# Avalon FM30
## Fetal / Maternal Monitor

The Philips **Avalon FM30** fetal/maternal monitor offers a state-of-the-art solution for all external and internal fetal monitoring measurements in doctors' practices, clinics and hospitals, during labor and delivery and for antepartum monitoring of high-risk patients.

With a cutting-edge feature set, including advanced transducers, high quality signal processing, and a touchscreen interface, the Avalon FM30 sets new standards for performance, flexibility, convenience, and ease of use.

## Measurements

The **Avalon FM30** lets you monitor and document:

- Up to three[1] fetal heart rates externally using ultrasound
- DECG via combined Toco/ECG "Toco+" transducer (also can measure MECG)
- Uterine activity externally, or intrauterine pressure
- Maternal heart rate with ECG waveform display

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1. Triplets monitoring is not currently available in the USA.

- 6 second maternal ECG strip, with a choice of real-time recording or "snapshot" together with the fetal trace
- Maternal blood pressure and pulse oximetry (optional)

## Features

- Touchscreen for intuitive, easy operation
- Tilt and fold 6.5-inch TFT color display with a wide viewing angle and large numerics
- Built-in 6-inch recorder for automatic printing of fetal and maternal parameters on the trace
- Intelligent transducers are waterproof, light, comfortable to wear and easy to clean
- 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
- Transmission of fetal and maternal parameters to an obstetrical surveillance system
- Network connectivity to an OB TraceVue[2] 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 TraceVue[2] system over a LAN connection
- Cordless monitoring using the award-winning Avalon CTS Cordless Fetal Transducer System[3]
- Compact and light, with built-in carrying handle, and stand for angled stance on any flat surface
- Comprehensive patient data presentation, including at-a-glance patient identification, and

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2. OB TraceVue Revision E.00.00 or later.
3. Requires Avalon CTS interface cable M2731-60001 (see Avalon CTS data sheet for details), and monitor software revision D.00.00 or higher.

**PHILIPS**

the choice to add user-configurable notes[4]

- Automatic screen layouts optimize size and presentation of measurements
- Fetal Movement Profile (FMP) detects and automatically records gross fetal body movements for antepartum applications
- NST timer for antepartum applications

## Description of Main Components

### TFT Color Display

The monitor has an integrated, tiltable 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.

### 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 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

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4. Using standard Roman-8 character sets.

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- 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.

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 connection 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 connection 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.

## 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



Monitors with software revision D.00.00 (or higher) are 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. Monitors with earlier software revisions can be upgraded to the lastest software version (see "Upgrade Options" on page 14). Refer to the Avalon CTS Data Sheet for the required Avalon CTS interface cable (M2731-60001) and further information.

## 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/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.

| FM30 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/M2735A/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. |

| $SpO_2$ Sensors | |
|---|---|
| Operating Temperature Range | 0°C to 37°C (32°F to 98.6°F) |

## Physical Specifications

| FM30 Monitor | | |
|---|---|---|
| Power | Supply Voltages | 100 VAC to 240 VAC ± 10% |
| | Supply Frequency Range | 50 Hz to 60 Hz |
| | Power consumption (maximum) | 60 VA |
| Dimensions and Weight | Size mm/(in) ±1%: width x height x depth (without options) | 286 x 133 x 335 (11.3 x 5.2 x 13.2 in) |
| | Weight | < 5.1 kg/11.2 lbs |
| Degree of Protection Against Electrical Shock | Type CF | |
| Electrical Class | Class II equipment | |
| Mode of Operation | Continuous operation | |
| Startup Time | Time taken from switching on the monitor to seeing the first parameter labels | < 30 seconds |

| Transducers (M2734A/M2735A/M2736A) | | | |
|---|---|---|---|
| Shock Resistance | Withstands ten 1m drops to concrete surface with possible cosmetic damage only | | |
| Water Ingress Protection Code | M2734/35/36A | 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 | M2734/35/36A | Size (diameter) | 83 mm/3.27 in |
| | | Weight (without cable) | < 220 g/7.8 oz. |
| | M2738A | Maximum size mm/(in): width x height x depth | 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 EN 60601-2-37:2001+A1:2004. ECG measurement follows EN/IEC 60601-2-27:1994.

