IMPORTANT SAFETY NOTICE

BIOPAC Systems, Inc. instrumentation is designed for educational and research oriented life science investigations. BIOPAC Systems, Inc. does not condone the use of its instruments for clinical medical applications.

Instruments, components, and accessories provided by BIOPAC Systems, Inc. are not intended for the cure, mitigation, treatment, or prevention of disease.

The MP35/30 is an electrically isolated data acquisition unit, designed for biophysical measurements.

Exercise extreme caution when applying electrodes and taking bioelectric measurements while using the Biopac Student Lab with other external equipment that also uses electrodes or transducers that may make electrical contact with the Subject.

Always assume that currents can flow between any electrodes or electrical contact points. In case of equipment failure, it is very important that significant currents are not allowed to pass through the heart.

If electrocautery or defibrillation equipment is used, it is recommended that the BIOPAC instrumentation be disconnected from the Subject.

MP35/30 ACQUISITION UNIT

The MP35/30 data acquisition unit is the heart of the Biopac Student Lab *PRO* System. The MP35/30 has an internal microprocessor to control data acquisition and communication with the computer. The MP35/30 unit takes incoming signals and converts them into digital signals that can be processed with your computer. There are four analog input channels, one of which can be used as a trigger input. You will need to connect the MP35/30 to your computer and connect electrodes, transducers, and I/O devices to the MP35/30. You are encouraged to take a few minutes to familiarize yourself with the MP35/30 prior to making any connections.

SYMBOLS — MP35

Symbol	Description	Explanation
	**TYPE BF EQUIPMENT**	Classification
	**Attention**	Consult accompanying documents
	**On** (partial)	Turns MP35 on assuming AC300A power adapter is powered by the mains
	**Off** (partial)	Turns MP35 off if but AC300A power adapter remains powered by the mains
	**Direct current**	Direct current output
	**USB**	USB port

COMPLIANCE

SAFETY

The MP35 satisfies the Medical Safety Test Standards affiliated with IEC60601-1. The MP35 is designated as Class I Type BF medical equipment

EMC

The MP35 satisfies the Medical Electromagnetic Compatibility (EMC) Test Standards affiliated with IEC60601-1-2.

TYPES OF INPUT DEVICES

There are three types of devices that connect to the MP35/30: electrodes, transducers, and I/O devices.

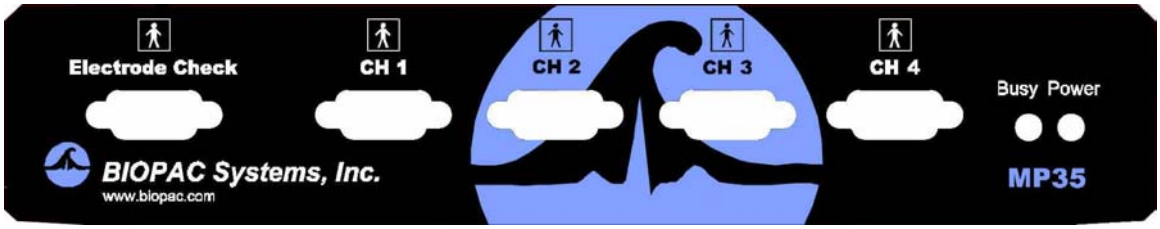
- Electrodes are relatively simple instruments that attach to the surface of the skin and pick up electrical signals in the body.
- Transducers, on the other hand, convert a physical signal into a proportional electrical signal.
- Input/Output devices (I/O for short) are specialized devices like pushbutton switches and headphones.

SIMPLE SENSOR CONNECTORS

Regardless of the type of device connected, every sensor or I/O device connects to the MP35/30 using a "Simple Sensor" connector. Simple Sensor connectors are designed to plugs only one way into the MP35/30, so you don't have to worry about plugging things in upside down or into the wrong socket.

- Electrodes, transducers, and the pushbutton switch all connect to the channel input ports on the front panel of the MP35/30.
- Headphones and the stimulator connect to the "Analog out" port on the back panel of the MP35/30.
- MP35 only: A digital device may connect to the "I/O Port" on the back panel
- MP35 only: A trigger device may be connected to the "Trigger" port on the back panel.

