

# **USER'S MANUAL**

## **Version 3.3**

### **PRESSURE GAUGE**

#### **Model IP-300.3**

October 2007



ELOMED Ind. e Com. de Equipamentos Eletrônicos LTDA  
Av. Sete de Setembro, nº 99, Sala 4 – Centro.  
99.010-120 - Passo Fundo – RS – Brazil  
Phone / Fax: (54) 3312-6661  
Home page: [www.elomed.com.br](http://www.elomed.com.br)  
E-mail: [vendas@elomed.com.br](mailto:vendas@elomed.com.br)

# Summary

<b>1. INTRODUCTION</b> .....	<b>4</b>
<b>2. USE</b> .....	<b>4</b>
<b>3. PRESSURE GAUGE</b> .....	<b>4</b>
3.1 PARTS THAT COMPRISE PRESSURE GAUGE .....	4
<b>4. PRESSURE GAUGE FOR THE USE IN SPHYGMOMANOMETERS</b> .....	<b>6</b>
4.1 NORMS FOR SPHYGMOMANOMETERS GAUGE .....	6
4.2 PROCEDURE OF SPHYGMOMANOMETER GAUGING USING THE PRESSURE GAUGE .....	7
4.3 GAUGING SPHYGMOMANOMETERS .....	7
4.4 CANCELLING OPERATIONS .....	11
4.5 RECORDING ACCOMPLISHED GAUGING.....	11
4.6 LISTING ACCOMPLISHED RECORDINGS .....	11
4.7 DELETING THE MEMORY .....	12
4.8 TRANSFERING DATA TO THE COMPUTER.....	13
4.9 ADJUSTING DATE AND TIME .....	14
4.10 ADJUSTING PRESSURE GAUGE .....	14
4.11 QUICK GUIDE.....	15
<b>5. PRESSURE GAUGE AS A PRESSURE METER</b> .....	<b>17</b>
<b>6. PRECAUTIONS</b> .....	<b>17</b>
<b>7. TECHNICAL SPECIFICATIONS</b> .....	<b>17</b>
<b>8. WARRANTY</b> .....	<b>18</b>

# List of Figures

Figure 1 Pressure gauge with details of the alphanumeric display, keyboard for data input and led functioning signalizer.....	4
Figure 2 Key functions of the pressure gauge.....	5
Figure 3 View of the back side of the pressure gauge and description of the parts.....	5
Figure 4 Pressure paddle.....	6
Figure 5 Serial communication cable.....	6
Figure 6 Power source.....	6
Figure 7 Cable connections.....	8
Figure 8 Manometer Connection in the pressure circuit.....	8
Figure 9 Detail of the button to be powered to start the gauging and signalization led of the "procedure outset".....	8
Figure 10 Detail of the keyboard.....	9
Figure 11 Pressure activation buttons.....	9
Figure 12 Flowchart for sphygmomanometer gauging.....	10
Figure 13 Flowchart for recording gauge registers.....	11
Figure 14 Flowchart to list stored registers in the equipment memory.....	12
Figure 15 Flowchart to delete memory registers.....	13
Figure 16 Connection with the computer through the serial port.....	13
Figure 17 Flowchart to adjust date and time.....	14
Figure 18 Flowchart to adjust gain error of the pressure gauge.....	15
Figure 19 Flowchart for Error Adjustment of Zero of the Pressure Gauge.....	15
Figure 20 Quick guide of the gauge basic operations.....	16

## 1. Introduction

The IP-300.3 Pressure Calibrators, produced by Elomed Industry and Commerce, is a device designed to measure the pressure carried out by gases in a rate of 0 to 300 mmHg. The equipment also comprises of sensors that allow it to obtain relative air humidity and room temperature, exerting the role of a thermohygrometer<sup>1</sup>. These two physical measures are needed to manufacture pressure gauge reports, except for certain limits, they alter the measured values in a significant way.

Before using the equipment, read this manual carefully to assure its perfect working. This manual just refers to the pressure gauge in operations which are not being used with a computer, and the program that accompanies the pressure gauge, named Calibwin version 2.1. For this case, read the user's specific manual of the program.

## 2. Use

The pressure gauge can be used in two different ways:

1. As a **Pressure Calibrator**, with specific routine for sphygmomanometer gauging (devices to measure blood pressure);
2. As a gas **pressure meter** up to the limit of 300 mmHg, informing the value of the measured pressure on the display.

## 3. Pressure Gauge

### 3.1 Parts that comprise pressure gauge

- a) **Pressure gauge device** in its front side comprises of: (a) a keyboard for data input, (b) an alphanumeric display of 2 lines x 16 characters, and (c) a light indicator (led) that signalizes that the pressure gauge is on (Figure 1).



**Figure 1 Pressure gauge with details of the alphanumeric display, keyboard for data input and led functioning signalizer**

- b) The data input keyboard presents some functions (Figure 2). These functions will be explained in details in this manual.