## Fetal / Maternal

| Fetal/Maternal Performance Specifications | | | |
|---|---|---|---|
| Ultrasound | Measurement Method | | Ultrasound Pulsed Doppler |
| | Measurement Range | US | 50 to 240 bpm |
| | Resolution | Display | 1 bpm |
| | | Printer | 1/4 bpm |
| | Jitter @ 200 bpm | | $\leq$ 3 bpm |
| | Display Update Rate | | 1 / second |
| | US Intensity | Average output power | $P = (4.3 \pm 0.4)$ mW |
| | | Peak-negative acoustic pressure | $p_- = (33.9 \pm 3.6)$ kPa |
| | | Output beam intensity ($I_{ob}$) (= spatial average - temporal average intensity) | $I_{sata} = (2.38 \pm 0.75)$ mW/cm$^2$ |
| | | Spatial-peak temporal average intensity | $I_{spta} = (10.3 \pm 2.2)$ mW/cm$^2$ |
| | | Effective radiating area @ -6 dB | 1.81 cm$^2$ |
| | Signal Quality Indication | Poor | Empty |
| | | Acceptable | Two-thirds full |
| | | Good | Full |
| | Beat to Beat Change (max.) for Ultrasound | | 28 bpm |
| | US Frequency | | 1 MHz $\pm$ 100 Hz |
| | US Signal range | | 3.5 µVpp to 350 µVpp @ 200 Hz |
| | US Burst | Repetition Rate | 3.0 kHz |
| | | Duration | $\leq$ 100 µs |
| | US LF Frequency Passband @ -3dB | | 100 to 500 Hz $\pm$ 20% |
| | FMP Signal Range @ 33 Hz | | 200 µVpp 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 | ~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 |
| IUP | Measurement Method | | Passive Resistive Strain Gauge Elements |
| | Measurement Range | | -100 to +300 mmHg |
| | Signal Range | | -99 to 127 mmHg |
| | Resolution | Display | 1 mmHg |
| | | Printer | 1/4 mmHg |
| | Sensitivity | | 5 µV/V/mmHg |
| | Offset Compensation | | +100 to -200 mmHg |
| | Baseline Setting | | 0 mmHg |
| | Accuracy (not including sensor accuracy) | | $\pm$ 0.5% per 100 mmHg |
| | Update Rate | Display | 1 / second |
| | | Printer | ~4 / second |
| | Auto Offset Correction | | 3 seconds after connecting the transducer, the IUP value is set to 0 mmHg |

| Fetal/Maternal Performance Specifications | | | |
|---|---|---|---|
| **Direct ECG and Maternal ECG** | Type | DECG | Single Lead ECG (derived from Fetal Scalp Electrode) |
| | | MECG | Single Lead ECG (derived from RA and LA electrodes) |
| | Measurement Range | | 30 to 240 bpm |
| | Resolution | Display | 1 bpm |
| | | Recorder | 1/4 bpm |
| | Accuracy | | ± 1 bpm or 1%, whichever is greater |
| | Filter Bandwidth | | 0.8 to 80 Hz |
| | Inop Auxiliary Current (Leads Off Detection) | | < 100 µA |
| | Input Signal Range | DECG | 20 µVpp to 6 mVpp |
| | | MECG | 150 µVpp to 6 mVpp |
| | Defibrillator Protection | | None |
| | ESU Protection | | None |

| Fetal Heart Rate (Ultrasound/DECG) 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 |

| **MECG 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.

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| 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) |
| Accuracy | | Max. Std. Deviation: 8 mmHg (1.1 kPa) <br> Max. Mean Error: ±5 mmHg (±0.7 kPa) |
| Pulse Rate | Range | 40 to 300 bpm |
| | Accuracy <br><br> (average over noninvasive 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) <br> > 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 |

## SpO$_2$

Maternal pulse oximetry provides numerics and pulse trace for oxygen saturation (SpO$_2$) of functional maternal arterial hemoglobin. Heart rate is measures 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 SpO$_2$ 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$_2$ <br><br> 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:** <br> M1191A, M1191AL, M1191ANL, M1192A, M1192AN= 2% (70% to 100%) <br> M1191T, M1192T, M1194A, M1194AN = 3% (70% to 100%) <br><br> **Philips Disposable Sensors with M1943A(L):** <br> M1131A, M1901B, M1903B, M1904B = 3% (70% to 100%) <br><br> **NellcorPB® Sensors with M1943A(L):** <br> 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.<br>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% |

| SpO$_2$ Alarm Specifications | Range | Adjustment | Delay |
|---|---|---|---|
| SpO$_2$ | 50 to 100% | 1% steps | (0, 1, 2, 3,... 30) + 4 seconds |
| Desat | 50 to low alarm limit | 1% steps | |
| Pulse | 30 to 300 bpm | 1 bpm steps (30 to 40 bpm)<br>5 bpm steps (40 to 300 bpm) | max. 14 seconds |
| Tachycardia | Difference to high limit 0 to 50 bpm | 5 bpm steps | max. 14 seconds |
| | Clamping at 150 to 300 bpm | 5 bpm steps | |
| Bradycardia | Difference to low limit 0 to 50 bpm | 5 bpm steps | max. 14 seconds |
| | Clamping at 30 to 100 bpm | 5 bpm steps | |

