

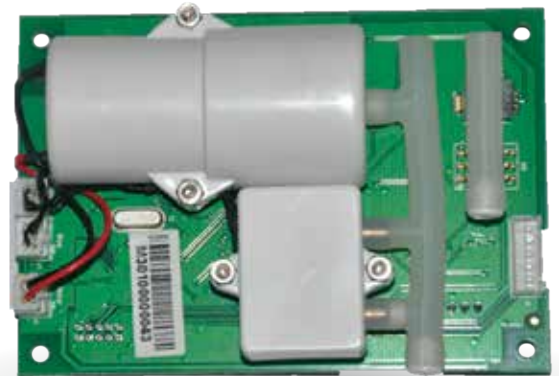
# NIBP Module

Our NIBP module is used for adult, children and neonate non-invasive blood pressure measurement in ICUs and hospital care.

The NIBP measurement is based on the oscillometric method. It uses the pressure sensor of the cuff bundled in the arms or legs to get pulse wave signal during stepwise deflation, then the measurement system will obtain results of SBP, MAP, DBP and PR by signal processing and algorithm.

## NIBP Module

Part #MNBIP



### FEATURES

- Systolic BP, Mean Arterial Pressure, Diastolic BP and Pulse Rate monitoring
- 3 measurement modes such as manual, auto and continuous
- Real time transmission of module states: hardware state, software state and sensor state
- Double protection mode: hardware and software over-pressure protection
- Verified by standard laboratory and clinical
- Compatible with ZUGMED protocol
- OEM Customization upon request

### APPLICATION

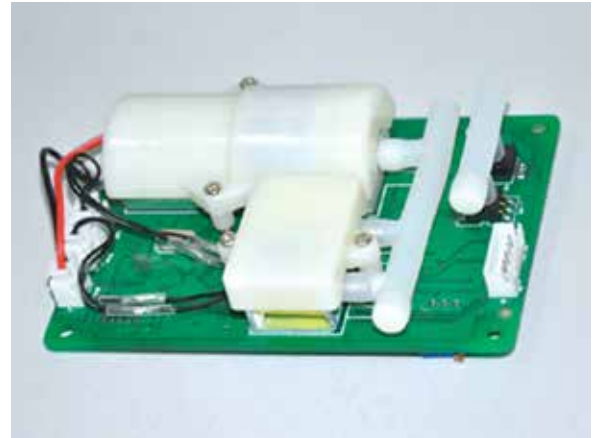
- Desktop blood pressure monitor
- NIBP function of Patient Monitor

## OVERVIEW

Zug NIBP module, referred herein after as MNIBP module is used for adult, children and neonate non-invasive blood pressure measurement in ICUs and hospital care.

The NIBP measurement is based on the oscillometric method. It uses the pressure sensor of the cuff bundled in the arms or legs to get pulse wave signal during stepwise deflation, then the measurement system will obtain results of SBP, MAP, DBP and PR by signal processing and algorithm.

MNIBP module uses the latest multi-wave similarity analysis and trend identification technology to overcome the interference of movement. The high precision sampling circuit is used to improve the ability to measure weak signals. In these ways, the module can obtain more accurate measurement results.



## FUNCTIONS

### MEASUREMENT MODES

There are three kinds of measurement modes: manual, automatic and continuous measurement mode.

#### **Manual mode**.....

*A startup command starts a measurement;*

#### **Automatic mode**.....

*Timing automatic starts the measurement. The cycle time can be selected: 1 minute, 2 minutes, 3 minutes, 4 minutes, 5 minutes, 10 minutes, 15 minutes, 30 minutes, 60 minutes, 90 minutes, 2 hours, 3 hours, 4 hours and 8 hours.*

#### **Continuous mode**.....

*The continuous measurement continues five minutes. The interval is 5 seconds between each two measurements.*

### PATIENT TYPES

The module provides three kind of measurement depending on the patient type: adult mode, children mode and neonate mode.

## PERFORMANCE

### CUFF PRESSURE

**Range**..... 0 - 300 mmHg

**Accuracy**.....  $\pm 2$  mmHg or  $\pm 1\%$   
of the reading (whichever is greater)

**Resolution**..... 1 mmHg

### BLOOD PRESSURE

**Adult**..... SBP: 40-270, MAP: 20-230, DBP: 10-210 mmHg

**Children**... SBP: 40-200, MAP: 20-175, DBP: 10-162 mmHg

**Neonate**... SBP: 40-130, MAP: 20-100, DBP: 10-90 mmHg

### CALIBRATION

The module provides continuous real time pressure to allow proper calibration.

### GAS LEAK DETECTION

The module is built-in with an algorithm to detect if the gas path has a gas leak.

### ARTIFACT REJECTION

Zug embedded NIBP algorithms allow great performance and artifact rejection even during motion or when capturing weak signals.

### RELIABILITY

- Real-time transmission of module status: hardware status, software status and sensor status. The host can generate an alarm according to these statuses.
- Double protection for over-pressure by hardware and software intelligence.
- Double protection for overtime: module overtime protection provides the host timing trigger port.