<sup>1</sup> Thermohygrometer – it is an instrument designated to measure temperature and air humidity or a gas.

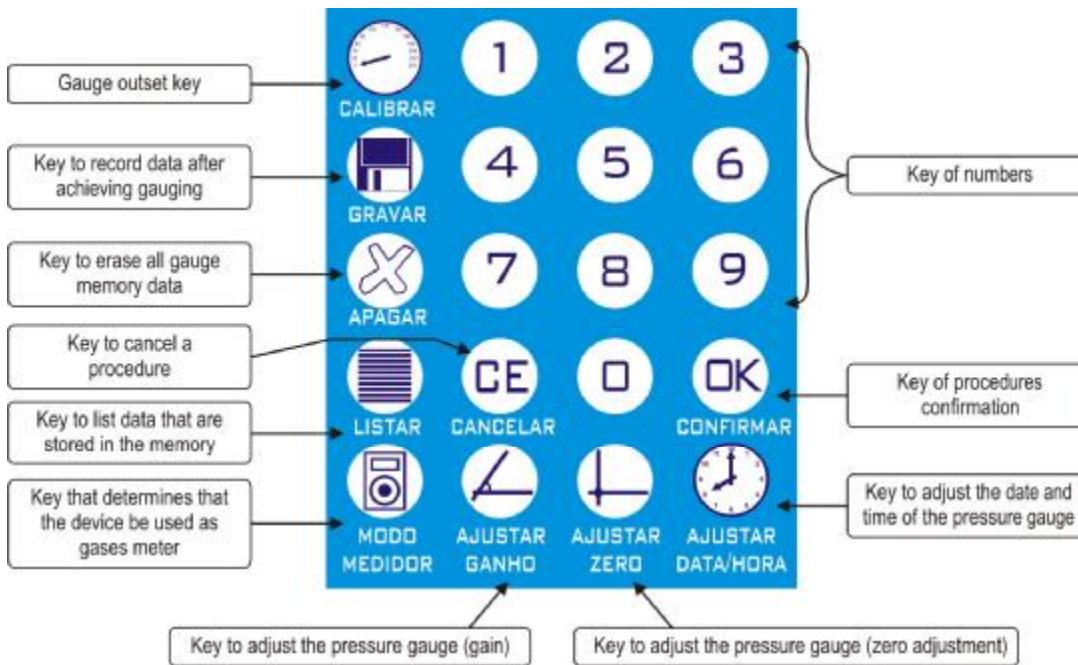


Figure 2 Key functions of the pressure gauge

c) **In the back side of the pressure gauge**, the connector of the communication cable (serial or USB communication), the connector of power source, the pressure power cable, the output pressure circuit, and the key On/Off are found, according to Figure 3.



Figure 3 View of the back side of the pressure gauge and description of the parts

d) **Pressure paddle** (Figure 4): the pressure injector that consists of the gauge has the objective of introducing or removing air from the pressure circuit where the manometer to be gauged is on.



Figure 4 Pressure paddle

- e) **Computer program:** denominated “Calibwin”, version 2.1 which makes the register of all gauges and the issue of printed reports possible.
- f) **Communication cable** (Figure 5)
- g) Power source (Figure 6)
- h) **Case** for transportation

Formatados: Marcadores e numeração



Figure 5 Serial communication cable



Figure 6 Power source

[D1] Comentário:

## 4. Pressure gauge for the use in sphygmomanometers

### 4.1 Norms for sphygmomanometers gauge

The methodology for gauge development of the program and the procedures adopted for sphygmomanometer gauging took the Inmetro directives into consideration.

Inmetro, through the Directive nº 153, of August 12, 2005, approved the Metrological Technical Regulation which establishes the conditions that must satisfy the mechanical sphygmomanometers.

Regarding the sphygmomanometers that are being used, this directive determines that they will continue to be used, since they are according to the maximum errors allowed, that at the increasing or decreasing pressure, in any point, is of 3 mmHg, and at a maximum hysteresis of 4 mmHg, in any point. Furthermore, all the devices, new or being used, must be checked from time to time every year. For the verification of the sphygmomanometer aneroid manometer, it is verified the correspondence of values between both "manometers" (in this case, the sphygmomanometer manometer and the pressure gauge) from the maximum scale up to 300 mmHg, and the magnitude of the difference in value correspondence, measured in mmHg, in each one of the levels. The aneroid manometers are considered gauged when the differences were inferior to  $\pm 3$ mmHg, which corresponds to 1% of the total scale.

The accomplishment of periodical verification and gauging is that it will assure the sphygmomanometers being used are in accordance with the allowed errors and, therefore, present trustworthy measures.

