INSTRUCTION MANUAL

AUTO IGNITION FLAME PHOTOMETER

1027

AN ISO 9001:2015 COMPANY

SYSTRONICS

SYSTRONICS®

A Division of Systronics (India) Ltd.

SYSTRONICS

WARRANTY CARD

Type Number : 1027/126.

Serial Number : 673/12571.

Date of Receipt : 10/03/2025

Name of Systronics Branch / Distributer

SYSTRONICS (A) Ltd, HYDERABAD.

DIST+ Asian Scientific, Hyd.

Customer's Name & Address

THE INSTITUTE OF HEALTH SYSTEMS.

Sivananda Rehabilitation center, kukatpally, Hyderabad.

We confirm that the instrument received on the date shown above and is functioning satisfactorily.
Please register this in accordance with warranty conditions.

10/03/2025 G. Bhuvaneshwari

Date : **Customer's Signature**

Manufactured by

SYSTRONICS
DIVISION OF SYSTRONICS INDIA LIMITED
89-92, NARODA INDUSTRIAL AREA
NARODA AHMEDABAD 382330
Email : sales@systronicsindia.com
Web: www.systronicsindia.com

Registered Office :

SYSTRONICS INDIA LIMITED
B/116-129 , SUPATH - II COMPLEX,
NR. JUNA WADAJ BUS TERMINUS,
ASHRAM ROAD, AHMEDABAD – 380013
Email : admn@systronicsindia.com
Web: www.systronicsindia.com
CIN U32201 GJ1973 PLC002437

CONTENTS

		PAGE
1.	INTRODUCTION	1
2.	SALIENT FEATURES	1
3.	PRINCIPLE OF OPERATION	2
4.	SYSTEM CONFIGURATION	3
5.	SPECIFICATIONS	4
6.	PANEL FEATURES	5
	6.1 FRONT PANEL	5
	6.2 REAR PANEL	7
7.	INSTALLATION	8
	7.1 UNPACKING AND VISUAL INSPECTION	8
	7.2 LOCATING THE SYSTEM	8
	7.3 ELECTRICAL CONNECTIONS	8
	7.4 PNEUMATIC CONNECTION	9
8.	SYSTEM CHECKING	10
9.	UTILITY MODE	11
	9.1 DATE & TIME	11
	9.2 LAB NAME	12
	9.3 VIEW DATA	13
	9.4 LOGIN SETTING	14
	9.5 FLAME OUTPUT	15
10.	EDIT TEST	16
11.	LOAD TEST	20
	11.1 VIEW & LOAD TEST METHOD	22
	11.2 SAMPLE ANALYSIS	23
	11.3 ON-LINE ANALYSIS	24
12.	PREPARATION OF STANDARD SOLUTIONS	25
13.	PRECAUTIONS	28
14.	MANUFACTURER'S WARRANTY	29
15.	SERVICE AFTER SALES	29

1.0 INTRODUCTION

SYSTRONICS **FLAME PHOTOMETER 1027** is a microcontroller-based unit designed to provide automation in operation, measurements and end-result presentation. It can do the estimation of Sodium (Na), Potassium (K), Lithium (Li), Calcium (Ca) and Barium (Ba) in single aspiration of a sample.

For user's convenience, the unit offers two measuring modes:
(i) Standard method
(ii) Medical method.

The later provides an automatic curve fitting for corrections of non-linear emission characteristics of element, at higher concentrations.

Frequently used measurement setups can be stored once and recalled whenever required. This eliminates the typical chores of instructions required to be given to a microcontroller-based instrument before it starts the operation..

An alphanumeric Graphics LCD readout (**240 x 128 Dot**) is used to provide adequate user interface and full presentation of final results obtained. A Centronix printer port for Epson compatible Dot Matrix/ Inkjet printer is also provided. Hard copy of results can be printed for individual sample, batch samples stored in the memory of the unit (700 max), on a dot matrix printer (optional).

A compact optics, based around special narrow band optical filters, and a high sensitivity Si photodiode combine together to provide high degree of acceptance of the selected element with strong ejection for the others present in the sample.

An air compressor supplied with built-in air regulator and air filter ensures stable and moisture/oil free air supply. LPG is used as fuel gas.

2.0 SALIENT FEATURES

* Microcontroller controlled automation for ease of operation.
* Determination up-to five elements with single aspiration (Na, K, Li, Ca & **Ba**).
* Unit of measurement "ppm" and "meq/l"
* Suitable for medical and industrial analysis
* Calibration standard up-to five point.
* Auto Ignition
* Gas leak sensor
* Auto Gas cut-off

* Password protection

* Separate login for Administrator and Guest

* Data processing with linear mode or quadratic curve fitting

* Results of a measurement taken earlier can be recalled and displayed (Max. results storage: 500)

* Graphics LCD readout (**240 x 128 Dot**) LCD readout for adequate user interfaces.

* Built-in real time clock for date and time.

* Centronix printer port for Epson compatible Dot Matrix / Inkjet printers to get hard copy of results (printer optional).

* Air compressor with built-in air regulator and air filter (SYSTRONICS Model 126).

* Pc-link software (optional)

3.0 PRINCIPLE OF OPERATION

The principle of operation of a flame photometer is simple. The fluid under analysis is sprayed as a fine mist into a non-luminous flame, which becomes coloured according to the characteristic emission of elements (**Na**: 589 nm, **Ca**: 622 nm, **Li**: 671 nm, **K**: 768 nm, **Ba: 554**). A photo detector which views the flame through a selected narrow band optical filter that only passes the wavelengths centred around the characteristic emission of the selected element monitors the flame. The output of the photo detector is fed to an electronic module, which provides digital readout of the concentration of the selected element(s). Before analysing the unknown fluid sample, the system is standardized with solutions of known concentrations of elements of interest.

In a measurement setup, compressed air from a compressor is supplied to an atomizer. Due to a draught of air at the tip of the atomizer, the sample solution is sucked in and enters in a mixing chamber as a fine atomised jet. Liquid Petroleum Gas (LPG) -- the household cooking gas from a suitable source is also injected in the mixing chamber at a controlled pressure. The mixture of gas and atomised sample is passed on to a burner and is ignited. The emitted light from the flame is collected by optical lenses and passed on to a photo detector through a selected filter. An electronic unit processes the output of the detector and the results are appropriately displayed.