**Accuracy**..... Mean deviation  $< \pm 5$  mmHg,  
Standard deviation  $< 8$  mmHg

**Resolution**..... 1 mmHg

### PULSE RATE

**Adult**..... 30 - 240 bpm

**Children**..... 30 - 240 bpm

**Neonate**..... 40 - 240 bpm

**Accuracy**.....  $\pm 2$  bpm or  $\pm 2\%$   
of the reading (whichever is greater)

**Resolution**..... 1 bpm

## PSI

**Range** ..... 10% - 120%  
**Accuracy** ..... Inapplicability  
**Resolution** ..... 1%

Note: In blood pressure simulator mode

## OVER PRESSURE PROTECTION

**Adult** ..... < 297mmHg  $\pm$ 3 mmHg  
**Children** ..... < 250mmHg  $\pm$ 3 mmHg  
**Neonate** ..... < 150mmHg  $\pm$ 3 mmHg

## THE MAXIMUM TIME OF MEASUREMENT

**Adult** ..... < 120 s  
**Children** ..... < 120 s  
**Neonate** ..... < 90 s

## LEAK RATE

Leak rate: < 6mmHg / min

## OPERATION TIME

Thanks to the use of a high quality pump, our module is guarantee over 30,000 measurements.

## STANDARDS COMPLIANCE DESCRIPTION

Standard NO.	Number of standard	Version
ANSI/AAMI SP-10	Electronic or automated Sphygmomanometers	1992 A1:1996
IEC60601-2-30	Medical Electrical Equipment - Part 2: Particular requirements for safety of automatic cycling indirect blood pressure monitoring equipment	1996 A1:1999
EN1060-1	Non-invasive sphygmomanometers - Part 1: General requirements	1995
EN1060-3	Non-invasive sphygmomanometers - Part 3: Supplementary requirements for electro- mechanical blood pressure measuring systems	1997
IEC60601-1-2	Medical Electrical Equipment - Part1: General Requirements for Safety - 2. Collateral Standard - Electromagnetic compatibility - Requirements and tests	2001

## ELECTRICAL CHARACTERISTICS

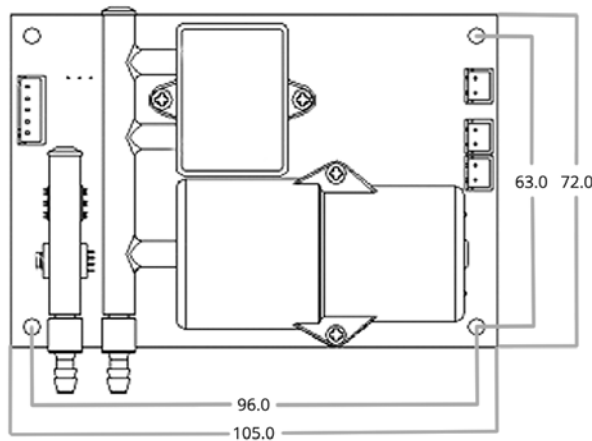
**Input Voltage** ..... External power supply should provide +12V DC  
Voltage offset range should between  $\pm$ 10% of voltage full range  
**Power Consumption** .....  $\leq$  5W

## ENVIRONMENT CHARACTERISTICS

	Operating environment	Storage environment
<b>Temperature</b>	10°C to 40°C (50°C to 140°C)	-20°C to +70°C (4°C to 158°C)
<b>Humidity</b>	15% - 90% non-condensing	15% - 90% non-condensing
<b>Altitude</b>	-170m to +1700m	-170m to +1700m

## DIMENSIONS

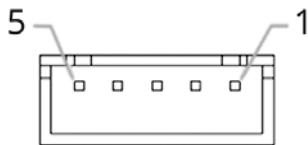
The board dimensions are given in millimeters.



## INTERFACES

### POWER AND COMMUNICATION INTERFACE

The connector J5 shown below is used for the purpose of communication and power supply. The pin 1 is actually indicated by an arrow on the PCB.



The table shows the pin assignment of this connector.

*Note 1: TXD pin is used for the data sent from the MNIBP/ M301 module to the host.*

*Note 2: M\_RST pin is a triggering pin for external reset. A high level will reset the module. M\_RST is TTL level.*

### GAS PATH INTERFACE

The module provides two gas paths to get better anti-interference effect.

## ORDERING

Our NIBP module part number is **MNBIP**.

For ordering our module, please contact directly our sales team by email at [sales@zugmed.com](mailto:sales@zugmed.com) or refer to our website [www.zugmed.com](http://www.zugmed.com) for further information.

### Headquarter

Zug Medical Systems SAS  
2000 Route Des Lucioles, CS 90029  
06901 Sophia Antipolis  
France

W [www.zugmed.com](http://www.zugmed.com)  
E [sales@zugmed.com](mailto:sales@zugmed.com)  
T +33 (0)9 84 116 339  
F +33 (0)9 57 135 843

**ZUG**  
MEDICAL SYSTEMS

Pin No	Signal	Description
1	M_RST	External reset
2	TXD	UART Sending data from module to host
3	RXD	UART Receiving data from host to the module
4	+12V	Power Supply input 12V DC
5	GND	Ground

### BLOOD PRESSURE CUFFS REQUIREMENTS

For evaluation purpose, a reusable adult cuff is provided with the module. However once modules are purchased to be integrated in equipment, the customer can also choose cuffs, which have been qualified as reliable and in conformance with the local regulation where the final product will be used.