#### ***4.2 Procedure of sphygmomanometer gauging using the pressure gauge***

The pressure gauge can be used to accomplish the sphygmomanometer gauge with or without the use of a computer such as IBM PC. When used without the aid of a computer, the pressure gauge can be calibrated in field, keeping in its memory up to 16 registers (each one composed of 3 ascent and descent cycles, totalizing 30 checks). After carrying out the calibration in field, the data must be transferred to a computer (by means of a communication cable) and, making use of Software Calibwin 2.1, supplied with the equipment, it is possible to achieve all necessary calculus and report printings.

In short, the technician who will be accomplish the calibration must connect the manometer to be gauged in the pressure circuit of the pressure gauge, activate the quick pressure elevation key to start the procedure, activate the key "gauge" (that can be found in the gauge keyboard) and activate pressure in the sphygmomanometer manometer up to the indicated value on the display, confirm the procedure typing ok, increase the pressure again to the next value indicated on the display (up to the next maximum value indicated, then, the inverse manner is carried out – descent value), repeating the procedure successively. At the end, activate key "register" to record the values obtained in the procedure.

The meticulous steps for the procedure are described below. This procedure of ascent and descent of the pressure value will be accomplished for three times, according to the recommendation of the Inmetro Directive, for the achievement of the necessary calculus.

#### ***4.3 Gauging sphygmomanometers***

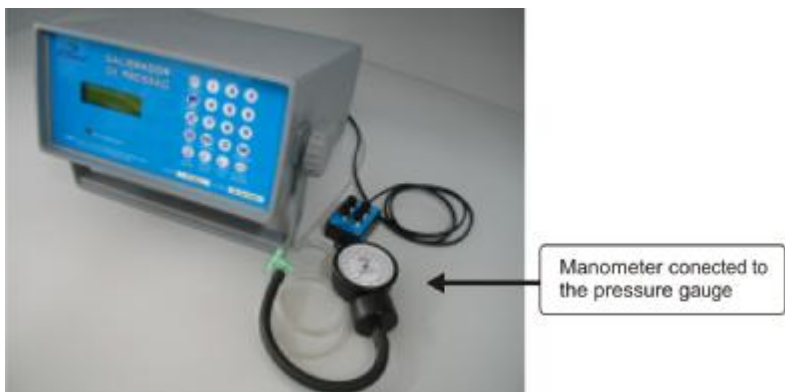
To accomplish gauging of a manometer, the next steps below must be followed:

1. Verify the local feeding tension;
2. Select the feeding tension on the back side of the gauge;
3. Plug the power source in the pressure gauge (Figure 7);



**Figure 7 Cable connections**

4. Connect the pressure output hose of the gauge in the pressure circuit according to Figure 8;



**Figure 8 Manometer Connection in the pressure circuit**

5. Switch on the key On/Off;
6. Push the paddle button << until the led "procedure outset" of the gauge front panel is on;

Formatados: Marcadores e numeração



**Figure 9 Detail of the button to be powered to start the gauging and signalization led of the "procedure outset"**

7. The time, the date, the relative air humidity value and room temperature will appear on the display;

8. Activate the key GAUGE;

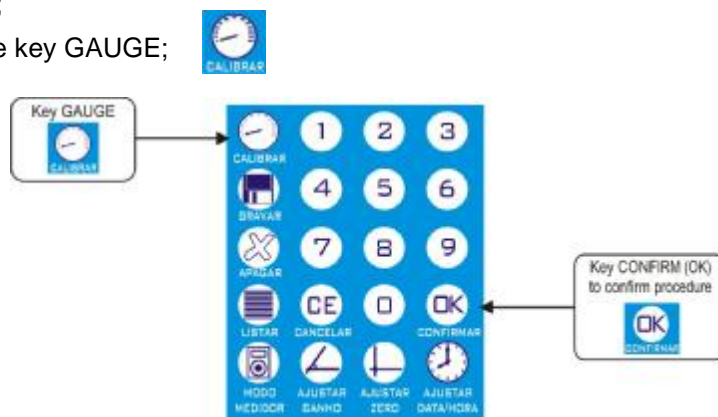


Figure 10 Detail of the keyboard

9. Activate the pressure increase button (>>) on the pressure paddle until the sphygmomanometer manometer reaches 20 mmHg;



Figure 11 Pressure activation buttons

10. Activate the key OK (checking the operation);

11. The value of the next pressure that must be applied in the manometer will appear on the display;

Formatados: Marcadores e numeração

12. This procedure will be carried out for the pressures of 80, 140, 200, and 260 mm Hg;

13. When the button OK is activated, after being “reached” the value of 260 mmHg, it will appear the real values of measured pressure of the sphygmomanometer in the determined pressures on the display;

14. The procedure must be repeated to the same values downward, in other words, the measures will be obtained for the value of 200, 140, 80, and 20 mmHg;

15. This ascent and descent procedure is repeated for three times (three cycles);

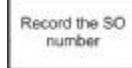
16. After the achievement of the three cycles, the data obtained can be registered;

17. Press the key RECORD (to register the obtained data);



18. The following message will appear on the display:

19. Type a number of OS to register the data;



20. It will appear on the screen OS = XX  
Cód ?

21. The manometer code must be typed  
22. Push the key OK of the gauge keyboard;

23. It will appear on the screen Rec Ok

24. The gauge procedure is finalized.

Formatados: Marcadores e numeração

Este procedimento poderá ser visualizado no Fluxograma apresentado na Figura 12.