FRONT PANEL



Front Panel, MP35

The front panel of the MP35/30 has an electrode check port, four analog input ports, and two status indicators.

Electrode Check

- The Electrode Check port is a diagnostic tool used with the BSL *PRO* software to determine if the electrodes are properly attached to the subject. See page **Error! Bookmark not defined.**.

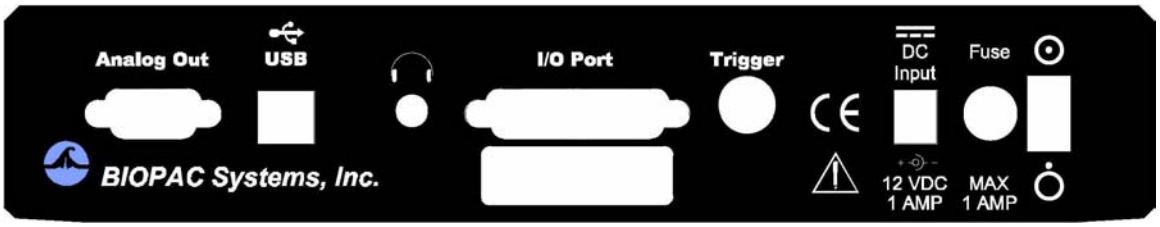
Input ports: CH 1, CH 2, CH 3, and CH 4

- The inputs on the MP35/30 acquisition unit are referred to as Channels. There are four 9-pin female analog input ports on the front of the MP35/30. The Biopac Student Lab Lessons software will always check to see that you have the proper sensors connected to the appropriate channel.

Status indicators

- The Busy status indicator is activated when the MP35/30 is acquiring data and also during the first few seconds after the MP35/30 is powered on to indicate that a self-test is in progress. (When the MP35/30 passes the power-on test, the Busy light will turn off.)
- The Power status indicator is illuminated when the MP35/30 is turned on.

BACK PANEL



Back Panel, MP35

The back panel of the MP35 has an analog output port, a USB port, an I/O Port, a Trigger Port, a DC input, a fuse holder, and a power switch, and the unit's serial number.

The back panel of the MP30 has an analog output port, a serial port, a DC input, a fuse holder, and a power switch, and the unit's serial number.

Analog Out port

There is one 9-pin male "D" analog output port on the back of the MP35/30 that allows signals to be amplified and sent out to devices such as headphones.

USB port (MP35 only)

The MP35 connects to the computer via a USB Port, located just below the word USB.

- Uses a standard USB connector.
- Should only be used to connect the MP35 to a PC or Macintosh.

Serial port (MP30 only)

The MP30 connects to the computer via a serial port, located just below the word Serial.

- Uses a standard MINI DIN 8 connector.
- Should only be used to connect the MP30 to a PC (with ISA or PCMCIA card) or Macintosh.

Headphone Output (MP35 only)

- Accepts a standard (1/4" or 6.3mm) stereo headphone jack.

I/O Port (MP35 only)

- Accepts a DB 25 Female connector.
- Input/Output port used to connect digital devices to the MP35.

Trigger Input (MP35 only)

- Accepts a male BNC connector.
- Input port used to send trigger signals from another device to the MP35.
- Used to synchronize MP35 units when more than one MP35 is used.

DC Input

Use the DC Input to connect a battery, AC/DC converter or other power supply to the MP35/30.

-  The power supply requirements for the MP35/30 are 12 VDC @ 1 Amp. Only use the AC300A power adapter with the MP35. The AC300A is a 12 VDC @ 1.25 Amp power supply adapter that can connect to any mains rated as 100-250 VAC @ 50/60Hz, 40VA.
- The receptacle is configured to accept a "+" (positive) input in the center of the connector and a "-" (negative) input on the connector housing.

Fuse holder

The fuse holder contains a fast-blow fuse that helps protect the MP35/30 from shorts on its power, analog, and digital I/O lines. The MP35 uses a 1.0 amp fast-blow fuse and the MP30 uses a 2.0 amp fast-blow fuse.