4.0 SYSTEM CONFIGURATION

The system consists of:

1. **Flame Photometer1027**, the main unit. (with sodium and potassium filter)
2. FPM Compressor 126.
3. Gas lighter
4. Atomiser / nebuliser
5. Gas pipe
6. Air Pipe
7. Sample beaker
8. Sample beaker stand
9. Drain pipe
10. Instruction manual

Optional accessories

1. Calcium filter for 1027
2. Lithium filter for 1027
3. Barium filter for 1027
4. 80-Column Dot-matrix Printer
5. Pc-LINK software

Note :

For price and installation charges contact your nearest systronics branch

5.0 SPECIFICATIONS

ELEMENTS	Minimum concentration Without Dilution	Maximum concentration (Without Dilution) LOW concentration mode	Maximum concentration (Without Dilution) High concentration mode
Na	0.2 ppm	10 ppm	100 ppm
K	0.1 ppm	10 ppm	100 ppm
Ca	3.0 ppm	100 ppm	300 ppm
Li	0.1 ppm	2 ppm	50 ppm
Ba	50 ppm	500 ppm	3000 ppm

- Minimum & maximum are the limit of calibration , not measuring range

ELEMENTS	SERUM	URINE	BIO-FLUIDS
Na	0-200 meq/l 1 : 100 dilution	0-250 meq/l 1 : 100 dilution	Upto 250meq/l with 1:100 dilution
K	0-10 meq/l 1 : 100 dilution	0-100 meq/l 1 : 1000 dilution	Upto 250 meq/l With 1: 100 dilution
Ca	----- (Note)	0-10 meq/l 1 : 2 dilution	Upto 250 meq/l With 1: 100 dilution
Li	0-2 meq/l 1 : 10 dilution	---------	Upto 250 meq/l With 1: 100 dilution

Note:

In blood, Ca is in traces and Na strongly dominates. Therefore, estimation of a Ca in serum with Flame Photometer is not advised.

- REPRODUCIBILITY: $\pm$ 1% fs $\pm$ 2 Digits in Low Concentration mode.
  $\pm$ 2% fs $\pm$ 2 Digit in High Concentration mode.
- CURVE FITTING ACCURACY : $\pm$ 2% fs. (High Conc. Range)
- FILTERS (Regular): Na (589 nm), K (768 nm); Interference filters with 10-nm Bandwidth
- FILTERS (Optional): Li (671 nm), Ca (622 nm), Ba (554 nm) Interference filters with 10-nm Bandwidth
- Separate channel and separate silicon photodiode (Detector) for each element.
- MINIMUM SAMPLE: Approx. 3ml.

- ASPIRATION TIME: five element analysis within 20 second on single aspiration (excluding washing time),
- OPERATING AIR PRESSURE: 0.45kg/cm2 (typical), regulated. *
- FUEL GAS: LPG (Liquid Petroleum Gas), regulated.**
- POWER SUPPLY: 230V ±10%, 50Hz.

*Use SYSTRONICS FPM COMPRESSOR 126.
**The common cooking gas (Domestic LPG).

Specification for Compressor

Pressure	:	0.0 to 1.0 Kg/cm^2 (Maximum)
Power Supply	:	230 V ± 10 %
Dimensions	:	255 (W) X 205 (H) X 210 (D) mm
Weight	:	6 Kg (Approx.)
Mounting	:	Preferable on floor

Note :

1) **For below 2 ppm analysis prefer minimum two standard solutions.**
2) **Always select read button only after proper development of colour of standard /sample solution**
3) **For proper result and repeatability at least provide fifteen minutes warm up with flame**
4) **Don't analysis Na & Ca, Na & Ba and Ca& Ba simultaneously , do septate analysis for each element because of optical interference of spectrum.**

6.0 PANEL FEATURES

6.1 FRONT PANEL (Refer fig 1, the isometric view of the unit FPM 1027)

DISPLAY:

Graphics LCD readout (240 x 128 Dot) LCD readout for adequate user interfaces..

KEYBOARD:

16 Alpa numeric keyboard for adequate user interfaces

FLAME VIEW:

Direct visual verification glass window for flame status

ATOMIZER:

For atomisation purpose, one end connected to compressor through Air pipe , other end for sample aspiration purpose along with capillary tube, Output section of atomiser is inserted /connected to mixing chamber

MIXING CHAMBER:

Atomised sample and fuel gas are get mixed inside mixing chamber, atomiser, fuel gas pipe and drain pipe are connected to mixing chamber, mixing chamber direct mixed sample and fuel to Grid for ignition.

FUEL TUBE:

Supplies fuel gas into the Mixing Chamber.

AIR TUBE:

Supplies compressed/regulated air from the FPM Compressor unit 126 to the Atomizer to enable aspiration of solution into the Mixing Chamber.

IGNITION Window (--located on the right panel):

A window, with shutter, for ignition lighter to access the burner for igniting the flame.

FUEL GAS FINE ADJ:

Control valve is provided at front side for controlling flow rate of fuel Gas.

6.2 REAR PANEL (Refer fig 3)

FUEL GAS INLET:

Inlet for fuel gas from LPG domestic cylinder

PRINTER (Port):

25-pin female connector for connecting an Epson compatible 80-column dot-matrix printer (Printer is optional).

RS-232:

USB D CONNECTOR for pc interface, optional

POWER ON Switch:

Switches on/off the mains supply to the unit.

FUSE:

Fuse for protection

MAINS Chord:

Three pin mains cord for power supply

NOTE:

1. The ELECTRONICS module can be pulled out for inspection/servicing after unscrewing two screws at back/ Rear panel and four screws at bottom side

2. The PNEUMATICS/OPTICS parts of the unit can be accessed after unscrewing its four screws at back panel

7.0 INSTALLATION

7.1 UNPACKING AND VISUAL INSPECTION

Utmost care is taken in packing to minimise transit damage. Carefully open the boxes and remove all the contents. Check that all the items listed above are present. Also check for any apparent visual damage. If the instrument is damaged, do not power on the instrument. Contact nearest SYSTRONICS office or the dealer who supplied the instrument.

7.2 LOCATING THE SYSTEM

Place the **Flame Photometer 1027** on a flat bench or table in a semi protected area that is reasonably free of dust, excessive moisture and corrosive chemicals and not subjected to significant temperature variations (-- a normal laboratory environment). The rear panel of the unit should be at least six inches from a wall, if any, to enable sufficient smooth air circulation, operation of mains on/off switch, fine adjustment of fuel flow, etc.

Avoid placing the unit under a fan or in the path of a blowing air. Direct sunlight or high intensity interior lighting may affect measurements.

