes | K03 |
| | Noninvasive Blood Pressure (NIBP) with Pulse Rate | K31 |
| | Pulse Oximetry (maternal SpO ₂) | K91 |

*We recommend to switch off FMP during labor.

**You can measure MHR using the “Toco⁺” transducer . Order M1363A separately (see “Maternal Heart Rate Accessories” on page 12).

Optional Measurements

| Type | Description | Required Option | Recommended Accessory Option(s) (See “Accessory Options” on page 10) |
|------------------------------|---------------------------|-----------------|---|
| Optional Fetal Measurements: | Triple FHR via ultrasound | C73 | K02 |

Standard Interfaces

| Description | Option |
|--|--------|
| System Interface (1 x RS232 port and 1 x LAN port) | J70 |
| Rear Telemetry connectors (for connecting to Avalon CTS) | J80 |
| External Display | J90 |

Optional Interfaces

| Description | Required Option | Recommended Accessory Option |
|--|-----------------|--|
| Dual MIB/RS232 Interface for connecting external touch screen (M8033B, M8033C) | J13 | - |
| Dual PS/2 Interface for keyboard and mouse connection | J22 | M8024A #A01) (See “Input Devices” on page 14) |

Accessory Options

| Option Number | Description |
|---------------|--|
| K01 | The monitor comes with one ultrasound transducer. To add a second M2736A ultrasound transducer, order option K01 . |
| K02 | The monitor comes with one ultrasound transducer. To add two additional M2736A ultrasound transducers, order option K02 (only in conjunction with C73). |
| K03 | Order ECG Patient Module M2738A (includes MECCG adapter cable M1363A), using option K03 . |
| K04 | Order the Remote Event Marker (989803143411) using option K04 . |
| K30 | Avalon CTS Cable M2731-60001 for front connection |
| K40 | Avalon CTS Cable M2732-60001 for rear connection (requires option J80) |
| K31 | Order Antimicrobial NIBP Cuff assortment kit with 3 m (10 ft) connection tubing (M1599B) using option K31 : small adult - M4554A; adult - M4555A; large adult - M4557A |
| K91 | Order reusable Adult Finger SpO ₂ sensor (M1191AL), cable length 3 m (10 ft), using option K91 . |

Paper Scaling Options

| Option Number | Description |
|---------------|--------------------------|
| P01 | 50-210 bpm paper scaling |
| P02 | 30-240 bpm paper scaling |

Fetal Supplies Starter Kits

| Kit Number | Description | Contents |
|------------|---|---|
| 862214 | Standard Antepartum Kit (North America) | Paper (30-240), belts, gel, belts buttons, belt clips |
| 862215 | Standard Antepartum Kit (Europe, Latin America, Asia) | Paper (50-210), belts, gel, belts buttons, belt clips |
| 862216 | Standard Antepartum Kit (Japan) | Paper (50-210), belts, gel, belts buttons, belt clips |

Standard Accessories Included

| Description | Quantity |
|--|----------|
| Toco transducer | 1 |
| Ultrasound transducer | 1 |
| Butterfly Belt Kit | 2 |
| Fetal paper pack (country-specific, installed) | 1 |
| Power cable | 1 |
| Instructions for Use | 1 |
| Documentation CD-ROM (includes Service Guide and Instructions for Use) | 1 |

Transducers

| Transducer | Part Number |
|--|---------------|
| Ultrasound transducer | M2736A |
| Toco transducer for monitoring external Toco | M2734A |
| “Toco+” transducer for monitoring Toco maternal heart rate | M2735A |
| ECG Patient Module for monitoring maternal heart rate | M2738A |

Fetal Accessories

| Fetal Accessories | | Part Number |
|--|--|---------------------|
| Belt (reusable, gray, water resistant) | 32 mm wide, 15 m roll | M4601A |
| | 60 mm wide, 5 belts | M4602A |
| | 60 mm wide, 15 m roll | M4603A |
| Belt (reusable, brown, contains latex) | 50 mm wide, 5 belts | M1562A |
| | 60 mm wide, 5 belts | 1500-0642 |
| | 60 mm wide, 15 m roll | 1500-0643 |
| Belt (disposable, yellow, water resistant) | 60 mm wide, pack of 100 | M2208A |
| Ultrasound gel | 12 Bottles | 40483A |
| | 5 liter refill (with dispenser) for 40483A Shelf life: 24 months max. | 40483B |
| Belt buttons, pack of 10 | | M1569A |
| Butterfly belt clip (pack of 6) | | 989803143401 |
| Telemetry interface cable | Avalon CTS Cable M2731-60001, red connector, for front connection | M2731-60501 |
| | Avalon CTS Cable M2732-60001, black connector, for rear connection (requires option J80) | M2732-60501 |
| External Marker | | 989803143411 |

Recorder Paper

Supplied in cases of 40 packs. Each pack has 150 numbered pages.

| Product No. | Geography | FHR Scale | Grid Color | Scale Units | High-lighted 3cm Lines? |
|---------------|---------------------|-----------|-------------|--------------|-------------------------|
| M1910A | USA/Canada and Asia | 30 - 240 | Red/ Orange | mmHg | Yes |
| M1911A | Europe/ Japan | 50 - 210 | Green | mmHg and kPa | No |
| M1913A | Japan | 50 - 210 | Green | mmHg | Yes |
| M1913J | Japan | 50 - 210 | Green* | mmHg | Yes |

*Bradycardia and tachycardia alarm ranges are shaded.

