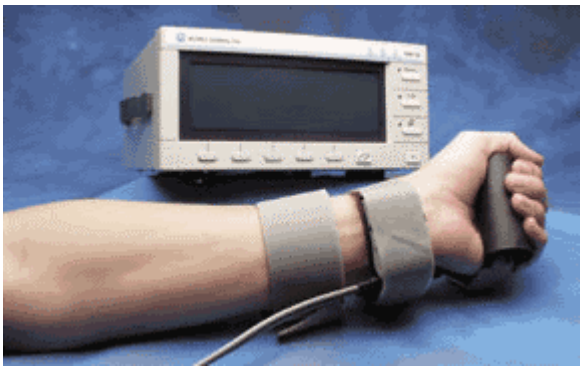
Chapter 6 Specialty Modules



NIBP100C

OXY100C Pulse Oximeter Module

The OXY100C Pulse Oximeter Module is primarily used to measure the blood oxygen saturation level in a non-invasive fashion. Via LEDs, the OXY100C transmits two wavelengths of light (660 and 940 nanometers) through a pulsating vascular bed (typically a finger or an earlobe) to a receiving photodiode. Compared to unsaturated blood, oxygen saturated blood absorbs different fractions of light at different wavelengths. Accordingly, the ratio of light absorbed can be used to calculate the ratio of oxygenated hemoglobin to total hemoglobin. This ratio is expressed as the O_2 Saturation Level and will vary between 0% and 100%.

The Pulse Oximeter Module connects directly to the MP150 via the UIM100C. Up to four OXY100C modules can be used with a single MP System. The Pulse Oximeter Transducer (TSD123) connects to the OXY100C via a 3-meter extension cable (included wit h the OXY100C).

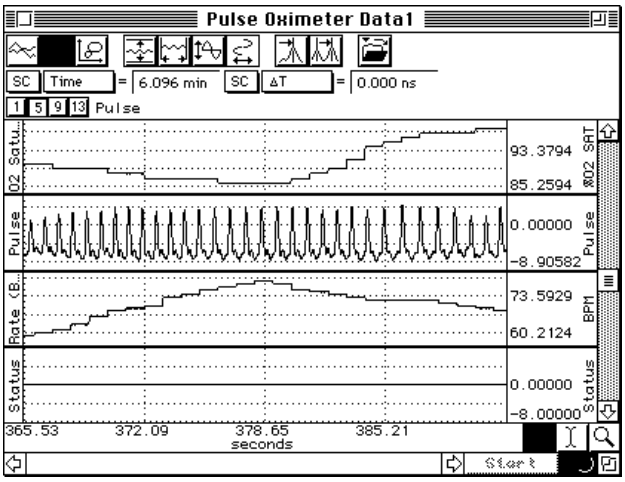
The OXY100C outputs four signals simultaneously, as shown in this graph:

O_2 Saturation (beat-by-beat, CH 1)

Pulse Waveform (beat-by-beat, CH 5)

Pulse Rate (continuous, CH 9)

Module Status (dynamic, CH13)



Output signals can be optionally directed to a number of different MP System input channels. The user can choose to sample all, some or none of these signals. The OXY100C includes calibration features that permit easy scaling of all these signals when using the OXY100C with the MP System.

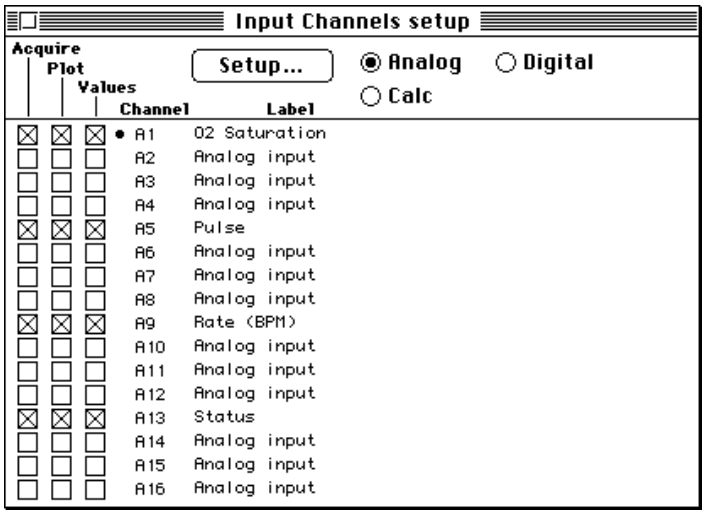
OXY100C Calibration

When you initially set up the OXY100C with an MP System:

1. Snap the OXY100C into the side of the UIM100C.
2. Connect the Analog cables directly from the MP150 to the OXY100C Analog mating connectors.
3. Connect the Digital cables directly from the MP150 to the OXY100C Digital mating connectors.
4. When the cable connections are secure, power up the MP150.
5. On the OXY100C module, slide the four-position **Calibration** switch to the **OFF** position (bottom).
6. Set all the **Signal Channel Enables** to **ON** (top position). There is one Signal Channel Enable two-position switch for each signal output by the OXY100C. When any Signal Channel Enable switch is OFF (bottom position), then that corresponding MP150 channel can be used by another input device.
7. Place the four-position **Bank Select** switch to the first bank (top position). In this position, the OXY100C output signals will be directed as follows:

O_2 Saturation	Channel 1
Pulse Waveform	Channel 5
Pulse Rate	Channel 9
Module Status	Channel 13

   If you are using multiple OXY100C modules with a single MP System, then be sure to place additional OXY100C modules on unique banks. Furthermore, please check that any OXY100C output does not reside on the same channel used by any other amplifier module.
8. Using the **Input Channels Setup** in Acq*Knowledge*, label the OXY100C signal outputs as shown:



9. It's best to calibrate the OXY100C once, then **Save As>Graph Template** to save the respective scale values.

Scale Setting

1. **Determine the highest frequency component** of all the waveforms sampled. To properly sample the signals from the OXY100C, the sample rate of the MP150 (set from Acq*Knowledge*) will need to be double the rate of the highest frequency component resident in the input data.