Make arrangement for collection of drained fluid from the mixing chamber of the main unit (128). Position the Drain Tube, as per the convenience, to get free flow of waste fluid.

Place the FPM Compressor 126 on a flat surface, preferably on the floor under the table. Ensure that the Air-Tube, when connected from the compressor (126) to the main unit (1027), is free and without any undue strain.

Locate the LPG cylinder, or any other fuel source as the case may be, at a suitable place to ensure:

(i) Easy access of the on/off switch of the fuel,

(ii) The Gas-Tube is not under any strain when connected to the main unit (1027).

7.3 ELECTRICAL CONNECTIONS

The system requires 230V, 50Hz AC.

IT IS ESSENTIAL TO SECURELY EARTH THE UNITS THROUGH A 3-PIN MAINS SOCKET HAVING GOOD EARTHING

7.4 PNEUMATIC CONNECTION

Tubing of 1027

1. Fix drain pipe at bottom side of drain cup , refer figure 21
2. Remove ":C" clamp form mixing chamber cup.
3. Insert atomiser to slot provided at mixing chamber cup
4. Re-Fix "C" clamp
5. Check fitting of mixing chamber cup
6. Fix air-pipe at atomiser end , (check washer at air tube)
7. Insert air tube one end to compressor outlet
8. Connect gas-pipe to gas cylinder (LPG-domestic)
9. Insert Gas-pipe other end to Rear panel of pneumatic section of FPM-1027
10. Switch on air-compressor set pressure to 0.5 kg/cm²
11. Aspirate double distilled water , check drain flow after three to five minutes it should be uniform
12. Switch on FPM-1027
13. Provide 10 minutes warmup
14. Turn-on gas regulator from cylinder side, checks leaking if any.

Note :

FPM-1027 is equipped with Gas leak sensor, so if any leaking occurred inside system it automatically close gas valve inside instrument. Along with buzzer

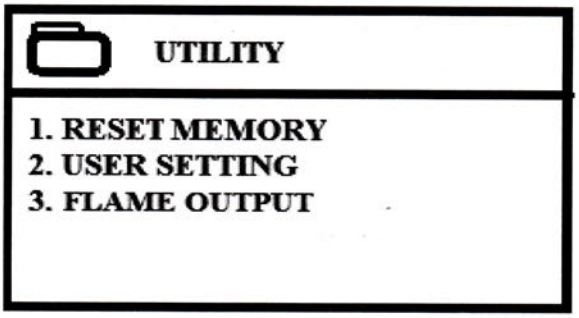
If buzzer sounds continually, then it means that gas leaking is there, so take necessary precautions.

8.0 SYSTEM CHECKING

After completion of all tubing following parameters are to be crosschecked for that

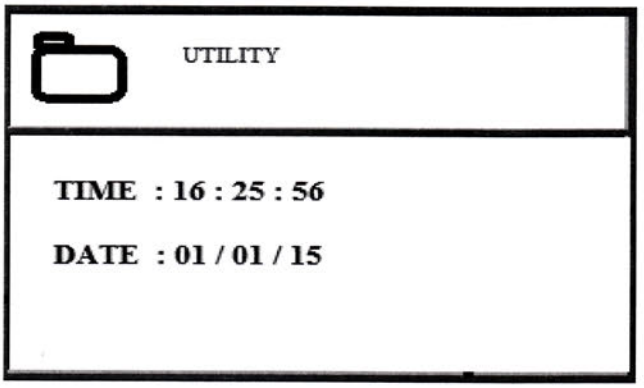
1. Switch –off gas regulator from gas regulator
2. Go to utility
3. Select Flame output
4. Select Flame output
5. Check count at lowest row , it should be between 1000 to 4000
6. Select Gas sensor output
7. Check count at lowest row , it should be less than 20000
8. Select sodium filter
9. Check count at lowest row , it should be between 100 to 200
10. Select potassium filter
11. Check count at lowest row , it should be between 100 to 200

9.0 UTILITY MODE



Function	Description
RESET MEMORY	Used to reset system memory , it will all user developed memory inside the system including passwords
USER SETTING	It include to view data saved during measurement Setting date and time of system Entering lab name Setting password /login setting
FLAME OUTPUT	This function is used to view output of filters , gas sensor , flame sensor , switch on gas valve ,, switch off gas valve and trigger ignitor

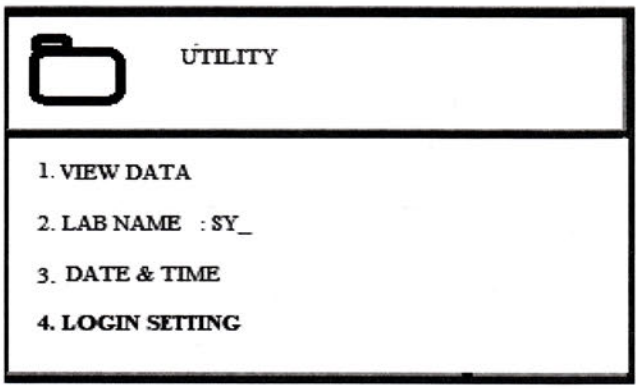
9.1 DATE & TIME



Press key "3" from user setting menu to set date and time, first display will show the current/ running date and time and press "Enter" key to set desired date and time. "ESC" key is for exit or cancel the function

9.2 LAB NAME

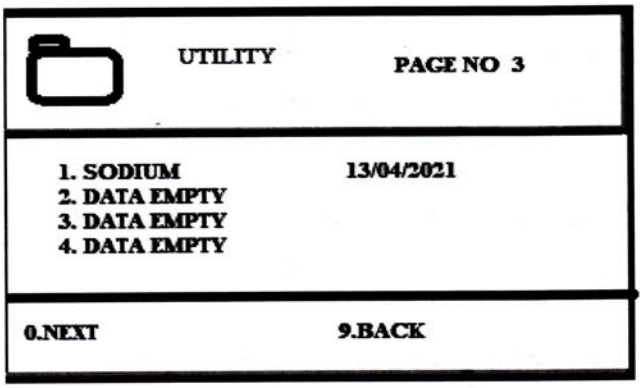
Press key "2" from User setting menu to set / feed laboratory name or organization name on instrument memory



First system will shows current name, press "Enter" key to set desired name. "ESC" key is for exit or cancel the function

9.3 VIEW DATA

From user setting menu press key "1" for view data saved during sample analysis



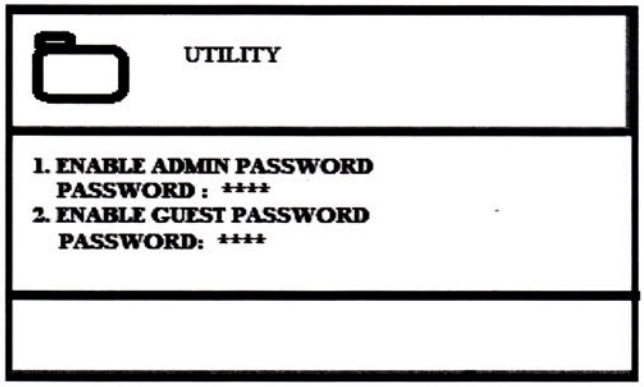
System opens directly the page where last data is saved.

