

# Personal Computer Interface (-P) Option



The Personal Computer Interface (-P) Option consists of A/D converter circuitry, cable and **FLOWTRACE** software to connect the **100 series (T101D, T106, T106X, T107, T108, T109)** or **200 series (T210D, T206, T206X, T208)** ultrasound flowmeter to a standard IBM-PC compatible computer via its **RS232** serial port. This option sends digitized flow information with 12 bits of resolution at a rate high enough to see the full bandwidth (100 Hz) of the flowmeter. The **FLOWTRACE** software provides a scrolling display of flow and the ability to store flow information on a disk.

(-P) Option components include:

- an accessory board mounted within the flowmeter cabinet;
- a female DB 25 RS-232 connector on the flowmeter's rear panel
- an RS-232 25 pin cable connecting the computer to your flowmeter;
- a 25 pin to 9 pin adapter for computers which have 9 pin serial ports;
- **FLOWTRACE** software program provided on 5.25" and 3.5" discs to display and record data.

The (-P) Option continually transmits the instantaneous or mean flow. The analog flow signal is converted to a 12-bit digital value. The signal is sampled 100 times per second to create a 2 byte packet that is transmitted at 9600 baud.

**Single Channel Format:** The 7th bit of the first byte is always set high to allow the computer to detect the start of the packet,. In contrast, the 7th bit of the second byte is always low.

### Single P Option RS232 Data Format

	Bits							
	7th	6th	5th	4th	3rd	2nd	1st	0th
First Byte	High	Low	Low	Sign	AD10	AD9	AD8	AD7
Second Byte	Low	AD6	AD5	AD4	AD3	AD2	AD1	AD0

**Software Capabilities:** **FLOWTRACE** Software is provided for displaying and recording flow data. Capabilities will vary somewhat with speed of the user's computer system. An AT clone is easily capable of real time display and continuous storage to hard disk. Source code and assistance in customization is available.

**When to Select an RS232 Interface:** When a system turnkey system is needed for collection of mean or instantaneous flow at speed of 100 sample per second.

**When to Select a Data Acquisition Board:** For several medium speed channels simultaneously (*ie., pressures EKG and EMG*).

### Dual P Option RS232 Data Format

		Bits							
Channel		7th	6th	5th	4th	3rd	2nd	1st	0th
First Byte	Left	High	High	Sign	AD10	AD9	AD8	AD7	AD6
Second Byte		Low	High	AD5	AD4	AD3	AD2	AD1	AD0
Third Byte	Right	High	Low	Sign	AD10	AD9	AD8	AD7	AD6
Fourth Byte		Low	Low	AD5	AD4	AD3	AD2	AD1	AD0

The RS232 data stream is transmitted at 9600 baud with a complete data sample transmitted 100 times per second, The 6th and 7th bits of each byte are used to identify the byte within the packet.

### Dual P Option Disk Data Format

The supplied program will continuously record incoming data to hard disk. The data is converted to a standard signed integer 16 bit format with alternating samples from each channel. Although each sample is stored as a 16 bit signed integer, the actual data range is restricted to -2048 to 2047.

channel 0	channel 1	channel 0	channel 1	channel 0	channel 1
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when used with a dual channel meter, samples are alternated.

sample 0	sample 1	sample 2	sample 3	sample 4	sample 5
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**FLOWTRACE** Software provides for simultaneous display of waveforms and recording of the raw data from the meter's P-Option. **FLOWTRACE** allows you to replay the data at a later time from the original raw recording. With a wide range of available gain, speed and offset selections, it is easy to zoom in on particular data segments in the recording. If used with VGA monitor, **FLOWTRACE** has three different on screen averaging options and allows for "screen dump" print-outs to dot matrix or laser printers. **FLOWTRACE** lets you export data from a recording to a text file (in ASCII format) with the option of data reduction schemes. Indeed, where pulsatile waveform display but also trend recording is desirable, data reduction can be selected for the recorded data as well.

Needed for **FLOWTRACE**:

- IBM PC compatible computer
- RS232 serial port (COM1 or COM2 can be used);
- VGA, EGA, Hercules, CGA monitor or Liquid Crystal Display which emulates one of more of the above. (VGA shows multiple traces simultaneously while other monitors show one trace at a time, selected by the keyboard;

## Modifications to the Personal Computer Interface:

The personal computer interface (-P) option and **FLOWTRACE** software can accept and display up to four channels of information (at 100Hz) or eight channels at 50Hz. Flowmeters can generate one or two channels of information. Additional information channels can be built-in for Pressure transducers using our pResure (-R) option and/or for a variety of analog signals which can be presented to the P-option in the range of -5 to +5 volt DC. These additional channels are customized for the specific application and signal involved and the P-option microchip must be programmed to accept extra signals. In the example below, a researcher using an ALF 21 laser Doppler flowmeter, a Transonic T106X and a pressure transducer used a P-option with an additional external analog input as well as the R-option to collect simultaneous waveforms from three instruments.

This figure shows microvascular perfusion in the rabbit ear (ALF perfusion units), volume blood flow in the auricular artery and pressure in the abdominal artery in a conscious male New Zealand white rabbit.

Data courtesy of Dr. T.L. Smith, Bowman Gray School of Medicine