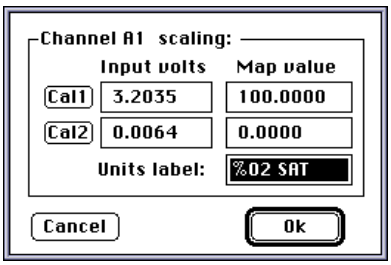
   If you are just using the OXY100C, the maximum sampling rate will normally be 50Hz or less.

   If you are not sampling the Pulse Waveform signal, the maximum sampling rate drops to double what the expected pulse rate maximum would be.

   The fastest pulse rate detectable by the OXY100C is 250 BPM, so the safe sampling rate minimum would be: 2 x [250 BPM]/[60 sec/min] or 8.33Hz

2. **Establish the Calibration Scaling for each channel**

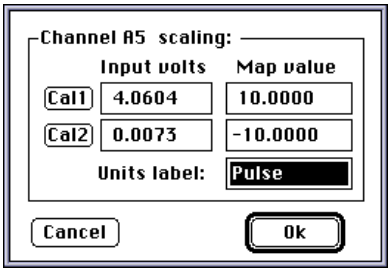
   O_2 Saturation (Channel 1) scaling



   a) Slide the OXY100C Calibration switch on the OXY100C module to the CAL LO position.
   b) Click on the Cal2 button in the Channel A1 scaling dialog box.
   c) Slide the OXY100C Calibration switch to the CAL HI position.
   d) Click on the Cal1 button in the Channel A1 scaling dialog box.
   e) Enter the Map values: Cal1 = 100.00, Cal2 = 0.00
   f) Enter the Units label: %O2 SAT

   Ideally, the nominal Cal1/Input volts value should be exactly 3.200. The nominal Cal2/Input volts value should be exactly 0.00. In practice, there will be very slight deviations from these expected values. The minimum O_2 Saturation level detectable by the OXY100C is 0.00%. The maximum O_2 Saturation level detectable is 100%. In the range from 80% to 100% the O_2 Saturation level is ±2% accurate. From 0% to 79%, the O_2 Saturation level is unspecified.

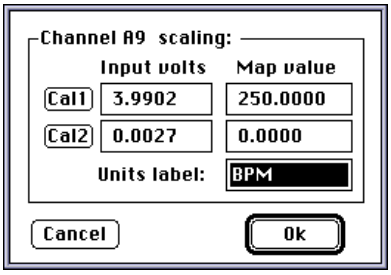
   Pulse Waveform (Channel 5) scaling



   a) Slide the OXY100C Calibration switch on the OXY100C module to the CAL LO position.
   b) Click on the Cal2 button in the Channel A5 scaling dialog box.
   c) Slide the OXY100C Calibration switch to the CAL HI position.
   d) Click on the Cal1 button in the Channel A5 scaling dialog box.
   e) Enter the Map values: Cal1 = 10.00, Cal2 = -10.00.
   f) Enter the Units label: Pulse

Ideally, the nominal **Cal1/Input** volts value should be exactly 4.064. The nominal **Cal2/Input volts** value should be exactly 0.00. In practice, there will be very slight deviations from these expected values. The Pulse Waveform output from the OXY100C is functionally equivalent to a standard plethysmographic waveform, such as obtained with the PPG100C and TSD200.

Pulse Rate (Channel 9) scaling



a) Slide the OXY100C Calibration switch on the OXY100C module to the CAL LO position.

b) Click on the Cal2 button in the Channel A9 scaling dialog box.

c) Slide the OXY100C Calibration switch to the CAL HI position.

d) Click on the Cal1 button in the Channel A9 scaling dialog box.

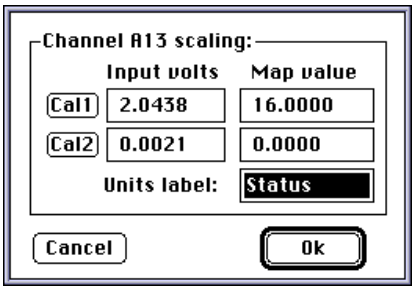
e) Enter the Map values: Cal1 = 250.00, Cal2 = 0.00.

f) Enter the Units label: BPM.

Ideally, the nominal **Cal1/Input volts** value should be exactly 4.00. The nominal **Cal2/Input volts** value should be exactly 0.00. In practice, there will be very slight deviations from these expected values.

The minimum BPM detectable by the OXY100C is 30. The maximum BPM detectable is 250. The BPM accuracy in the range of 30-250 BPM is ±1%. The BPM settles to ±1% of the final reading less than 15 seconds after the sensor is properly applied.

Module Status (Channel 13) scaling



1. Slide the OXY100C Calibration switch on the OXY100C module to the CAL LO position.
2. Click on the Cal2 button in the Channel A13 scaling dialog box.
3. Slide the OXY100C Calibration switch to the CAL HI position.
4. Click on the Cal1 button in the Channel A13 scaling dialog box.
5. Enter the Map values: Cal1 = 16.00, Cal2 = 0.00.
6. Enter the Units label: Status.

Ideally, the nominal **Cal1/Input volts** value should be exactly 2.048. The nominal **Cal2/Input volts** value should be exactly 0.00. In practice, there will be very slight deviations from these expected values.

The Module Status levels are:

Status = 0.0 = Proper operation

Status = 1.0 = Probe off finger

Status = 10 = Probe disconnected from OXY100C