- DATA EMPTY → Means no data saved
- 0.NEXT → Press key "0" for viewing next page
- 9.BACK → Press key "9" for previous page
- PAGE NO → Current page number (1 to 125)
- ESC → press key "ESC" for exit from menu

"1. SODIUM 13/04/2021"

- Press key "1" to open file
- "SODIUM" name of sample
- "13/04/2021" date of analysis

9.4 LOGIN SETTING



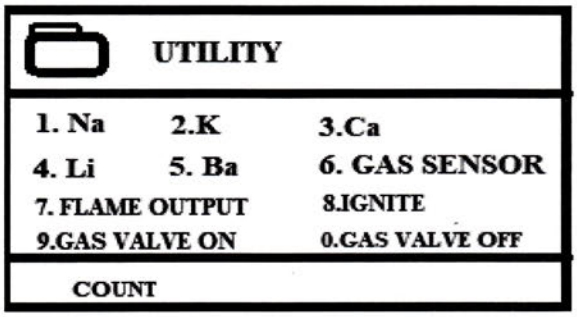
➔ Press key "1" to enable Administrative password /login
➔ Press key "2" to enable guest password /login

Note:

Password should be a combination of four digit number in between 1000 to 9999

If guest login is enable edit function get disabled for user

9.5 FLAME OUTPUT



- Press corresponding keys to select functions
- Millivolt output will displayed at bottom row " COUNT XXXX"

FUNCTION	DESCRIPTIONS
1. Na	To view sodium filter output in millivolt
2. K	To view potassium filter output in millivolt
3. Ca	To view calcium filter output in millivolt
4. Li	To view Lithium filter output in millivolt
5. Ba	To view barium filter output in millivolt
6. GAS SENSOR	To view gas sensor / gas leak sensor output in millivolt it should be less than 22000 If count is more than 25000 , it means that some kind of gas leak .
7. FLAME OUTPUT	To view flame output in millivolt it should in between 2000 to 4000 without flame. With flame with double distilled water it should be greater than 6200. **Flame sensor is a direct sensor of light so it is necessary to keep instrument such that no direct exposure of light on flame view window and on chimney**
8. IGNITE	To ignite flame, this function automatically open gas valve and release gas to mixing chamber and initiate spark for some while. **Most important points is that after choosing this function system keep GAS VALVE in open mode , so it is necessary to Close gas valve by selecting KEY "0"**
9. GAS VALVE ON	To open gas valve , message will displayed at at bottom row of LCD "GAS VALVE ON"
0. GAS VALVE OFF	To close gas valve

10.0 EDIT TEST

Standard operating procedure for edit test

A) Select desired mode, by selecting corresponding keys , asterisk sign will appear after selected item

1. Standard method
2. Medical method

B) Select mode of operation, by selecting corresponding keys, asterisk sign will appear after selected item.

3. New test
4. View test
5. Delete test

New test	For creating new test
View test	View test already created
Delete test	Delete already created test

C) Select desired mode, by selecting corresponding keys,, asterisk sign will appear after selected item.

D) Press key "0" for next menu or press key "9" to exit or press key " ESC" to exit

Standard method

a. Low concentration
b. High concentration
c. Low concentration Bi-chromatic
d. High concentration Bi-chromatic

Low concentration analysis

Follow table to create new test in low concentration method

Sr.No	Parameter	Limit
1	Filter/Element , [Na, K, Ca, Li, & Ba)	Minimum one filter maximum based on application
2	Dilution factor	1- 100
3	Number of standard	Minimum one or maximum 2 For analysis below 2 ppm , minimum two standard is necessary for proper analysis

High concentration analysis

Follow table to create new test in low concentration method

Sr.No	Parameter	Limit
1	Filter/Element , [Na, K, Ca, Li, & Ba)	Minimum one filter maximum based on application
2	Dilution factor	1- 100
3	Number of standard	Minimum two or maximum 5 For analysis below 2 ppm , minimum two standard is necessary for proper analysis

High concentration bi-chromatic analysis

Follow table to create new test in low concentration method

Sr.No	Parameter	Limit
1	Bi-chromatic element /filter [Na, K, Ca, Li, & Ba)	Any one filter
2	Filter / Element , [Na, K, Ca, Li, & Ba)	Minimum one filter maximum based on application Do not select bi-chromatic element for analysis
3	Dilution factor	1- 100
4	Number of standard	Minimum two or maximum 5 For analysis below 2 ppm , minimum two standard is necessary for proper analysis

Low concentration bi-chromatic analysis

Follow table to create new test in low concentration method

Sr.No	Parameter	Limit
1	Bi-chromatic element /filter [Na, K, Ca, Li, & Ba)	Any one filter
2	Filter / Element , [Na, K, Ca, Li, & Ba)	Minimum one filter maximum based on application Do not select bi-chromatic element for analysis
3	Dilution factor	1- 100
4	Number of standard	Minimum one or maximum 2 For analysis below 2 ppm , minimum two standard is necessary for proper analysis

Medical method

A) SERUM:

This mode is used for measuring Na, K, and Li contents in serum. Na and K can be selected as one combination (--most commonly used) as well as independently, while Li has to be selected independently.

B) URINE:

This mode is used for measuring Na, K and Ca contents in Urine. Since in Urine the concentration of elements varies over wide range, the emission characteristic of flame may enter in non-linear region. There for in this mode the unit provides curve fitting. A maximum of 5 standards and a minimum of 2 standards are accepted by the unit. Usage of only 2 standards (spread over a reasonably close range) offers what we call a Band mode, allowing the measurement over a given segment with only two standards.

C) BIO-FLUID:

It is general mode, which can be used for measurement of any bio-fluid, e.g. Silva, sweat, semen, tears etc. This mode is useful especially for research-oriented measurement.