- To remove the fuse, use a screwdriver to remove the fuse cover located below the word Fuse.

Power switch

-  ON position — powers up the MP35/30
-  OFF position — cuts the flow of power to the MP35/30

CLEANING PROCEDURES

Be sure to unplug the power supply from the MP35/30 before cleaning. To clean the MP35/30, use a damp, soft cloth. Abrasive cleaners are not recommended as they might damage the housing. Do not immerse the MP35/30 or any of its components in water (or any other fluid) or expose to extreme temperatures as this can damage the unit.

SPECIFICATIONS

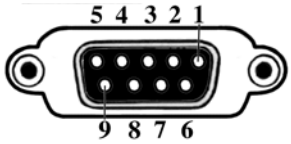
Specification	MP35 Unit	MP30 Unit
Front Panel		
ELECTRODE CHECKER Resistance Range (Vin+ and Vin- to GND)	0-100 KΩ	0-100 KΩ
ANALOG INPUTS Number of channels	4 isolated (front panel CH 1–CH 4), 2 unisolated (auxillary)	4 (front panel CH 1–CH 4)
SAMPLE RATE Maximum Minimum Trigger Input Threshold	 100K samples/second 1 samples/second Analog or digital channel Adjustable threshold; Positive or Negative Trigger	 2K s/s (8K aggregate on four ch.) 1 samples/second CH 4 input only Adjustable threshold; Positive or Negative Threshold
A/D resolution (before digital filtering)	24-bit	10-bit
Signal to noise ratio	> 90 dB (nominal)	> 90 dB
Voltage resolution Gain dependent	1.192 microvolts /bit (Gain 10) to 0.024 nanovolts /bit (Gain 50,000)	0.400 microvolts/bit (Gain 100) to 0.200 millivolts/bit (Gain 25,000)
Input voltage range (Gain dependent)	400 microvolts to 2.0 Volts p-p	4.0 millivolts to 0.2 Volts p-p
Input accuracy	±0.01% of Full Scale Range (FSR)	±0.05% FSR
Input protection; current limited	± 1 mA/V	± 1 mA/V
Maximum Input Voltage (between Vin+ and Vin-)	2V p-p	130mV p-p
Differential Input Impedance (between Vin+ and Vin-)	2 MΩ	2 MΩ
Filters (automatic or user adjustable)	3 two-pole IIR digital filters per channel	3 two-pole IIR digital filters per channel
Common Mode Input Impedance (between Vin+/Vin- and GND) DC AC (50/60 Hz)	 11 MΩ 1,000 MΩ	 11 MΩ 1,000 MΩ
Gain ranges (automatic preset or user adjustable)	10 – 50,000	100 – 50,000
Baseline adjustment (automatic or user adjustable)	Gains 10, 20, and 50: ±100mV Gains 100 to 50,000: ±10mV	±10mV all Gains
Electrode offset potential tolerance	Gains 10, 20, and 50: ±2V Gains 100, 200, 500: ±200mV Gains 1,000 to 50,000: ±80mV	±70 mV all Gains
Back Panel		
ANALOG OUTPUT Number of channels D/A resolution Accuracy Output impedance Output voltage Output drive current	 1 12 bits ±0.0125% of FSR 50Ω 0 - 4.096 V ±10 mA maximum	 1 8 bits ±0.2% of FSR 50Ω 0 - 5.000 V ±100 mA maximum

Specification	MP35 Unit	MP30 Unit
SERIAL INTERFACE Transmission type Transmission rate	 USB Type 2.0 full speed	 RS422-clocked asynchronous 524,000 bits per second (KBPS)
HEADPHONE (MP35 only)	Drives low-impedance standard stereo headphones	N/A – MP35 only
I/O PORT (MP35 only)	8 TTL compatible inputs and 8 TTL compatible outputs	N/A – MP35 only
TRIGGER (MP35 only)	TTL compatible input and synchronization port	N/A – MP35 only
DC INPUT	Power input; requires 12 VDC @ 1 Amp. Use the AC300A 12 VDC @ 1.25 Amp power supply adapter to connect to any mains rated as 100-250 VAC @ 50/60Hz, 40VA.	Power input; requires 12 VDC @ 1 Amp. Use the AC300A 12 VDC @ 1.25 Amp power supply adapter to connect to any mains rated as 100-250 VAC @ 50/60Hz, 40VA.
FUSE	1.0 amp fast-blow fuse	2.0 amp fast-blow fuse
MP UNIT Dimensions Weight	 7 cm x 29 cm x 25 cm 1.4 Kg	 7 cm x 29 cm x 25 cm 1.4 Kg

