



## TBR4100 & TBR1025

*Free Radical Analyzers*



- Real-time detection with electrochemical microsensors
- Includes one temperature sensor, choice of two additional sensors (one for TBR1025) and a start-up kit.
- Wide dynamic range for detection
- Wide bandwidth for recording fast events
- Measure:
  - Nitric oxide from  $< 0.3\text{nM}$  to  $100\mu\text{M}$
  - Hydrogen peroxide  $< 10\text{nM}$  to  $100\text{mM}$
  - Hydrogen sulfide
  - Glucose
  - Oxygen from 0.1% to 100%
- Isolated architecture allows simultaneous measurement of free radical and independent analog data (ECG, BP, etc.) on any channel
- Benchtop or rack mounted

**Don't need four channels?** The single-channel TBR1025 packs the power of its big brother in a small, economical package.

Free radical analyzers are available in two models:

**TBR4100** is the four-channel model

**TBR1025** is the one-channel model

The operation of the analyzers and specifications are exactly the same. **TBR4100** channels operate independently. Real-time detection and measurement of a variety of redox-reactive species is fast and easy using the electrochemical (amperometric) detection principle employed in these instruments. Designed for use with WPI's wide range of nitric oxide, hydrogen peroxide, hydrogen sulfide and oxygen sensors, these optically isolated free radical analyzers have ultra low noise.

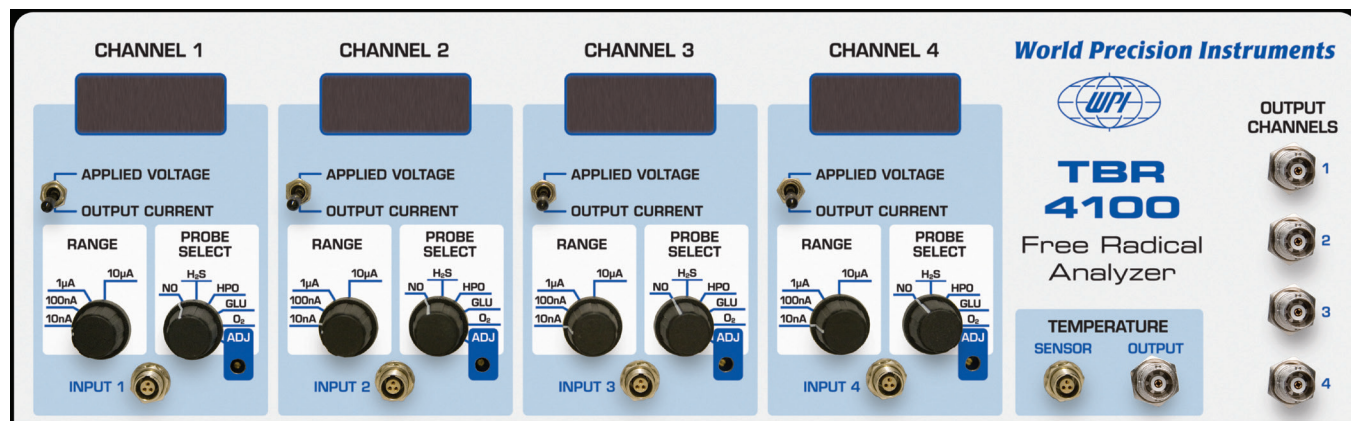
The **TBR4100** can measure four different species simultaneously in the same preparation. Simply plug a sensor into any one of the input channels on the front panel and select the detection and acquisition parameters using the software. Poise voltage can be selected from a range of values tuned

for optimal response from WPI sensors. An independent input port for real-time monitoring of temperature is also included.

Both analyzers utilize PC-based data acquisition via our **Lab-Trax** interface; data traces are displayed and recorded in real-time. The **Data-Trax** software comes pre-configured for single or multiple electrode recording; filters, gains, and smoothing are all set for optimal results. Data can be viewed making adjustments to smoothing and filter settings without affecting the original stored raw data. Electrode calibration from multiple concentration readings can be input into the software's Multipoint Calibration utility quickly provides a plot and slope calculation for electrode sensitivity determination. Alternately, the Lab-Trax data interface can be used for providing simultaneous acquisition of Free Radical data along with other physiological data (ECG, HR, BP, etc.) as each of the four input channels has its own independent input, filters, and 24-bit converter.

# TBR4100

Free Radical Analyzer



## TBR4100 SPECIFICATIONS

Power.....	100 ~ 240 VAC, 50-60 Hz, <15 W
Operating Temperature (ambient).....	0 - 50°C (32 - 122°F)
Operating Humidity (ambient).....	15 - 70% RH non-condensing
Warm up Time.....	<5 minutes
Dimensions.....	135 X 419 X 217 mm (5.25" X 16.5" X 8.16")
Weight.....	1.35 kg (3 lb)
Display Functions.....	18 mm (0.7") LCD readout, 4.5 digit Polarization Voltage (mV) Current input (nA, $\mu$ A)
Controls.....	Power (on/off) Current Input Range Polarization Voltage
Analog Output Range.....	+/- 10 V (continuous)
Analog Output Impedance.....	10 kohm
Channel to Channel Isolation.....	>10 Gohm
Channel to Output Isolation.....	>10 Gohm
Power Supply to AC Line Isolation.....	>100 Mohm
Analog Output Drift.....	<10 pA/h

### Temperature Input

Number of Channels.....	1
Sensing Element.....	Platinum RTD, 1000 Ohm
Range.....	0-100°C
Accuracy +/- 1°C	

Resolution.....	0.1°C
Analog Output.....	31.25 mV/°C (continuous)

### Amperometric Input

Number of Amperometric Channels.....	4
Signal Bandwidth.....	0-3 Hz
Polarization Voltage (selectable via rotary switch)	
Nitric Oxide.....	865 mV
Hydrogen Sulfide.....	150 mV
Hydrogen Peroxide.....	450 mV
Glucose.....	600 mV
Oxygen.....	700 mV
ADJ (user adjustable).....	+/- 2500 mV
Polarization Voltage Accuracy.....	+/- 5 mV
Polarization Voltage Display Resolution.....	+/- 1mV

### Current measurement Performance

Range	Analog Output	Noise @ 3Hz*	Noise @ 0.3 Hz*
+/- 10 nA	1 mV / 1 pA	< 1 pA	< 0.3 pA
+/- 100 nA	1 mV / 10pA	< 7 pA	< 3 pA
+/- 1 $\mu$ A	1 mV / 100pA	< 70 pA	< 30 pA
+/- 10 $\mu$ A	1 mV / 1 $\mu$ A	< 700 pA	< 300 pA

\*Instrument performance is measured as the (max-min) over 20 seconds period with open input. Typical values are given at 3 Hz and 0.3 Hz bandwidth.

Typical sensor performance with TBR4100

ISO-NOPF100 noise.....0.2 nM NO (<2 pA)\*\*

\*\*Sensor noise is measured as the (max-min) over a 20 seconds period with the sensor immersed in 0.1 M CuCl<sub>2</sub> solution.



## WORLD PRECISION INSTRUMENTS

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