Since the concentration(s) of element(s) may vary over a wide range, curve fitting software is provided to take care non-linear characteristic of the flame. A maximum of 5 standards and a minimum of 2 standards are accepted by the unit except for Li in SERUM. Usage of only 2 standards (spread over a reasonably close range) offers what we call a Band mode, allowing the measurement over a given segment with only two standards.

The maximum concentration is permitted in this mode is 250 meq/l with 1:100 dilution

Edit test process chart

a) Select method
   - Standard method

   Or
   - Medical method

b) Select concentration mode
   - Low concentration

   Or
   - High concentration

   Or
   - Low concentration Bi-chromatic

   Or
   - High Concentration Bi-chromatic

   Or
   - Urea

   Or
   - Serum

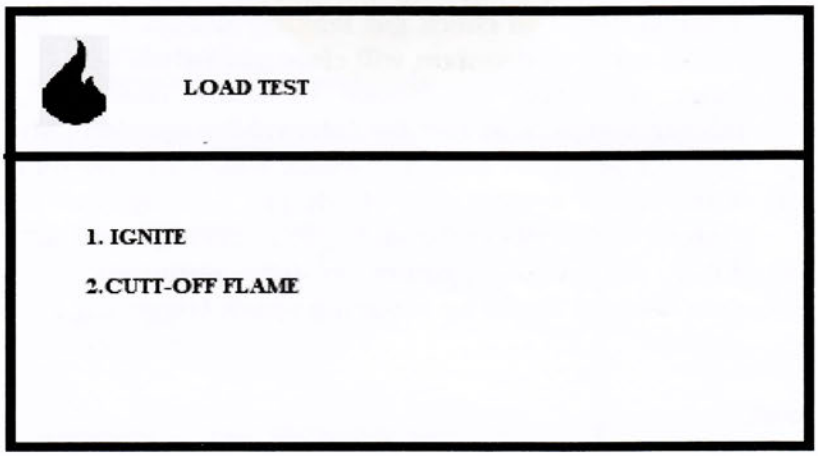
   Or
   - Bio-fluid

c) Select Bi-chromatic element ,if Bi-chromatic mode selected
d) Select element to be estimated
e) Enter number of standard
f) Enter dilution factor
g) Enter sample name
h) Enter concentration value of each element
i) Finally save test
j) System automatically save edit

Key "0" for next menu
Key "9" for back
Key "ESC" for exit

11.0 LOAD TEST

Element analysis is carried out on this function



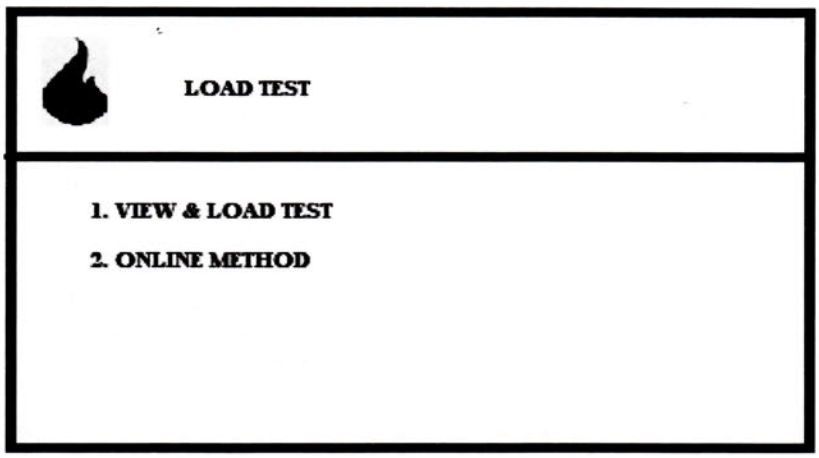
Ignite	To ignite flame , after selecting this function system will shows message for to turn on compressor adjust pressure to 0.5 and keep gas control valve to ignition position **Adjustment of gas control valve**: From factory gas valve is adjusted with respect to domestic LPG pressure such that user can easily set flame For setting ignition position rotate gas control knob in anticlockwise direction , around 180 to 270 degree Once all igniting parameters are ready press key "0" for start **system controlled ignition process** Key "9" for previous menu ,key "ESC" for exit Igniting parameters 1) Air pressure 0.5kg/cm 2) Aspirate double distilled water 3) Constant drain water dropping from mixing chamber 4) Instrument should be free from direct light falling , do not keep instrument under any light source, assure there is no direct light fall on flame view window 5) Don't keep instrument under any rotating FAN/ for strong wind flow room.
Cut-off flame	This function gas valve and shut-down flame and flame related controls expect gas leaking

System controlled ignition process

During this process

a) **First system open main gas valve**
b) **Then system will check gas leaking and flame status, if any deviation system will shows error and system will close gas valve.**
c) **After successful completion of status checking , system automatically start triggering spark at regular interval for ignition , always keep gas control knob at ignition position (fully anti-clock wise) during flame ignition process**
d) **Then again system will check gas leaking and flame status, if any deviation system will shows error and system close gas valve.**
e) **After successful ignition system automatically cross check stability and durability of flame by reducing spark triggering interval.**

Analysis mode



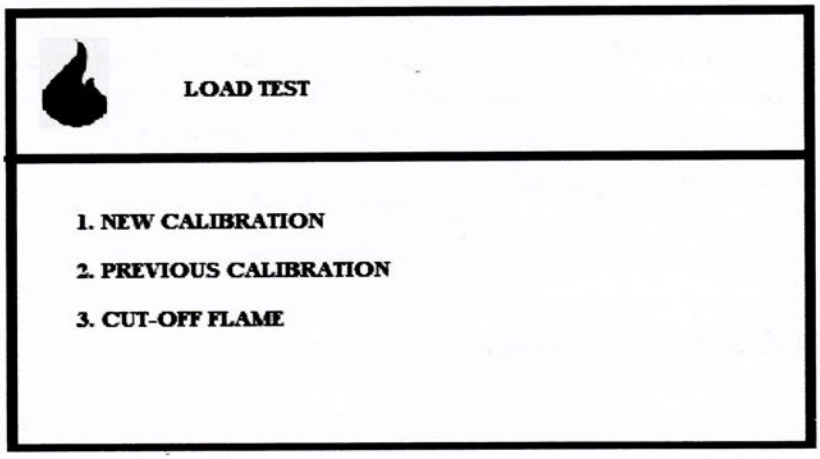
After completion of successful ignition system will enter to analysis mode

Two type of analysis mode is available

View & load test	To execute and analysis test saved during edit test mode
Online method	Direct analysis of single element using single or two standard mode