Maternal Heart Rate Accessories

| MECG Accessories | Part Number |
|---|-----------------|
| MECG adapter cable | M1363A |
| Foam ECG electrodes, snap-fit, for MECG adapter cable | 40493D/E |

Noninvasive Blood Pressure Accessories

Adult/Pediatric Multi-Patient Comfort Cuffs and Disposable Cuffs

| Patient Category | Limb Circumference (cm) | Bladder Width (cm) | Disposable cuff Part No. | Reusable cuff Part No. | Tubing |
|------------------|-------------------------|--------------------|--------------------------|------------------------|----------------------------------|
| Adult (Thigh) | 42.0 - 54.0 | 20.0 | M1879A | M1576A | M1598B (1.5 m) or M1599B (3.0 m) |
| Large Adult | 34.0 - 43.0 | 16.0 | M1878A | M1575A | |
| Adult | 27.0 - 35.0 | 13.0 | M1877A | M1574A | |
| Small Adult | 20.5 - 28.0 | 10.5 | M1876A | M1573A | |

Adult Antimicrobial Coated Reusable cuffs

| Patient Category (color) | Limb Circumference (cm) | Bladder Width (cm) | Part No. | Tubing |
|-------------------------------|-------------------------|--------------------|----------|----------------------------------|
| Adult Thigh (grey) | 45.0 - 56.5 | 21.0 | M4559A | M1598B (1.5 m) or M1599B (3.0 m) |
| Large Adult X-Long (burgundy) | 35.5 - 46.0 | 17.0 | M4558A | |
| Large Adult (burgundy) | 35.5 - 46.0 | 17.0 | M4557A | |
| Adult X-Long (navy blue) | 27.5 - 36.5 | 13.5 | M4556A | |
| Adult (navy blue) | 27.5 - 36.5 | 13.5 | M4555A | |
| Small Adult (royal blue) | 20.5 - 28.5 | 10.6 | M4554A | |

Adult Soft Single Patient Single-Hose Disposable Cuffs

| Patient Category | Limb Circumference (cm) | Bladder Width (cm) | Part No. | Tubing |
|--------------------|-------------------------|--------------------|----------|----------------------------------|
| Adult (Thigh) | 45.0 - 56.5 | 20.4 | M4579A | M1598B (1.5 m) or M1599B (3.0 m) |
| Large Adult X-Long | 35.5 - 46.0 | 16.4 | M4578A | |
| Large Adult | 35.5 - 46.0 | 16.4 | M4577A | |
| Adult X-Long | 27.5 - 36.5 | 13.1 | M4576A | |
| Adult | 27.5 - 36.5 | 13.1 | M4575A | |
| Small Adult | 20.5 - 28.5 | 10.4 | M4574A | |

SpO₂ Accessories

All listed sensors operate without risk of exceeding 41°C on the skin if ambient temperature is below 37°C.

| Product No. | Description | Comments |
|---------------------------------|--|----------------------------|
| Philips reusable sensors | | |
| M1191A/B | Adult sensor (2.0 m cable), for patients over 50 kg. Any finger except thumb. | No adapter cable required. |
| M1191AL/BL | M1191A with longer cable (3.0 m) | |
| M1192A | Small adult, pediatric sensor (1.5m cable) for patients between 15 kg and 50 kg. Any finger except thumb. Use only on adult patients with FM30/40/50 | |
| M1194A | Ear sensor (1.5m cable) for patients more than 40 kg. Use only on adult patients with FM30/40/50 | |
| M1196A | Adult clip sensor (3 m cable) for patients more than 40 kg. Any finger except thumb. | |
| | | |