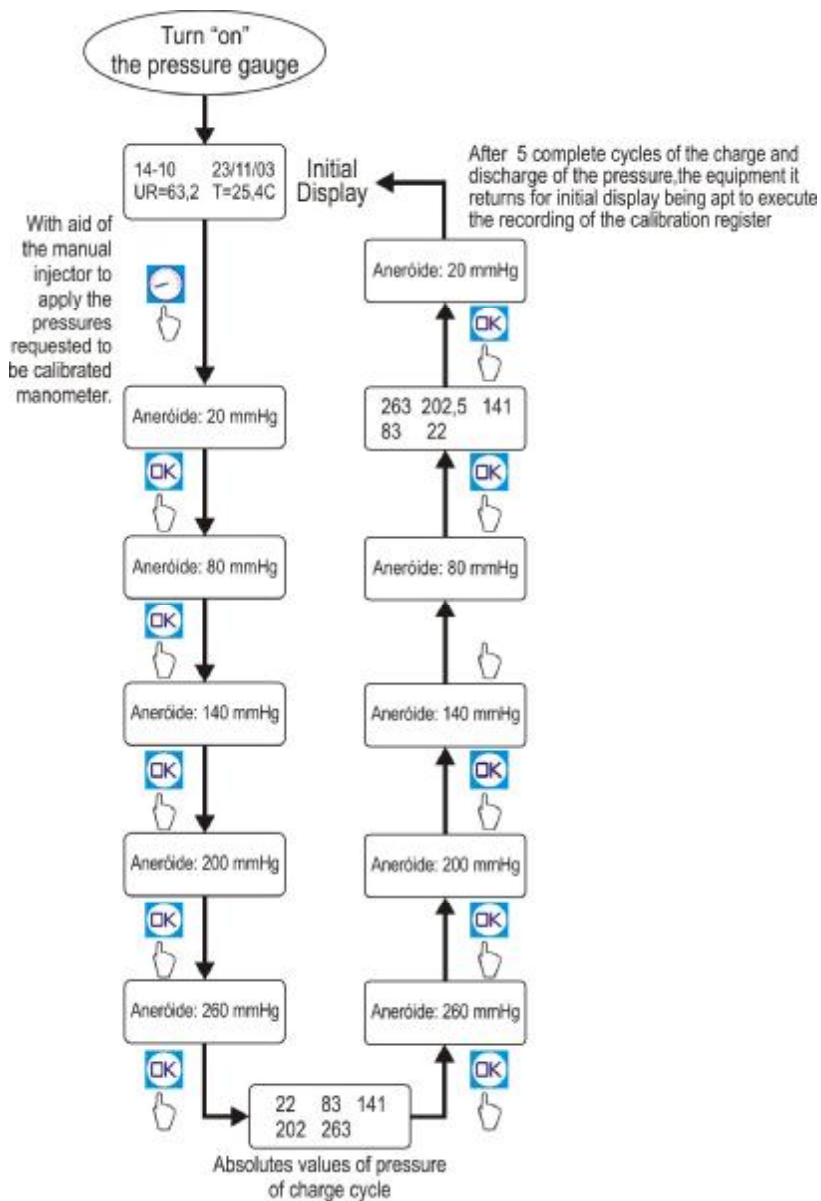


Figure 12 Flowchart for sphygmomanometer gauging

#### 4.4 Cancelling operations

Any procedure can be cancelled by typing the key CANCEL of the keyboard.



#### 4.5 Recording accomplished gauging

After achieving a complete gauging, the equipment returns to the initial screen, enabling the register for recording (as mentioned in item 4.3):

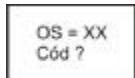


1. Push the key RECORD of the gauge keyboard;
2. The following message will appear on the display:



3. Type a number of SO to register the data;

4. It will appear on the screen:



5. The manometer code must be typed;
6. Push the type OK of the gauge keyboard;
7. It will appear on the screen:



8. Push the Key OK.

Figure 13 presents the recording procedure.

