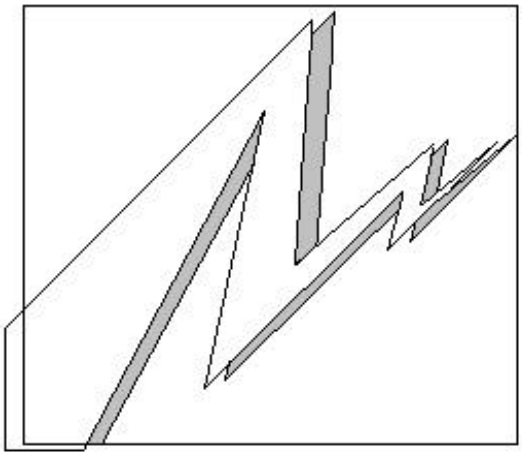
P1195
DUAL TOURNIQUET MONITOR



USER MANUAL

FOR OPERATING SYSTEM 22099-01

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1 Introduction

P1195 INTRODUCTION

The P1195 Dual Tourniquet Monitor is designed to set tourniquet pressure applied to two independent tourniquet systems, then monitor the pressures and sound an alarm should the pressures rise or fall outside preset limits. Minute timers are also run for each system with an audible reminder every 15 minutes of operation

The audio system of the P1195 uses four different combinations of beeps and mixed frequency tones to indicate various events. The four combinations are:- 1 beep, 2 beeps, 3 beeps and a continuous triple mixed frequency signal as the alarm sound.

The alarm condition has both an audible and visual component, while the 15 minute reminder has an audible component only. Both audible alarms share a common sound system. The volume of the alarms can be set to 1 of 8 levels, this is done internally at the time of installation.

The Dual Tourniquet Monitor can display pressures in either kPa or mmHg. Selection is done internally and is set at the time of installation. Two green LED’s on the front panel indicate which one has been selected.

All timing is done via a “realtime clock” that runs even when the unit is turned off. When the unit is off, the clock is powered by an internal battery. This battery is constantly monitored when the unit is powered up and a red LED is provided on the front panel to indicate when the battery is considered too low to function properly. At this point the unit should be serviced and the battery replaced.

2 Unit Description

FRONT PANEL

The front panel of the Dual Tourniquet Monitor is divided into two sections, left (A) and right (B), there is also a small section in the centre containing indicators common to both sides.

The left and right sides mirror each other and present the following items to the operator.

1) Pressure Regulator – Used to adjust the pressure applied to the cuff.

2) Cuff Air Supply – Connects air supply to the cuff.

3) Set Button – Used to start the monitoring process. While held, it prevents the alarm from sounding as the cuff pressure is adjusted. As soon as it is released, the set pressure is memorised. Upper and lower limits of plus and minus 5 kPa on the set pressure are also memorised, providing the pressure is between 5 and 55 kPa. The timer is zeroed and the monitoring started.
When the “set” button is operated, a single “beep” will be heard as an acknowledgment of operation. When released a single “beep” will be heard if the setup is acceptable, or a triple “beep” will be heard if pressure is outside the acceptable range.

4) Timer Display – A 2-digit timer is provided to keep track of the number of minutes the tourniquet has been in operation. A double beep is sounded every 15 minutes of operation. Should the total time exceed 99 minutes, the display will flash 99 continuously. The 15-minute double beep will continue to operate every 15 minutes for up to 24 hours, after which it will cease.

5) Pressure Display – A 3-digit display displays the cuff pressure in either kPa or mmHg. The upper and lower alarm points are plus & minus 5 kPa on the set pressure, hence the pressure range of 5 to 55 kPa because the lower limit can go to ‘0’ kPa and the upper limit can go to ‘60’ kPa, 60 being the absolute maximum pressure permitted.

The common front panel area presents the following items to the operator.

1) Alarm LED – This 15mm x 15mm red LED flashes whenever an alarm situation exists.

2) Battery Low LED – This red LED will be illuminated when the internal battery that powers the timer is low and due to be replaced.

3) KPa & mmHg LED's – One of these two green LED's will be illuminated indicating which units of pressure have been internally pre-selected for display.

INTERNAL CONTROLS

There are several setup items accessible to the installation technician from the rear on the unit.

1) Power Connector – Power to the unit is connected via this terminal block. The Dual Tourniquet Monitor requires an external 12VDC @ 0.5A plug pack to power the unit. The connection is polarity conscience, however, a blocking diode has been incorporated to prevent damage to the unit should reverse voltage be applied accidentally.

2) Timer Battery – This battery is a 3V button style, type CR2032. It should be replaced as soon as the "low battery" LED is illuminated.

3) Pressure Units Selection – This 3 way pin block should have the centre leg linked to either one of the outer legs to select either kPa or mmHg as the desired pressure unit to be displayed. It is common to both left and right side displays.

4) Setup Button – Providing a pressure cycle is not in progress on either side of the unit, operation of this button will step the unit through 2 setup states. The first state is to allow setting of the audible alarm level. The second state is to allow calibration of the pressure sensors. Detailed explanation of these states is given in the "Unit Operation" section on page 7.

5) Calibration Buttons – Two sets of 2 buttons are provided to calibrate the pressure sensors, one set per side. Each set is used to let the unit "learn" the output reading of the associated sensor at two calibration points. These points are saves in non-volatile memory and used to calculate the pressure reading from the sensor.