11.1 VIEW & LOAD TEST METHOD

On this method system shows all saved test / setup created during edit test mode
User can select desired test by pressing numerical key displayed along with test
After that system will shows all parameters belongs to that particular test and finally shows calibration menu as given below



New-calibration	For better performance always prefer new calibration , because flame strength is effected by environmental conditions , gas flow and air flow , During process system will shows messages for aspiration of blank and standards at regular interval , **Select read button after proper development of flame visually** **After completion of sample analysis system automatically directed to sample analysis menu**
Previous calibration	Not preferable in the case of accuracy is more important In this mode system automatically re-call previous calibration data and automatically directed to sample analysis menu
Cut-off flame	To shut down flame

11.2 SAMPLE ANALYSIS

Here user can set SAMPLE ID & BATCH NUMBER for sample analysis, select read button only after proper development of flame

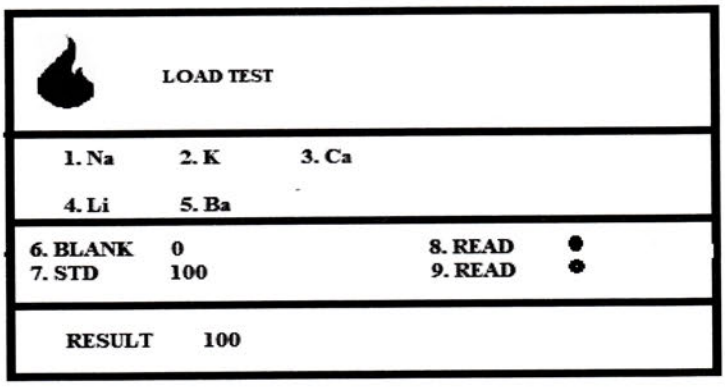
Sample id	For entering sample id (1-100) for sample
Batch number	For entering batch number (1-100) for sample
Print	To print result of analysis with help of 80colum dot matrix printer
RS232	To transfer data to PC with help of USB cable (optional)
ESC	To exit from sample analysis

Note:

Results are automatically saved to system memory

11.3 ON-LINE ANALYSIS

- Press corresponding keys to select functions
- Millivolt output will displayed at bottom row " COUNT XXXX"



FUNCTION	DESCRIPTIONS
1. Na	To select sodium filter output in millivolt
2. K	To select potassium filter output in millivolt
3. Ca	To select calcium filter output in millivolt
4. Li	To select Lithium filter output in millivolt
5. Ba	To select barium filter output in millivolt
6. Blank	To enter blank value
7. STD	To enter standard value
8. Read	Before selecting this function aspirate correct blank solution and check proper development of flame through flame view window, after completion of all above process select read button. And astrik symbol will appear after "8. READ" This function clear all previous standard reading
9. Read	Before selecting this function aspirate proper standard solution and check proper development of flame through flame view window, after completion of all above process select read button. And astrik symbol will appear after "9. READ"
Result	After completion of calibration RESULT column will display reading of solution under aspiration
Print	To print result of analysis with help of 80colum dot matrix printer
RS232	To transfer data to PC with help of USB cable (optional)
ESC	To exit from sample analysis

Note :

- Sample id and batch number will be one during print and RS232 in this mode.
- Range of operation in online mode is limited to low concentration mode , solution with higher concentration than limits provided on low concentration mode cannot analysis in online mode

Two standard methods

To operate this mode user should have two standard , user have to set lower standard value in blank column and higher standard value in STD column .

12.0 PREPARATION OF STANDARD SOLUTIONS

12.1 GENERAL PROCEDURE FOR PREPARATION OF STOCK STANDARD SOLUTIONS.

1. Sodium (i) 1000 ppm:
Dissolve 2.5416 g NaCl in one litre of glass distilled water.

(ii) 1000 ppm (as Na_2O):
Dissolve 1.886 g NaCl in one litre of glass distilled water.

2. Potassium (i) 1000 ppm:
Dissolve 1.9070 g KCl or 2.5869 g KNO_3 in one litre of glass distilled water.

(ii) 100 ppm (as K_2O):
Dissolve 1.5830 g KCl in one litre of glass distilled water.

3. Calcium (i) 1000 ppm:
Dissolve 2.497 g $CaCO_3$ in approx. 300ml glass distilled water and add 10 ml conc. HCl. Dilute to 1 litre.
The same solution is 1400 ppm as CaO.

4. Lithium (i) 2000 ppm (as Li_2O):
Dissolve 4.945 g Li_2CO_3 in approx. 300 ml glass distilled water and add 15 ml conc. HCl. After release of CO_2, dilute to 1 litre.

5.Barurm (i) 5000 ppm
Dissolve 8.8925 g of BaCl22H2O (barium chloride) in H2O.
Dilute to 1 L to
give a 5000 ppm Ba solution.

(ii) Dissolve 7.185 g of BaCO3 (barium carbonate) in a minimum volume of 1:1 HCl. Dilute to 1 L with 1% HCl to give a 5000 ppm Ba solution

12.2 GENERAL PROCEDURE FOR PREPARATION OF STOCK STANDARD SOLUTIONS FOR MEDICAL/ CLINICAL METHOD

1. Sodium (i) 50 meq/litre:
Dissolve 2.923 g NaCl in one litre of glass-distilled water.

2. Potassium (i) 50 meq/litre:
Dissolve 3.728 g KCl in one litre of glass-distilled water.

3. Calcium (i) 50 meq/litre:
Dissolve 2.503 g $CaCO_3$ in approx. 300 ml glass distilled water and add 10 ml conc. HCl. Dilute to 1 litre.

4. Lithium (i) 70 meq/Litre (as $LiCO_3$):
Take 2.587 g $LiCO_3$ in 300 ml of glass-distilled water. Dissolve by adding 15 ml conc. HCl. After release of CO_2, dilute to 1 litre.

12.3 GENERAL PROCEDURE FOR PREPARATION OF Na AND K STOCK STANDARD SOLUTIONS (CLINICAL)

SODIUM (Na): 200 meq/litre

Dissolve 11.69 gm of pure dry NaCl in one litre of glass-distilled water.
OR
Dissolve 1.169 gm of pure dry NaCl in 100 ml of glass-distilled water.

POTASSIUM (K): 10 meq/litre

Dissolve 0.746 gm of pure dry KCl in one litre of glass-distilled water.
OR
Dissolve 0.0746 gm of pure dry KCl in 100 ml of glass-distilled water.