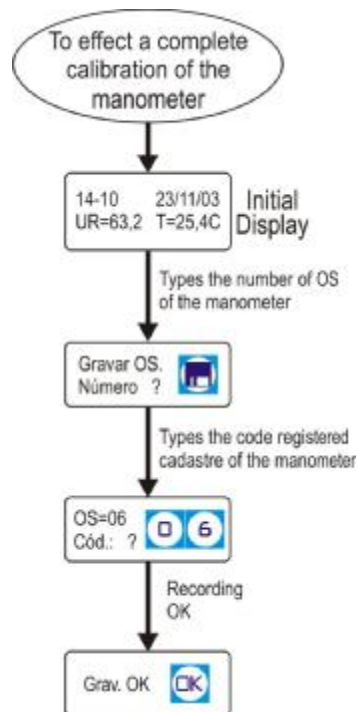


Figure 13 Flowchart for recording gauge registers

Note:

1. If the key "Record" is pushed before a gauging has been accomplished, the display will present the message "Empty Buffer" followed by the message "Cancelled Recording".
2. When recording more than one manometer code for the same Service Order number (SO), the equipment sends a warning message on the display "SO already exists". When confirming (the key OK), the code of this manometer will be recorded in SO.
3. If the manometers have not been registered yet in Calibwin 2.1 program, when passing data to the computer, an error will occur. See more details in the program manual.

Formatados: Marcadores e numeração

Formatados: Marcadores e numeração

#### 4.6 Listing accomplished recordings

To visualize the pressure gauge registers on the pressure gauge displays already done and recorded, follow the steps below:



1. Push the key LIST of the gauge keyboard;
2. The number of a registered SO, the manometer of this SO and the gauge number will appear (1, 2 or 3, because three cycles in each SO are carried out);
3. If the SO that appears on the display is needed, push the key OK;
4. The OS number, the time, and the date will appear on the display that the gauging was accomplished;

5. Press the key OK to show on the display data related to the first cycle of the gauge register;
6. Push the key OK again to list the second cycle;
7. Push the key OK to list the third cycle;
8. Push the key OK to verify temperature and air relative humidity, and relative humidity of the environment at the gauge date;
9. Push the key OK to return to the initial screen;
10. When the SO listed is not the desired one, keep pushing the key LIST until the SO desired appears (when pushing the key LIST, all stored gauges are being listed in the equipment memory);
11. At the end of the registers, return to the initial screen;

Formatados: Marcadores e numeração

Figure 14 presents the flowchart of this procedure.

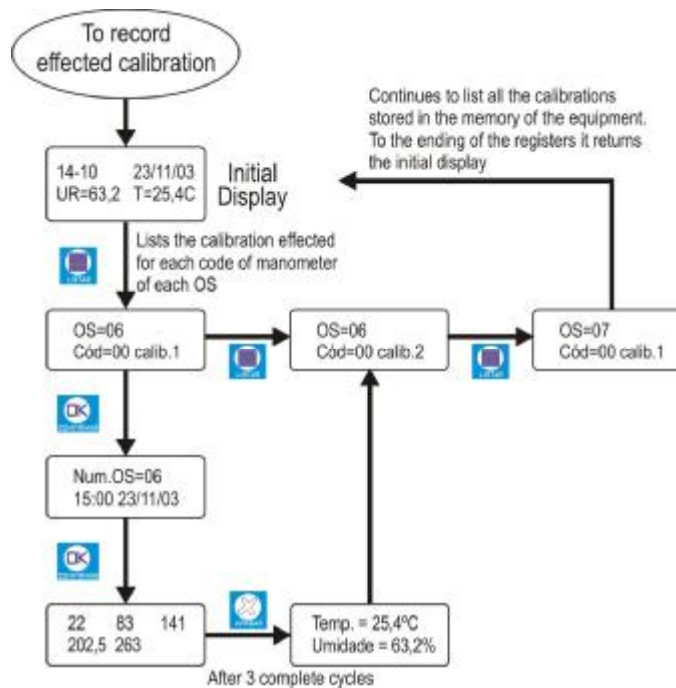




Figure 14 Flowchart to list stored registers in the equipment memory

#### 4.7 Deleting the memory

To eliminate the memory gauge registers, proceed as follows:

1. Push the key DELETE of the gauge keyboard; 
2. The following message will appear on the display: "Delete all memory";
3. Push the key OK when it is desired to delete all stored data in the gauge;
4. The following message will appear on the display: "Deleted memory";
5. To give up the procedure, push the key CANCEL. 

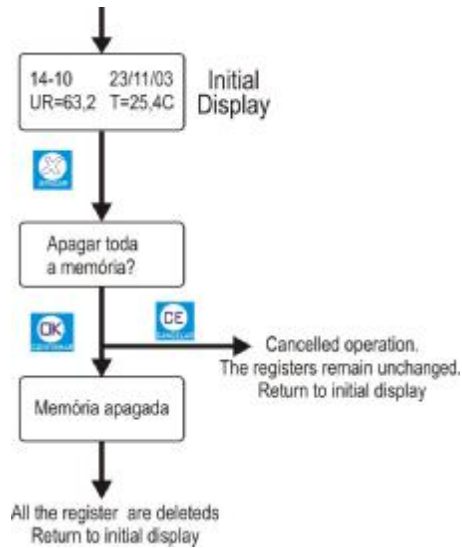
A diagram of the procedure can be seen in Figure 15.