| Product No. | Description | Comments |
|--|---|---|
| M1191T | Adult sensor (0.45 m), for patients over 50 kg. Any finger except thumb. | Requires M1943A (1.0 m) or M1943AL (3.0 m) adapter cable. |
| M1192T | Small adult, pediatric sensor (0.45m cable) for patients between 15 kg and 50 kg. Any finger except thumb. Use only on adult patients with FM30/40/50 | |
| M1196T | Adult clip sensor (0.9 m cable) for patients more than 40 kg. Any finger except thumb. | |
| M1191ANL | Special Edition (SE) Adult sensor (3m cable), for patients over 50 kg. Any finger except thumb. | No adapter cable required. |
| M1192AN | Special Edition (SE) Small adult, pediatric sensor (1.5m cable) for patients between 15 kg and 50 kg. Any finger except thumb. Use only on adult patients with FM30/40/50 | SE sensors work with FM30/40/50, as well as with OxiMax-compatible SpO ₂ |
| M1194AN | Special Edition (SE) Ear sensor (1.5m cable) for patients more than 40 kg. | versions of other Philips monitors. |
| Philips disposable sensors. Not available in the USA. | | |
| M1904B | Identical to OxiMax MAX-A | Requires M1943A (1.0 m) or M1943AL (3.0 m) adapter cable |
| M1903B | Identical to OxiMax MAX-P | |
| M1901B | Identical to OxiMax MAX-N | |
| Philips disposable sensors. Available worldwide. | | |
| M1131A | Adult/Pediatric finger sensor (0.45 m cable) Use only on adult patients with FM30/40/50 | Requires M1943A (1.0 m) or M1943AL (3.0 m) adapter cable |
| M1133A | Adult/Infant/Neonatal sensor(0.9 m cable) for patients >40 kg. Any finger except thumb. | |

| Product No. | Description | Comments |
|--|--|--|
| NELLCOR disposable sensors (must be ordered from Nellcor) | | |
| OxiMax MAX-A | Adult finger sensor (patient size >30kg) | Requires M1943A (1.0 m) or M1943AL (3.0 m) adapter cable. |
| OxiMax MAX-AL | OxiMax MAX-A with long cable | |
| OxiMax MAX-P | Pediatric foot/hand sensor (patient size 10-50 kg) Use only on adult patients with FM30/40/50 | |
| OxiMax MAX-N | Adult finger or neonatal foot/hand sensor (patient size >40 kg or <3 kg) Use only on adult patients with FM30/40/50 | |
| Oxisensor II D-25 | Adult sensor (patient size >30kg) | Requires M1943A (1.0 m) or M1943AL (3.0 m) adapter cable. |
| Oxisensor II D-20 | Pediatric sensor (patient size 10-50 kg) Use only on adult patients with FM30/40/50 | |
| Oxisensor II N-25 | Neonatal/Adult sensor (patient size <3 kg or >40 kg) Use only on adult patients with FM30/40/50 | |
| OxiCliq A | See OxiMax MAX-A | |
| OxiCliq P | See OxiMax MAX-P Use only on adult patients with FM30/40/50 | Requires M1943A (1.0 m) or M1943AL (3.0 m) adapter cable together with OC3 adapter cable. |
| OxiCliq N | See OxiMax MAX-N Use only on adult patients with FM30/40/50 | |
| Extension / Adapter Cables | | |
| M1941A^a | Extension cable (2 m) | For use with Philips reusable sensors and adapter cables. |




| Product No. | Description | Comments |
|----------------------------|-----------------------------------|--|
| M1943A^a | Adapter cable (1.1 m cable) | Adapter cable for Philips/ Nellcor disposable sensors. |
| M1943AL^a | Adapter cable (3 m cable) | |
| OC 3 | Adapter Cable for OxiCliq sensors | Available from Nellcor. |

a. Do not use more than one extension cable with any sensors or adapter cables. Do not use an extension cable with Philips reusable sensors or adapter cables with part numbers ending in -L (indicates "Long" version).

Input Devices

| Description | Option |
|--|--------------------|
| Slimline keyboard with integrated trackball (includes spill cover) | M8024A #A01 |
| Optical mouse | M8024A #B01 |
| Trackball | M8024A #C01 |
| Wireless trackball | M8024A #C02 |
| Hand-Track | M8024A #C03 |

Mounting Hardware

| Mounts, Carts and Rollstands | | |
|---|---|---|
| M2740A #C02 | M2740A #C03 | M2740A #U01 |
|  |  |  |
| Cart with fixed angle mount and two drawers | Camlock Kit | Mounting Kit for Avalon CTS for use with M2740A #C01 |

Upgrade Options

Upgrade options are prefixed with **M2704A**. For example, to add a system interface upgrade, order **M2704A** Option J70.

| Upgrade Options | |
|-----------------|--|
| Option Number | Option Adds |
| C73 | Triplets monitoring capability. |
| J13 | Dual MIB/RS232 Interface for connecting external touch screen (M8033B, M8033C) |
| J22 | Dual PS/2 Interface for connecting a keyboard and mouse. |
| K30 | Avalon CTS Cable M2731-60001 for front connection |
| K40 | Avalon CTS Cable M2732-60001 for rear connection |

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M2704A complies with the requirements of the Council Directive 93/42/EEC of 14 June 1993 (Medical Device Directive).



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Printed in The Netherlands.
4522 962 29411 JAN 2008