## 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, 1cm/min |
| | ECG Wave Recording (not real-time) | Emulated 25 mm/s<br>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 | |
| Trace Separation Offset for FHR (Ultrasound and DECG) | Twin | FHR2 +20 bpm |
| | Triplet | FHR2 +20 bpm<br>FHR3 -20 bpm |

## Ordering Guide and Accessory Options

You can order the Avalon FM30 fetal monitor under the product number **M2703A**. To order, precede the required option number with M2703A (for example, M2703A #B71 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 capablities, and what is available as options. Refer to "Standard Accessories Included" on page 10 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 14).

## Standard Measurements

| Type | Description | Recommended Accessory Option (See "Accessory Options" on page 9) |
|------|-------------|------|
| Standard Fetal Measurements: | Fetal Heart Rate (FHR) via ultrasound | - |
| | Twins monitoring via ultrasound | **K02** |
| | Fetal Movement Profile* (FMP) | - |
| | Toco | - |
| | FHR via Direct ECG (DECG) | - |
| | Intrauterine Pressure (IUP) | **K03** |
| Standard Maternal Measurements: | Maternal ECG** and Heart Rate via MECG electrodes, including MECG waveform | **K03** |

*We recommend to switch off FMP during labor.

**You can measure MECG using the "Toco+" transducer if you are not already using it to measure DECG. Order M1363A separately (see "MECG Accessories" on page 11).

## Optional Measurements

| Type | Description | Required Option | Recommended Accessory Option(s) (See "Accessory Options" on page 9) |
|------|-------------|-----------------|------|
| Optional Fetal Measurements: | Triple FHR via ultrasound (Not currently available in USA) | **C73** | **K02** |
| Optional Maternal Measurements: | Noninvasive Blood Pressure (NIBP) with Pulse Rate | **B71** | **K31** |
| | Pulse Oximetry (maternal SpO$_2$) together with NIBP with Pulse Rate | **B73** | **K31 + K91** |

## Optional Interfaces

| Description | Required Option | Recommended Accessory Option |
|-------------|-----------------|------|
| Dual PS/2 Interface for keyboard and mouse connection | **J22** | **M8024A #A01)** (See "Input Devices" on page 13) |
| System Interface (1 x RS232 port and 1 x LAN port) | **J70** | - |

## Accessory Options

| Option Number | Description |
|---------------|-------------|
| **K01** | The Avalon FM30 comes with one ultrasound transducer. To add a second M2736A ultrasound transducer, order option **K01**. |
| **K02** | The Avalon FM30 comes with one ultrasound transducer. To add two additional M2736A ultrasound transducers, order option **K02** (only in conjunction with C73). |
| **K03** | Order ECG/IUP Patient Module M2738A (includes MECG adapter cable M1363A), using option **K03**. |
| **K04** | Order the Remote Event Marker (9898 031 43411) using option **K04**. |
| **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 |
| 862217 | Intrapartum DECG Kit (single spiral) | Fetal scalp electrodes, fetal adhesive pad electrodes |
| 862218 | Intrapartum DECG Kit (double spiral). Europe only. Not for USA | Fetal scalp electrodes, fetal adhesive pad electrodes |

**Standard Accessories Included**

| Description | Quantity |
|---|---|
| "Toco+" transducer for Toco, DECG, MECG or IUP monitoring | 1 |
| Ultrasound transducer | 1 |
| Butterfly Belt Kit | 2 |
| Fetal paper pack (country-specific, installed) | 1 |
| Power cable | 1 |
| DECG adapter cable 9898 031 37651 | 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, DECG, MECG or IUP | M2735A |
| ECG Patient Module for monitoring maternal heart rate or IUP | 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 |
| | 50 mm wide, 5 belts | M1562B |
| 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 5 | | M1569A |
| Butterfly belt clip (pack of 6) | | 9898 031 43401 |
| DECG Accessories: New Philips DECG Solution | DECG reusable legplate adapter cable (with flushing port) | 9898 031 37651 |
| | DECG leg attachment electrode for DECG legplate adapter cable | 9898 031 39771 |
| | DECG fetal scalp electrode: single spiral, worldwide availability | 9898 031 37631 |
| | DECG fetal scalp electrode: double spiral, Europe only. Not for USA | 9898 031 37641 |

