

TSE Blood Pressure Monitor *Invasive – 209100series*



For Invasive Measurements in Laboratory Animals



Specifications subject to change without notice





TSE Blood Pressure Monitor Invasive - 209100series



General information

The TSE Blood Pressure Monitor is an easy-touse compact system designed for invasive pressure measurements on all laboratory animals.

TSE Universal Transducer Amplifier

With its integrated power supply this singlechannel amplifier provides power to the connected transducer and performs amplification and filtering of the measured signal. The pressure values are continuously displayed on the LCD display in mmHq.

The unit comprises an output connector for convenient use with a strip chart recorder. A chart recorder with an input of +10V is required. Alternatively the amplifier can be connected to a data acquisition system.

The desired measuring range of the amplifier is chosen via the front panel range knob:

Range 1	020 mmHg	venous pressure
Range 2	0200 mmHg	arterial pressure
		(pulmonary)
Range 3	0300 mmHg	arterial pressure

The ranges are set ex works and can not be altered by the user.

A filter can be chosen according to the quality of the input signal. The filter knob on the front panel allows a filter setting of 1 Hz, 10 Hz or 100 Hz frequency.

Other features are:

- lightweight easily portable due to its construction,
- stackable housing for multi-channel use.



Front Panel

Front panel:

- 1 ZERO = Zero adjustment knob
- 3 ¹/₂ digit LCD display (pressure in mmHg) 2 3
 - Range knob
 - 1: 0-20 mmHg
 - 2: 0-200 mmHa
 - 0-300 mmHg 3:
- Filter frequency knob (1 Hz, 10 Hz, 100 Hz) 4

Rear panel:

- 1 Power cable
- 2 **ON/OFF** switch
- 3 AMP OUT = Signal output connector (e.g. to chart recorder)
- 4 AMP IN = Transducer input connector
- CAL = Calibration adjusting screws 5





Rear Panel Control Elements

Specifications

Signal Input	Differential signal from TSE blood pressure transducer 9100-series
Sensitivity FS	Range1 020 mmHg (venous)
	Range2 0200 mmHg (pulmonary, arterial)
	Range 3 0300 mmHg (arterial)
Amplifier Output	1+8 V DC FS
Output Impedance	100 Ω maximum
Non-Linearity	± 0.02 % FS
Accuracy	±1% FS
Filter	1 Hz, 10 Hz, 100 Hz
Display	3 1/2 digit LCD display
Environ. Temp.	10 - 50 °C
Power	230 V/50 Hz
Fuses	2 fuses (50 mA, slow-blow)

TSE Pressure Transducer 9100-series

The TSE Pressure Transducer 9100-series is a universal physiological pressure sensor for pressure measurements up to +300mmHg.



The reliable and robust transducer is suitable for a variety of measurements including arterial

pressure, central venous pressure, pulmonary artery pressure, perfusion pressure etc. It has excellent stability and high accuracy over the whole pressure range.

The pressure is transmitted via a catheter or a cannula to the sensor. This pressure is then translated into an electrical signal, which is proportional to the pressure level. The output is fed into the amplifier via a special connecting cable.

The transducer is powered by the amplifier.

Due to a specific surface treatment the pressure transducer can be easily ventilated. Other features are:

- integral 3-way stopcock,
- integrated fast flush device,
- over-pressure safety valve,
- crystal clear for easy detection of air bubbles,
- reusable.



Specifications

Pressure Range	-50 to +300 mmHg	
Sensitivity	50μV/V/cmHg	
Max. Over-Pressure	10.000 mmHg	
Volume Displacement	0.04 mm ³ /100 mmHg	
	pressure	
Zero Point Drift	±0.3 mmHg/°C	
Sensitivity Drift	±0.1 %/°C	
Zero Offset	\pm 25 mmHg	
Linearity/Hysteresis	\pm 2% or 1mm Hg (whatever is larger)	
Electrical Leakage	5μA at 220V/50Hz	
Maximum Excitation	>10V DC or AC	
Voltage		
Insulation	withstands 10.000 V DC	
Output Impedance	350 Ω, nominal	
Weight	approx. 15g w/o cable	



Preparing the transducer for a measurement



1	Pressure sensor
2	3-way-stopcock
3	Flush-device
4	Port A

- 1. Flushing the sensor chamber
- Use 3-way-stopcock (2) to make connection sensor chamber/port B (5-1).
- Remove cap from port B (5) and connect a syringe filled with flush solution.
- Remove cap from port A (4).
- Pull tab of flush-device (3).
- Using the syringe flush the sensor chamber. Remove all air bubbles.
- Close port A with a non-vented cap if included in the scope of supply or use another 3-waystopcock. Take care no air bubbles are trapped inside the stopcock or sensor chamber.
- Repeat procedure if air bubbles remain inside the sensor chamber!

