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MP36R SYSTEMS

MP36R Licensed Systems – See corresponding license page for more information:

System	Windows Part #	Mac Part #
MP36R	MP36RWSW	MP36RWS
MP36R with Workflow	MP36RWSW-AWF	MP36RWS-AWF
MP36R with Basic Scripting	MP36RWSW-BAS	MP36RWS-BAS
MP36R plus Network Data Transfer	MP36RWSW-NDT	MP36RWS-NDT
MP36R Enterprise System	MP36RWSW-ENT	N/A
MP36R with 2-channel Vibromyography	VMG36R2WSW	VMG36R2WS
MP36R with 4-channel Vibromyography	VMG36R4WSW	VMG36R4WS

The MP36R data acquisition unit has an internal microprocessor to control data acquisition and communication with the computer. The MP36R unit takes incoming signals and converts them into digital signals that can be processed with the computer. There are four analog input channels, one of which can be used as a trigger input. To record signals, connect the MP36R unit to the computer and connect electrodes, transducers, and I/O devices to the MP36R unit.

MP36R Symbology

Symbol	Description	Explanation
	**Type BF Equipment**	Classification
	**Attention**	Consult accompanying documents
	**On** (partial)	Turns MP36/35 on assuming AC300A power adapter is powered by the mains
	**Off** (partial)	Turns MP36/35 off if but AC300A power adapter remains powered by the mains
	**Direct current**	Direct current output
	**USB**	USB port

COMPLIANCE

SAFETY

The MP36R satisfies the Medical Safety Test Standards affiliated with IEC 60601-1 and is designated as Class I Type BF medical equipment

EMC

The MP36R satisfies the Medical Electromagnetic Compatibility (EMC) Test Standards for IEC 60601-1-2.

Types of Input Devices

There are three types of devices that connect to the MP36R: electrodes, transducers, and I/O devices.

- Electrodes 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 MP36R using a "Simple Sensor" connector. Simple Sensor connectors are designed to plug only one way into the MP36R—it's not possible to plug items 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 MP36R.
- Headphones and the stimulator connect to the "Analog out" port on the back panel of the MP36R. (There is also a 3.5 mm headphone jack for headphones with a mini-connector.)
- Digital devices connect to the "I/O Port" on the back panel.
- Trigger devices connect to the "Trigger" port on the back panel.

MP36R Front Panel

The front panel of the MP36R 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 Acq*Knowledge* 4.1 software to determine if the electrodes are properly attached to the subject.

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

- The four 9-pin female analog input ports on the MP36R acquisition unit are referred to as Channels.

Status Indicators

- **Busy**—indicator is activated when the MP36R is acquiring data and also during the first few seconds after the MP3X is powered on to indicate that a self-test is in progress. (When the MP3X passes the power-on test, the Busy light will turn off.)
- **Power**—status indicator is illuminated when the MP36R is turned on.

MP36R Back Panel

The back panel of the MP36R 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.

Analog Out Port – Low Voltage Stimulator

There is one 9-pin male "D" analog output port on the back of the MP36R that allows signals to be amplified and sent out to devices such as headphones. On the MP36, Analog Out is built-in low voltage stimulator.

USB Connection

 The MP36R 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 MP36R to a PC or Macintosh.

Headphone Output

- Accepts a standard (1/8" or 3.5 mm) stereo headphone jack.

I/O Port

- Accepts a DB 25 Female connector.
- Input/Output port used to connect digital devices to the MP36R.

Trigger Input

- Accepts a male BNC connector.
- Input port used to send trigger signals from another device to the MP36R.
- See External Trigger Inputs.

DC Input

 Use the DC Input to connect a battery, AC/DC converter or other power supply to the MP36R.

-  The power supply requirements for the MP36R are 12 VDC @ 1 Amp. Only use the AC300A power adapter with the MP36R. 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 MP3X from shorts on its power, analog, and digital I/O lines. The MP36R uses a 1.0 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 MP Unit  OFF position — cuts the flow of power

Fixed Hardware Low Pass Filters

To provide for anti-aliasing for the digital IIR filters and to reduce high frequency noise, the MP36R employs a low pass filter. These filtering options are incorporated into each MP unit channel: The low pass filter is set at approximately 20 KHz.

Fixed Hardware High Pass Filters

To accommodate the DC offsets associated with a range of biopotential and transducer signals, the MP36R employs a switchable bank of single pole high pass filters. These filtering options are incorporated into each MP unit channel: The high pass filter options are DC (HP filter off), 0.05 Hz, 0.5 Hz and 5 Hz.

MP36R Cleaning Procedures

Before cleaning, be sure to unplug the power supply from the MP36R. To clean the MP36R, use a damp, soft cloth. Abrasive cleaners are not recommended as they might damage the housing. Do not immerse the MP36R or any of its components in water (or any other fluid) or expose to extreme temperatures as this can damage the unit.