12.4 PREPARATION OF MIXED WORKING SOLUTIONS OF Na AND K (CLINICAL):

Take the above std. stock solutions as per given table and dilute to 100 ml.

Na Conc. (meq/lit)	K Conc. (meq/lit)	Stock sol Na (ml)	Stock sol K (ml)
1.0	0.01	0.50	0.1
1.1	0.02	0.55	0.2
1.2	0.03	0.60	0.3
1.3	0.04	0.65	0.4
1.4	0.05	0.70	0.5
1.5	0.06	0.75	0.6
1.6	0.07	0.80	0.7
1.7	0.08	0.85	0.8

(Most conc. std. K is usually 0.08 meq/litre)

12.5 PREPARATION OF STOCK STANDARD BLANK/STOCK STANDARD/WORKING STANDARD SOLUTIONS FOR Li:

Li STOCK STANDARD BLANK SOLUTION (140 meq NaCl/l and 5 meq KCl/l):

→Dissolve 0.373 gm of potassium chloride and 0.18 gm of sodium chloride in one lit. of glass distilled water.

Li STOCK STANDARD SOLUTION (1 meq/l):

→Dissolve 73.89 mg. of Lithium Carbonate ($Li2CO_3$) in 50 ml glass distilled water and add 20 ml 0.1 N HCl. Dilute to 2 lit.

Lithium carbonate ($Li2CO_3$) was chosen as the standard because it is not hydroscopic (A primary standard grade carbonate salt was reported to lose only 0.002%). Weigh Li2CO3 only after drying for 4 hrs. at 200 Centigrade temperature.

Li WORKING STANDARD SOLUTION:

→Take the Stock Standard Blank and Stock Standard solutions as per the table given below and dilute to 50 ml.

Li Conc. (meq/l)	Stock Standard Sol	Stock Blank Sol.
0.0	0 ml	5 ml
0.05	2.5ml	5 ml
0.10	5 ml	5 ml
0.20	10ml	5 ml

NORMAL CONCENTRATIONS OF Na, K, AND Ca SERUM AND URINE:

	Na (meq/l)	K (meq/l)	Ca (meq/l)
Serum	133 - 156	3.8 - 4.3	4.5 - 5.5
Urine	130 - 215	7 - 100	0 - 15

DILUTION OF SERUM SAMPLES FOR Na, K, AND Li Na AND K:

Dilute 0.2 ml of Serum with 19.8 ml of glass-distilled water (1:100 dilution) Li:
→Dilute 1 ml of serum to 9.0 ml of glass-distilled water (1:10 dilution).

NOTE: Dilution of URINE for K analysis would require a high dilution, 1:1000 or even higher. Whereas for the Na analysis the dilution of 1:100 may suffice.

RELATIONSHIPS BETWEEN meq/l AND ppm FOR Na, K, Li AND Ca:

	Na	K	Li	Ca
1 meq/l	23 ppm	39 ppm	7 ppm	20 ppm

Li ESTIMATION IN SERUM

Li working standard, say 0.2 meq/l, is aspirated as the higherend reference. But for the zero reference the Li Blank-Standard is aspirated instead of the distilled water.

13.0 PRECAUTIONS

1. Before feeding next sample, feed distilled water to the atomizer, say for 5 sec, to avoid interference of the previous sample.

2. Check the calibration with standard solution(s) with which the unit is calibrated, say, after every 20-sample testing or half an hour period, whichever is less.

3. While switching off the instrument the **GAS SHOULD BE CLOSED FIRST**.

4. Switch on/off the fuel supply from the fuel regulator switch. **DO NOT USE THE 'FUEL GAS FINE ADJ' VALVE FOR SWITCHING ON/OFF THE FUEL SUPPLY.**

5. Aspirate sufficient distilled water, say for 15 sec before switching off the compressor to ensure that the atomizer is fully cleaned and no deposits are left. **UNCLEAN ATOMIZER CAN CAUSE FLUCTUATIONS IN THE READOUT.**

6. Do not drain out Air-Filter of the Compressor when the flame is on.

7. **SWITCH OFF THE FUEL SUPPLY IMMEDIATELY IF THE COMPRESSOR GOES OFF.**

8. SWITCH OFF THE FUEL SUPPLY IMMEDIATELY IF THE MAINS SUPPLY GOES OFF.

9. Never keep gas supply on when the flame is not ignited.

10. Don't leave the FPM unattended if the flame is on.

11. Replace the gas cylinder well before it gets empty. Otherwise reproducibility will significantly deteriorate.

12. Do not disturb OUTPUT REGULATOR setting unless is required.

13. Observe the compressor OUTPUT PRESSURE daily. Only significantly deviated, readjust it.

14. If the OUTPUT PRESSURE drifts/fluctuates, differential pressure across the regulator has to be checked. It should a minimum of 0.3 Kg/cm^2.

15. **Avoid placing the main FPM unit under a fan or in the path of a blowing air.**

16. **Avoid placing the main FPM unit under a light source or in the path of light source.**

17. Check all tubing connections initially and periodically to ensure that there is no leakage (soapy water can be used to check leakage at any point/joint).