2. Flushing the pressure line

- Mount the transducer to the pressure line via port C (6)
- Use 3-way-stopcock (2) to make connection pressure line/port B (6-5).
- Using the syringe on port B flush the pressure line. Remove all air bubbles.
- Use 3-way-stopcock (2) to make connection pressure line/sensor chamber (6-1).
- Remove syringe.

5 6 yellow arrow red arrow

Port B Port C Cable connector Pressure line

 Close port B with a non-vented cap if included in the scope of supply or use another 3-waystopcock.

3. Connect pressure line to catheter/cannula

It is recommended that the sensor is positioned at the level of the measuring point during measurement!

Note: Stopcocks must be positioned 90° for OFFposition. Do not position stopcocks at 45° to achieve OFF-position, since this position is unprecise and may result in bleed back or air embolism!

Measurement

Any chart recorder with an input range from 0 to +10 V is suited for connection to the amplifier unit. Choose the chart speed according to your waveform requirements.

- Connect the recorder to the amplifier's rear BNC socket AMP OUT.
- In order to read off absolute pressure values the recorder has to be calibrated with zero pressure and a second pressure value, which should correspond to the maximum pressure level to be expected, e.g. 200mmHg!
- Remove the blue cap from the transducer connector.



- Carefully connect the transducer connector (white) to the amplifier cable (grey connector). Align the connector arrows and push the connectors together.
- Connect the amplifier cable to the rear panel 5-pole input socket AMP IN.
- Switch the amplifier on. The amplifier is switched on with the POWER mains switch on the rear panel. The LCD display lights up immediately.

Important: Allow approx. 5 minutes for the amplifier to warm-up in order to guarantee correct measurements!



 Setting the amplifier: Depending on the measurement you want to perform choose the suitable measuring range with the front panel range knob.

Range 10...20 mmHg Range 20...200 mmHg Range 30...300 mmHg venous pressure arterial pressure (pulmonary) arterial pressure

- Zero balance the system to atmospheric pressure by removing the pressure line from the animal (or by opening port B with 3-waystopcock).
- Set the display on the amplifier to zero with knob ZERO.

Note: If you change the measuring range the zeroing has to be repeated.

- Switch the recorder ON. Set the pen to the desired baseline position.
- Connect pressure line to the animal (or close port B with 3-way-stopcock).



- Choose the desired filter frequency 1 Hz, 10 Hz or 100 Hz with the filter knob on the front panel. Maximum signal smoothing, i.e. maximum suppression of artifacts, is achieved by using the 1 Hz filter.
- For blood or perfusion pressure measurements usually a setting of 10 or 100 Hz is recommended.
- The pressure can be read off the display in mmHg.

Calibrating the amplifier

Each transducer is calibrated at the factory for a sensitivity of 50 $\mu\text{V/V/cmHg}$ and can not be recalibrated by the user.

The amplifier is also delivered calibrated. In case a recalibration is necessary please proceed as follows:

- Connect the pressure transducer to the amplifier (AMP IN).
- Connect a pressure-gauge to the transducer.
- Switch the amplifier ON.
- Choose the desired measuring range 1, 2 or 3.



- With the transducer vented to atmospheric pressure set the display to zero with the ZERO knob.
- Using the pressure-gauge apply a defined pressure to the transducer. The pressure is dependant on the range to be calibrated (e.g. range 3: 300mmHg).



 If the display deviates from the pressure applied, use the corresponding adjusting screw on the rear panel to set it to the correct value (CAL). CAL1, 2, 3 are used for range 1, 2 and 3 respectively.

The procedure described above can also be used to calibrate the chart recorder (omit step 7 then).

The transducer has been designed for multiple use. It is delivered non-sterile.

Not for clinical use!



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