MP36R Specifications

Electrode Check Resistance Range:	0-1 MΩ (Vin+ and Vin- to GND)
Analog inputs:	4 isolated channels (front panel CH 1–CH 4)
Sample rate: Max Min	4 CH @ 100K s/second 1 sample/second
Trigger Input:	Analog CH1-CH4 or Digital D1-D8
Threshold:	Adjustable threshold level with Positive or Negative Trigger
A/D resolution:	24-bit (before digital filtering)
Signal to noise ratio:	> 89 dB min Tested at lowest Gain at 1,000 s/s with grounded front end
Voltage resolution:	Gain dependent: 2.38 microvolts /bit (Gain 5) to 0.024 nanovolts /bit (Gain 50,000)
Storage buffer:	512 K
Input voltage range:	Gain dependent: 400 microvolts to 4.0 Volts p-p
Input noise voltage:	9 nV rms /sqrt(Hz) and 0.1 uV rms noise (0.1 Hz to 35 Hz) - nominal
Input noise current:	100 fA rms /sqrt(Hz) and 10 pA p-p noise (0.1 Hz to 10 Hz) - nominal
Input protection:	± 1 mA/V current limited
Maximum input voltage:	4 V p-p (between Vin+ and Vin-)
Differential input impedance:	2 MΩ (between Vin+ and Vin-)
Software Filters:	Three programmable digital (IIR) filters; automatic or user-adjustable
Hardware Filters:	Fixed hardware low pass – 20 KHz Fixed hardware high pass – switchable DC, 0.05 Hz, 0.5 Hz, 5 Hz
Common mode input impedance: DC AC (50/60 Hz)	(between Vin+/Vin- and GND) 11 MΩ 1,000 MΩ
CMRR:	110 dB minimum at 50/60 Hz
Gain ranges:	5 – 50,000 (automatic preset or user adjustable)
Baseline adjustment:	*Gain* (automatic or user adjustable) 5, 10, 20, 50: ±100 mV 100, 200, 500: ±10 mV 1,000 to 50,000: ±4 mV
Electrode offset potential tolerance:	*Gain* 5, 10, 20, 50: ±2 V 100, 200, 500: ±200 mV 1,000 to 50,000: ±80 mV
Analog Output Number of channels: D/A resolution: Accuracy: Headphones Output impedance: Output voltage: Output drive current:	 1 16 bits ±0.01% of FSR 50 Ω -10 V to +10 V 5 mA max
Serial interface:	USB, Type 2.0 high speed
Headphone:	Drives 16-32 Ω standard stereo headphones
I/O port:	8 TTL compatible inputs and 8 TTL compatible outputs
Trigger:	TTL compatible input and synchronization port – see External Trigger Inputs.
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 @ 50/60 Hz, 40 VA
Fuse:	1.0 amp fast-blow fuse
Dimensions & Weight:	7 cm x 29 cm x 25 cm, 1.4 Kg
Operating Temperature Range:	0 – 70 deg C
Storage Temperature Range:	-10 – 70 deg C
Operating / Storage Humidity Range:	0 – 95% (non-condensing)
Operating / Storage Pressure Range:	0 – 300 kPA
Channel-to-Channel Latency:	None: Channels are sampled simultaneously

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Mains Power Disconnection

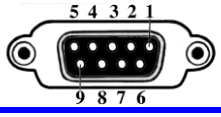
To completely disconnect the MP36R unit and the AC300A power adapter from all poles of the supply mains, extract the power cord plug from the mains outlet.
Please note that the power switch on the back of the MP36R unit turns power ON and OFF to the MP36R unit only.

Extract the plug by grasping the plastic shell of the plug and pull firmly away from the mains outlet in a direction perpendicular to the face of the mains outlet. Take care not to touch the metal blades associated with the plug. This procedure will fully power down (de-energize) the MP36R unit and AC300A power adapter.

MP36R Unit Pin-outs

Electrode Check

9-PIN FEMALE DSUB

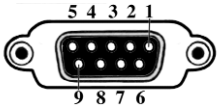


2	Vin+	Electrode connection
3	GND	
4	Vin-	Electrode connection

CH Input

9 PIN FEMALE DSUB

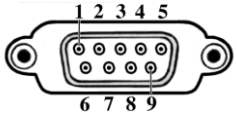
(1 of 4)



1	Shield drive	6	+5 V (100 mA max aggregate)
2	Vin+	7	ID resistor lead 1; I²C SCL
3	GND	8	ID resistor lead 2; I²C SDA
4	Vin–	9	–5 V (100 mA max aggregate)
5	Shield drive		

Analog Output

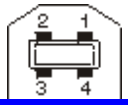
9 PIN MALE DSUB



1	Buffered analog or pulse output A.C. coupled (1,000 uF) Analog range: +/- 2.048 V Pulse range: 0 to 2.048 V	4	+5 V (100mA max.)
		5	Buffered pulse output Z out = 1 kΩ Range: 0 to 5 V
2	Low voltage stimulator Buffered, D.C. coupled Z out = 50 Ω Range: -10 V to +10 V	6	+12 V (100 mA max)
		7	I²C SCL – Do not connect
		8	I²C SDA
		9	Monitor – Do not connect
3	GND		

Connector

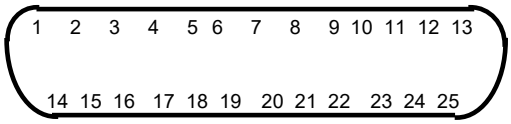
USB



1	+5	5	n/a
2	-Data	6	n/a
3	Data +	7	n/a
4	GND	8	n/a

I/O Port

DSUB 25 (male)



† Digital Input are 0-5 V with 100 K ohm pullups to 5 V on board

1	Digital Output 1 0-5 V 8 ma	15	Digital Output 6
2	Digital Output 2 0-5 V 8 ma	16	Digital Output 7
3	Digital Output 3 0-5 V 8 ma	17	Digital Output 8
4	Digital Output 4 0-5 V 8 ma	18	Analog Input, Right 1 VRMS, centered at 0 V
5	GND Unisolated		
6	GND Unisolated	19	Analog Input, Left 1 VRMS, centered at 0 V
7	RS-232-RX		
8	+5 V Unisolated/fused	20	RS-232-TX 0-5 V
9	I²C-SDA 3.3. V	21	I²C-SCL 3.3 V
10	Digital Input 1† 0-5 V	22	Digital Input 5
11	Digital Input 2† 0-5 V	23	Digital Input 6
12	Digital Input 3† 0-5 V	24	Digital Input 7
13	Digital Input 4† 0-5 V	25	Digital Input 8
14	Digital Output 5		