ERROR CONDITIONS

All parameters set during calibration and running of pressure cycles are stored in non-volatile memory. This memory has a finite limit on the number of write cycles it will accept before failure. Many conditions influence the life expectance of this memory, in particular temperature. Even in the worst case conditions the memory has a life expectancy of many thousands of write operations.

Should a failure occur, it may affect only one side or both sides of the unit. Whatever the case the affected side will flash “Er” on the time display and no pressure cycle can be initiated, the pressure display is unaffected.

If such an error condition occurs, the unit should be serviced immediately.

3 Unit Operation

USE OF UNIT

For the description of the units operation only one side will be discussed, the other side operates in exactly the same manner.

In its standby state the P1195 should be displaying “0” pressure with the time display blank. A small residual pressure up to 5 kPa can be present without the alarm sounding. In the standby state no timing takes place and no alarms will sound.

To use the unit, place the tourniquet cuff as required. Hold the “set” button, the unit will beep once, then increase the pressure as required. Release the “set” button when the desired pressure has been reached, the unit will beep once if conditions are acceptable, or three times if they are not. If pressure conditions are acceptable, the timer will start from zero and count off the minutes. If the conditions are not acceptable, ie. the pressure is less than 5 or greater than 55 kPa the timer will remain blank, should the pressure be less than 5 kPa the alarm will not sound, if greater than 55 kPa the alarm will sound.
If the pressure rises or falls by 5 kPa on the set pressure, an alarm will sound. To silence the alarm adjust the pressure back to the set point.

Once the unit is running a double beep will be heard every 15 minutes of operation, this will continue for up to 24 hours. If the timer exceeds 99 minutes it will display 99 and flash.

To disable the unit at the end on the cycle, hold the “set” button and reduce the pressure to zero, or at least to less than 5 kPa, then release the “set” button. The unit will beep twice and leave the display blank, it is now back to standby state.

INSTALLATION SETUP

There are several selections to be made at the time of installation. All adjustments are done within a simple setup procedure with the exception of the “units of pressure”.

The “units of pressure” to be displayed is set via a 3 pin connector designated as “CON1” and labelled as “PRESSURE SELECT”, use a shorting shunt to select kPa or mmHg as indicated on the PCB.

All other adjustments are done under setup. To use setup, make sure no monitoring cycle is running, as this inhibits entering setup. Operate the “setup” button to enter Stage 1.

Stage 1

Stage 1 permits adjustment of the alarm volume. The top left hand timer display will show an “A” indicating alarm volume adjustment, the top right hand timer display is blank. The bottom left hand pressure display will show the timer battery voltage and the bottom right hand pressure display will show the current volume setting represented by a number from 1 to 8. The audible alarm signal is also turned on. Operation of the “B” side high & low pressure calibration buttons will adjust the volume up and down between 1 and 8, increasing and decreasing the audio level as it goes. When the desired level is set, pressing the “setup” button will save the value and turn off the audio signal as it steps to Stage 2 of the setup.

Stage 2

Stage 2 permits calibration of the pressure sensors. The top left hand timer display will show a “P” indicating pressure sensor calibration adjustment, the top right hand timer display is blank. Both the bottom pressure displays will show current pressure readings.
Calibration is performed by applying two accurately known pressure values to the sensors, these values being ‘0’ and ‘50’ kPa. Both A and B sensors have individual calibration buttons and can therefore be set independently. Note; pressure readings must be stable before saving them.
When ‘0’ kPa is being applied to one, or both, sensors, operation of the “LOW A” and/or “LOW B” buttons will save the output value being read from each sensor as the ‘0’ kPa value, this will be reflected by displaying “0” in the appropriate left (A) and/or right (B) pressure display.
Similarly, when ‘50’ kPa is being applied to one, or both, sensors, operation of the “HIGH A” and/or “HIGH B” buttons will save the output value being read from each sensor as the ‘50’ kPa value, this will be reflected by displaying “50” in the appropriate left (A) and/or right (B) pressure display.

Operation of the “setup” button a third time will end the setup cycle and the unit will go back to standby state.

The “setup” button can be operated to simply step through the stages to examine battery voltage and volume level without changing any settings.

Note. The battery is considered low when it reads less than 2.2V. Anything below this value will turn the “battery low” LED on. Nominal battery voltage is 3V.

The pressure sensors are calibrated at sea level before leaving the factory. However, a regular maintenance program is advised which should include checking the sensor calibration.

4 Specifications

SPECIFICATIONS

Power Consumption

Operating Voltage	12 Volts DC +/- 10%
Current Consumption	0.3 Amps
Power Consumption	3.6 Watts

Environmental Conditions

Operating Temperature Range	0 - 45 Deg C
Operating Humidity Range	95% R.H. non-condensing

Pressure Sensors

Maximum Pressure	100 kPa
Connecting Tube	6mm.

Timers Displays

Two Digit	0 – 99 Minutes

Pressure Displays

Three Digit	0 – 100 kPa (0 – 750 mmHg)

Alarm Volume

Adjustable in 8 steps

Audio Signals

1 Beep	Acceptance of a button or operation.
2 Beeps	15 Minute audible reminder.
3 Beeps	Rejection of an operation.
3 Tones Mixed Continuously	Alarm signal.

Battery Life

Unknown at the present time
Anticipated to be several years.

Battery Type

CR2032 Nominal 3V