#### 4.8 Transferring data to the computer

To transfer the data from the pressure gauge to the computer, follow the steps below:

1. Connect the pressure gauge to the socket, choosing the suitable tension;
2. Connect the pressure gauge to the communication cable (serial cable standard RS-232 with the serial adapter/USB). Then connect the cable to a connector on the computer (input USB);
3. Carry out the Calibwin 2.1 program:
  - a. Go to the communication menu;
  - b. Select the subitem connect;
  - c. Select the subitem import data;
  - d. The program will capture all stored registers in the pressure gauge.

For further information, check the user's manual of the program.



**Figure 15 Flowchart to delete memory registers**


NOTE: Before transferring the data from the pressure gauge to the computer, it is necessary to register the manometers which have their gauges stored in the program. The manual of the program informs how to register the manometers.



**Figure 16 Connection with the computer through the serial port.**

#### 4.9 Adjusting date and time

When there is a necessity of adjusting date and time, proceed as follows:

1. Press the key ADJUST DATE/TIME  of the gauge keyboard;
2. The following question will appear on the display: "Type the time";
3. Type the time using the gauge numerical keyboard (two digits);
4. After typing the time, the following question will appear on the display: "Type the min.";
5. Type the minutes (two digits);
6. After typing them, the following question will appear on the display: "Type Day of the month";
7. Type the day of the month (two digits);
8. I will appear on the display: "Type the month";
9. Type the month;
10. It will appear on the display "Type the year";
11. Confirm the new date and time, pressing the key OK;
12. The described procedure is represented in the flowchart of Figure 20.

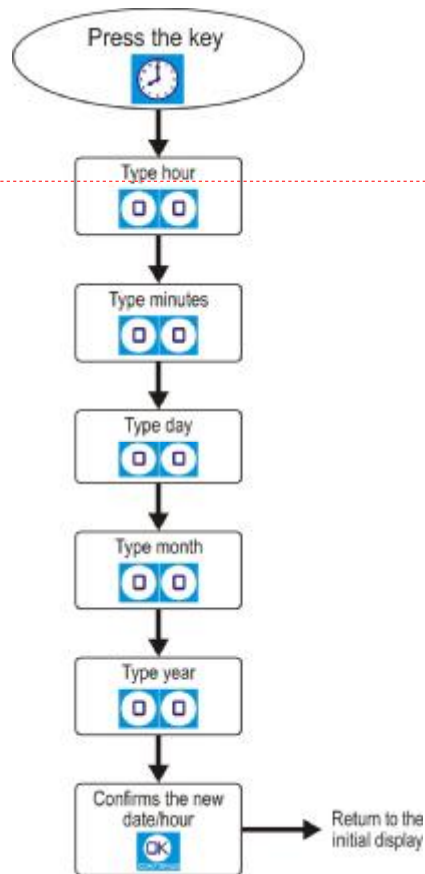


Figure 17 Flowchart to adjust date and time

#### 4.10 Adjusting pressure gauge

On the same manner that the sphygmomanometer manometer must be gauged and adjusted from time to time, the pressure gauge must be calibrated and adjusted in order to assure that it is providing the appropriate values.

The pressure gauge presents some functions to make some adjustments. The adjusting procedures of gain error and of zero adjustment are described as follows.


##### 4.10.1 Gain error

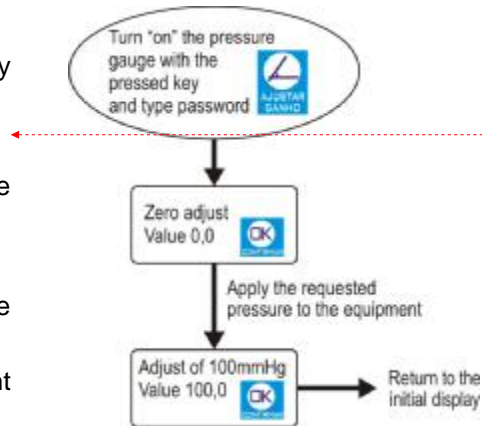
**CAUTION:** This procedure must only be carried out by using a standard equipment of pressure gauged and with uncertainty measurement inferior to the pressure gauge. If this warning is not fulfilled, the equipment may be unable to be used or damaged. Normally, this procedure is carried out by a Gauge Laboratory of Low Pressures, associated to RBC.

For carrying out the adjustment, assemble the pressure circuit involving the standard equipment and the pressure gauge (IP-300.3). Inject the pressures requested by the pressure gauge, based on the standard equipment.

In order to obtain more security, this procedure is protected by the password 972.