MP UNIT PIN-OUTS

Electrode Check — *Front Panel*

9-PIN FEMALE DSUB

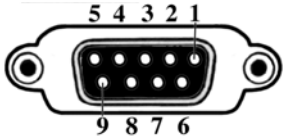


Pin	MP35 and MP30	
2	Vin+	Electrode connection
3	GND	
4	Vin-	Electrode connection

MP Input — *Front Panel*

CH 1, CH 2, CH 3, CH 4

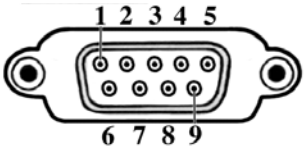
9 PIN FEMALE DSUB (1 of 4)



Pin	MP35	MP30
1	Shield drive	Shield drive
2	Vin+	Vin+
3	GND	GND
4	Vin–	Vin–
5	Shield drive	Shield drive
6	+5 V (100 mA max aggregate)	+5 V (50 mA max)
7	ID resistor lead 1; I^2C SCL	ID resistor lead 1 (+5 V)
8	ID resistor lead 2; I^2C SDA	ID resistor lead 2
9	–5 V (100 mA max aggregate)	–5 V (50 mA max)

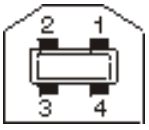
MP Analog Output — *Back Panel*

9 PIN MALE DSUB



Pin	MP35	MP30
1	Buffered AC output Z out = 2,200 µF Cap V out range MP35: (+/- 2.0 V)	Buffered AC output Z out = 2,200 µF Cap MP30: (+/- 2.5 V)
2	Buffered DC output Z out = 50 Ω V out range MP35: (0 to 4.096 V)	Buffered DC output Z out = 50 Ω MP30: (0 to 5 V)
3	GND GND	
4	+5.0 V (100 mA max)	+7.5 V (100 mA max)
5	Buffered digital output Z out = 1 kΩ V out range (0 to 5 V)	Unbuffered DC output Z out = 1 kΩ V out range (0 to 5 V)
6	+12 V (100 mA max)	Not used
7	I^2C SCL	Not used
8	I^2C SDA	Not used
9	Not used	Not used

MP Serial Connector — *Back Panel*



MP35

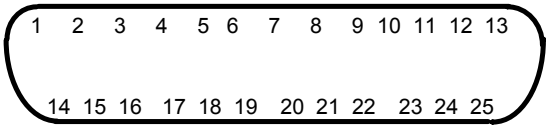
MP30

Pin	MP35	MP30
1	+5	Digital Output 1
2	-Data	Digital Output 2
3	Data +	Digital Output 3
4	GND	Digital Output 4
5	n/a	GND Unisolated
6	n/a	GND Unisolated
7	n/a	RS-232-RX
8	n/a	+5 V Unisolated

MP UNIT PIN OUTS *continued*

I/O Port — *MP35 Back Panel*

DSUB 25 (male)



Note: BSL v 3.7.0 does not support Pins 7, 9, 18, 19, 20 and 21.

Pin	MP35 Only
1	Digital Output 1
2	Digital Output 2
3	Digital Output 3
4	Digital Output 4
5	GND Unisolated
6	GND Unisolated
7	RS-232-RX
8	+5 V Unisolated
9	I^2C-SDA
10	Digital Input 1
11	Digital Input 2
12	Digital Input 3
13	Digital Input 4
14	Digital Output 5
15	Digital Output 6
16	Digital Output 7
17	Digital Output 8
18	Analog Input — Right
19	Analog Input — Left
20	RS-232-TX
21	I^2C-SCL
22	Digital Input 5
23	Digital Input 6
24	Digital Input 7
25	Digital Input 8