| Fetal Accessories | | Part Number |
|---|---|---|
| DECG Accessories:<br>QwikConnect Plus™<br>Solution | ECG reusable legplate adapter cable (QwikConnect Plus™) | **M1362B** |
| | ECG leg attachment electrode for DECG legplate adapter cable | **M1349A** |
| | DECG fetal scalp electrode: single spiral, worldwide availability | **15133E** |
| | DECG fetal scalp electrode: double spiral, Europe only. Not for USA | **15133D** |
| Disposable Koala IUP catheter | | **M1333A** |
| Reusable Koala IUP adapter cable | | **9898 031 43931** |
| External Marker | | **9898 031 43411** |

## Recorder Paper

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

| Product Number | Geography | FHR Scale | Grid Color | Scale Units | Highlighted 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 |

*Normal bradycardia and tachycardia alarm ranges are yellow; severe bradycardia and tachycardia ranges are red.

## MECG Accessories

| Maternal Heart Rate 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)<br>or<br>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)<br>or<br>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** | |

**SpO$_2$ Accessories**

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

| Product Number | Description | Comments |
|---|---|---|
| **Philips reusable sensors** | | |
| **M1191A** | Adult sensor (2.0 m cable), for patients over 50 kg. Any finger, except thumb. | No adapter cable required. |
| **M1191AL** | 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 | |
| **M1194A** | Ear sensor (1.5m cable) for patients more than 40 kg. Use only on adult patients with FM30 | |
| **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 | |
| **M1191ANL** | Special Edition (SE) Adult sensor (3m cable), for patients over 50 kg. Any finger, except thumb. | No adapter cable required. SE sensors work with FM30, as well as with OxiMax-compatible SpO$_2$ versions of other Philips monitors. |
| **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 | |
| **M1194AN** | Special Edition (SE) Ear sensor (1.5m cable) for patients more than 40 kg. | |
| **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 | Requires M1943A (1.0 m) or M1943AL (3.0 m) adapter cable |
| **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 | |
| **OxiMax MAX-N** | Adult finger or neonatal foot/hand sensor (patient size >40 kg or <3 kg) Use only on adult patients with FM30 | |

| Product Number | Description | Comments |
|---|---|---|
| **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 | |
| **Oxisensor II** **N-25** | Neonatal/Adult sensor (patient size <3 kg or >40 kg Use only on adult patients with FM30 | |
| **OxiCliq A** | See OxiMax MAX-A | Requires M1943A (1.0 m) or M1943AL (3.0 m) adapter cable **together with** OC3 adapter cable. |
| **OxiCliq P** | See OxiMax MAX-P Use only on adult patients with FM30 | |
| **OxiCliq N** | See OxiMax MAX-N Use only on adult patients with FM30 | |
| **Extension / Adapter Cables** | | |
| **M1941A**a | Extension cable (2 m) | For use with Philips reusable sensors and adapter cables. |
| **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 "**L**ong" 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 #A01** | **M2740A #A05** | **M2740A #C01** | **M2740A #R01** | **M2740A #U01** | **M2740A #W01** |
|  |  |  |  |  |  |
| *Flush Wall Mount* for flat wall mounting | *Wall Mount* (Arm) | *Cart* with fixed angle mount and two drawers | *Rollstand* with tray | *Mounting Kit* for Avalon CTS for use with M2740A #C01 | *Wall Channel* required for wall mounts A01 and A05 |

## Upgrade Options

Upgrade options are prefixed with **M2703AU**. For example, to add a sytem interface upgrade, order
M2703AU Option J70.

| Upgrade Options | |
|---|---|
| **Option Number** | **Option Adds** |
| B71 | Noninvasive Blood Pressure. No supplies included. |
| B72 | SpO$_2$ (only for monitors that already have Noninvasive Blood Pressure installed). No supplies included. |
| B73 | Noninvasive Blood Pressure and SpO$_2$. No supplies included. |
| C73 | Triplets monitoring capability. (Not currently available in USA.) |
| J22 | Dual PS/2 Interface for connecting a keyboard and mouse. |
| J70 | System Interface: 1 x RS232 port and 1 x LAN port. |
| SD0 | Rel. D.0 Software Upgrade. Required for monitors with Rel. C.0 software for compatibility with Avalon CTS and OB TraceVue via LAN connection. |

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M2703A complies with the requirements of the Council Directive 93/42/EEC (Medical Device Directive).

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