The procedure to error gain:

1. Turn on the pressure gauge pressing the key ADJUST GAIN 
2. Type the password (972);
3. The following message will appear on the display: "Gain adjust";
4. Type the key OK;
5. The following message will appear on the display: "Adjust of 100 mmHg";
6. Apply the requested pressure to the equipment with the other standard pressure equipment;
7. Type the key OK;
8. It will return to main screen;



Formatados: Marcadores e numeração

Figure 18 Flowchart to adjust gain error of the pressure gauge


Note: To achieve the comparison between the pressure gauge and a standard equipment, turn on the gauge pressing the key "**Meter Mode**", then the instrument will present the pressure values related to it on the display.

Formatados: Marcadores e numeração

#### 4.10.2 Zero error

**CAUTION:** To accomplish this procedure, the pressure sensor of the pressure gauge must be free, without any obstructions, that is, only when in contact with air.

The procedure for gain error:

1. Switch on the pressure gauge; 
2. Press the key ADJUST ZERO;
3. The following message will appear on the display: "Zero adjust";
4. Type the key OK;
5. It will return to the main screen;

Note: To accomplish the pressure gauge with a standard equipment, turn on the gauge with the screen in "**Meter Mode**" pressed. This way the instrument will present the pressure values applied to it on the display.

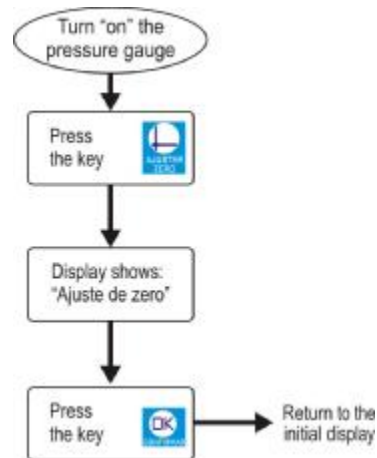


Figure 19 Flowchart for Error Adjustment of Zero of the Pressure Gauge

#### 4.11 Quick Guide

The following presents a quick figure of the pressure gauge operations for using in field, that is, without being connected to the computer.

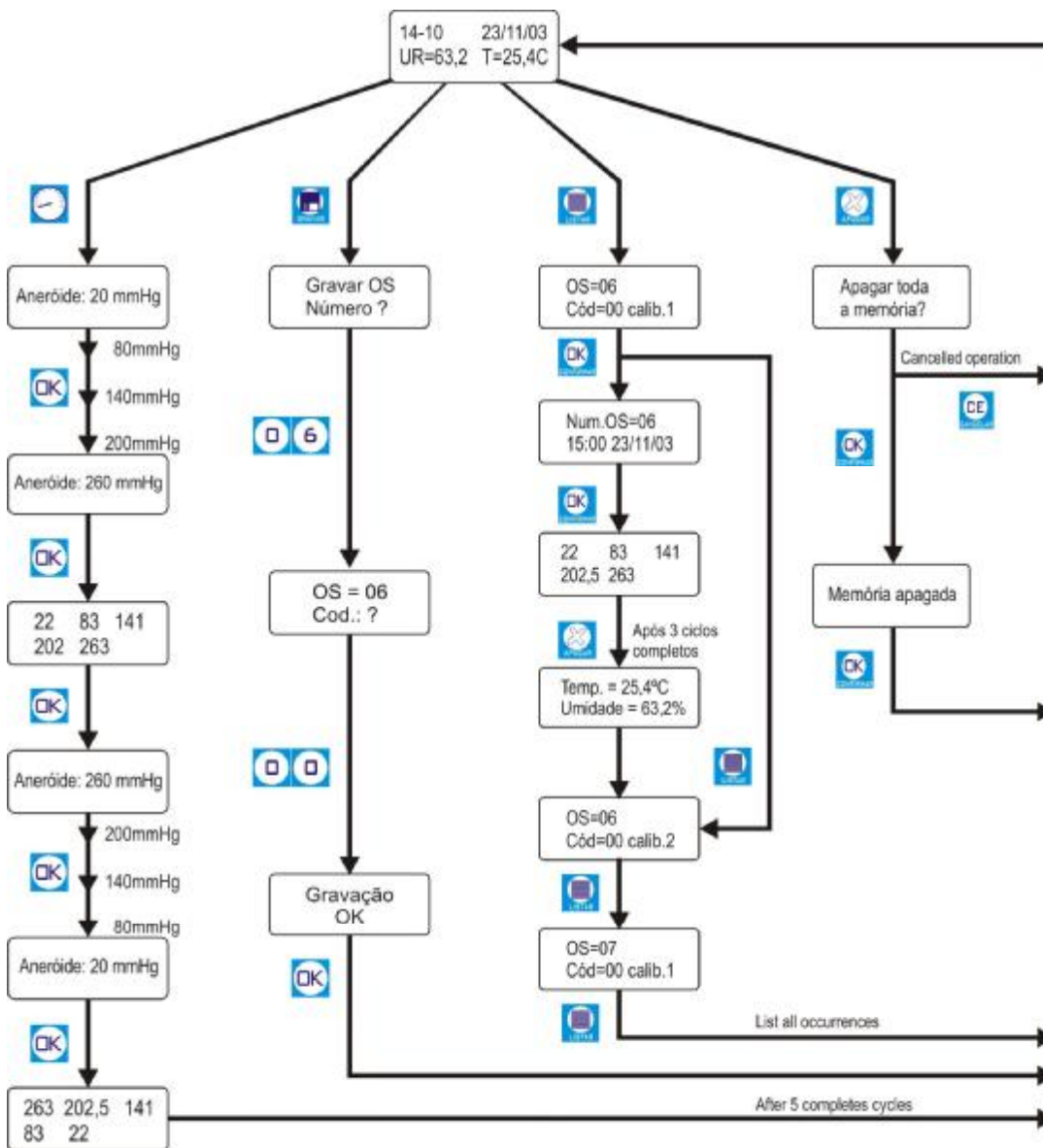
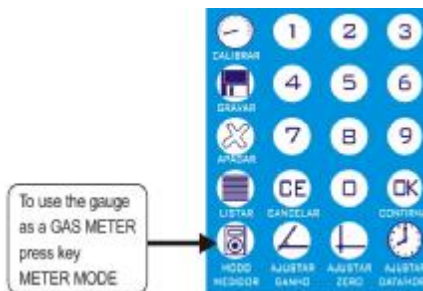


Figure 20 Quick guide of the gauge basic operations

## 5. Pressure Gauge as a pressure meter

The pressure gauge can be used as a gas pressure meter up to the limit of 300 mmHg, informing the measured pressure value on the display. In order to enter this operation mode press the key meter mode.



## 6. Precautions

The manometers gauging for measuring blood pressures is an attribution of the Inmetro, according to the Brazilian legislation. For this reason, this equipment must be used by fixing services of these manometers and then, the owner must send the manometer to nearest Inmetro agency to gauge and add stamp with the indication of the validity year of this verification.

Formatados: Marcadores e numeração

Incorporated into the pressure gauge there is a pressure injector. This injector can inject pressure above 300 mmHg. The manometers of measuring blood pressure can receive pressures of up to 300 mmHg, as well as the gauge electronic sensor. For this reason, the operator must be careful in order not to exceed the value of 300 mmHg, under the risk of damaging the equipment. The same way, care is necessary in order not to fulfill a pressure below 0 mmHg (zero mmHg). The equipment will beep every time these conditions are exceeded.

## 7. Technical specifications

Technical specifications of the pressure gauge	Value
<b>Pressure</b>	
Measurement line	0 a 300 mmHg
Uncertainty of measurement	± 0,05 %
Increase	0,1 mmHg
<b>Temperature</b>	
Measurement line	1°C a 50°C
Uncertainty of measurement	± 1°C
<b>Feeding tension</b>	
Tension	110V/220V
<b>Umidade Relativa do Ar</b>	
Measurement line	10% a 95%
Uncertainty of measurement	± 5% de umidade relativa
Increase	0,5%
<b>Energy consumption</b>	
Power	4,50W
<b>Mechanical data</b>	
Approximate mass	2,2 kg
Dimensions	26cm x 23cm x 12cm
<b>Reading storage</b>	
Memory capacity	Calibração em 16 manômetros

## 8. Warranty

### Term of Warranty

This equipment has Elomed Industry and Commerce warranty, against manufacturing fault, during 180 days (90 legal days and 90 additional days) from the issued date from the receipt. The warranty comprises of a substitution of components and/or faulty goods since it is properly noticed that it was a manufacturing fault.

Elomed has the right to alter the general, technical and aesthetics features of its equipments, as well as to remove market models without any previous notice.

The warranty does not cover expenses on transportation and on technician dislocations.

The warranty does not apply to the following:

Fall, improper use, nature phenomena, deficient facilities, seal rupture without any appropriate register, alteration of the series number, damaged parts as a consequence of transportation accidents, equipment adulteration and of its belongings.

Customer's name: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_

State: \_\_\_\_\_ Contry: \_\_\_\_\_ Zip Code: \_\_\_\_\_ Telephone: \_\_\_\_\_

Product: \_\_\_\_\_ Installation date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Salesman's name: \_\_\_\_\_



ELOMED Ind. e Com. de Equipamentos Eletrônicos LTDA  
Av. Sete de Setembro, nº 99, Sala 4 – Centro.  
99.010-120 - Passo Fundo – RS – Brazil  
Phone / Fax: (54) 3327-1661  
Home page: [www.elomed.com.br](http://www.elomed.com.br)  
E-mail: [vendas@elomed.com.br](mailto:vendas@elomed.com.br)