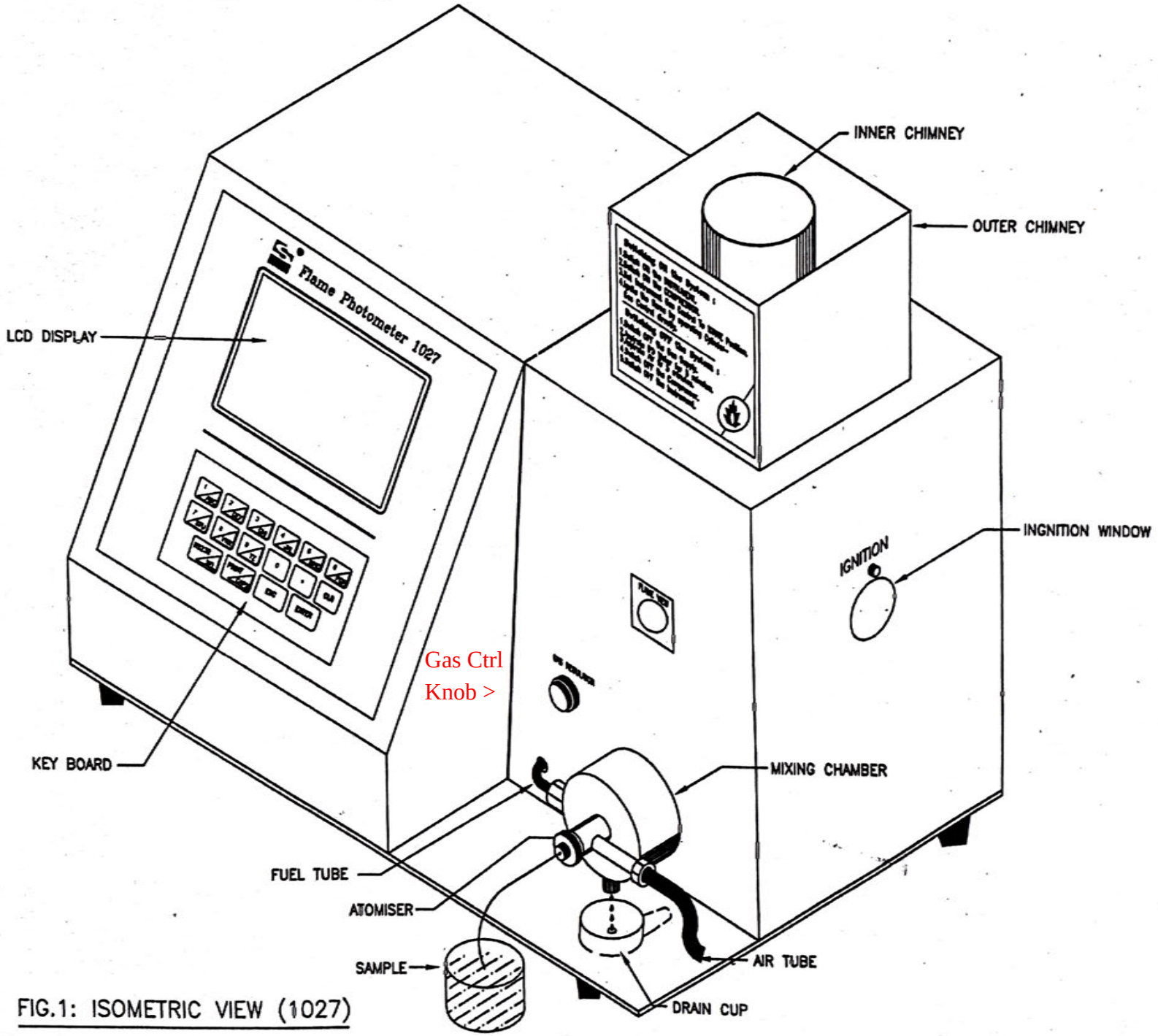


FIG.1: ISOMETRIC VIEW (1027)

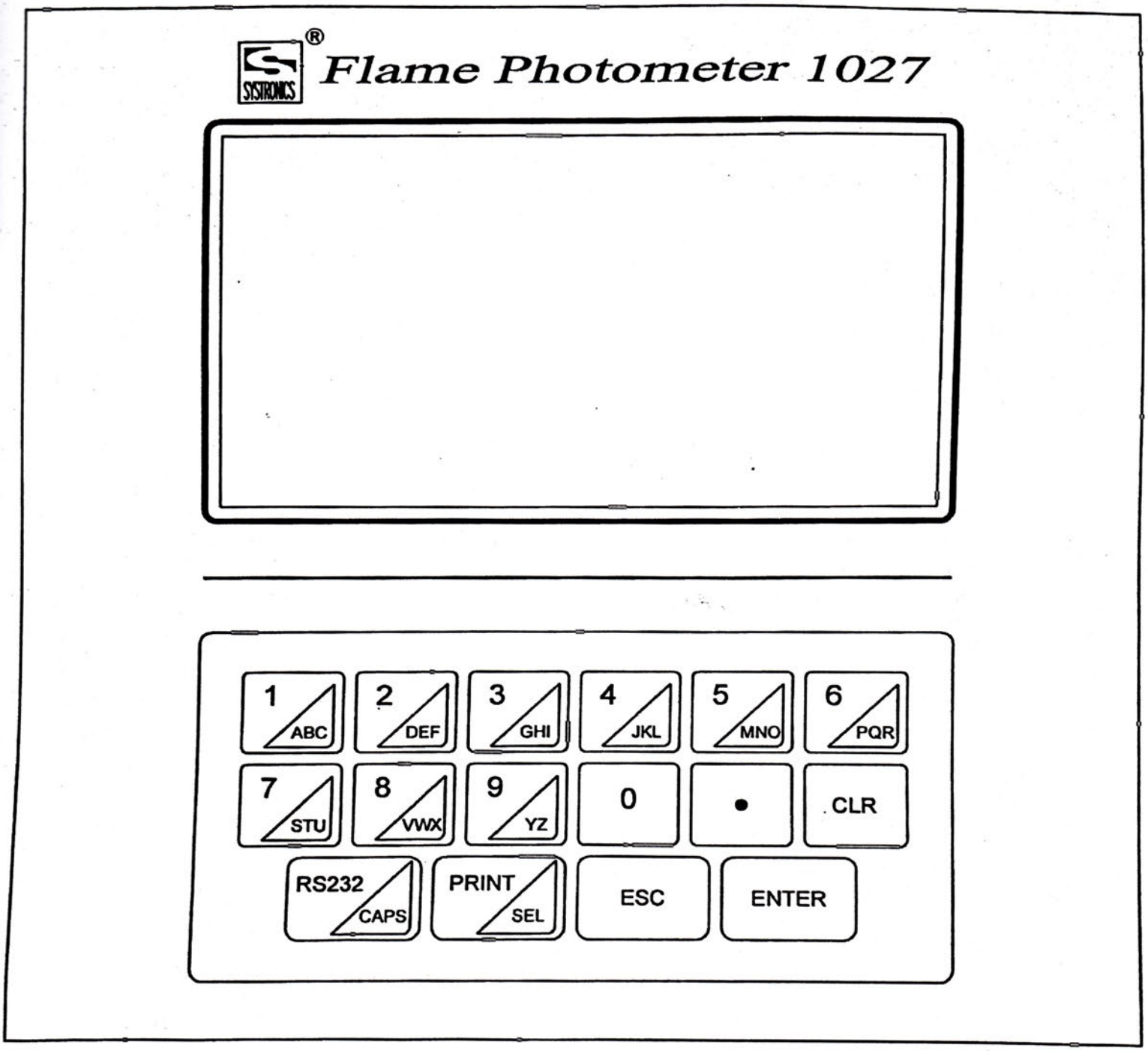


FIG.2: FRONT PANEL CONTROLS (1027)

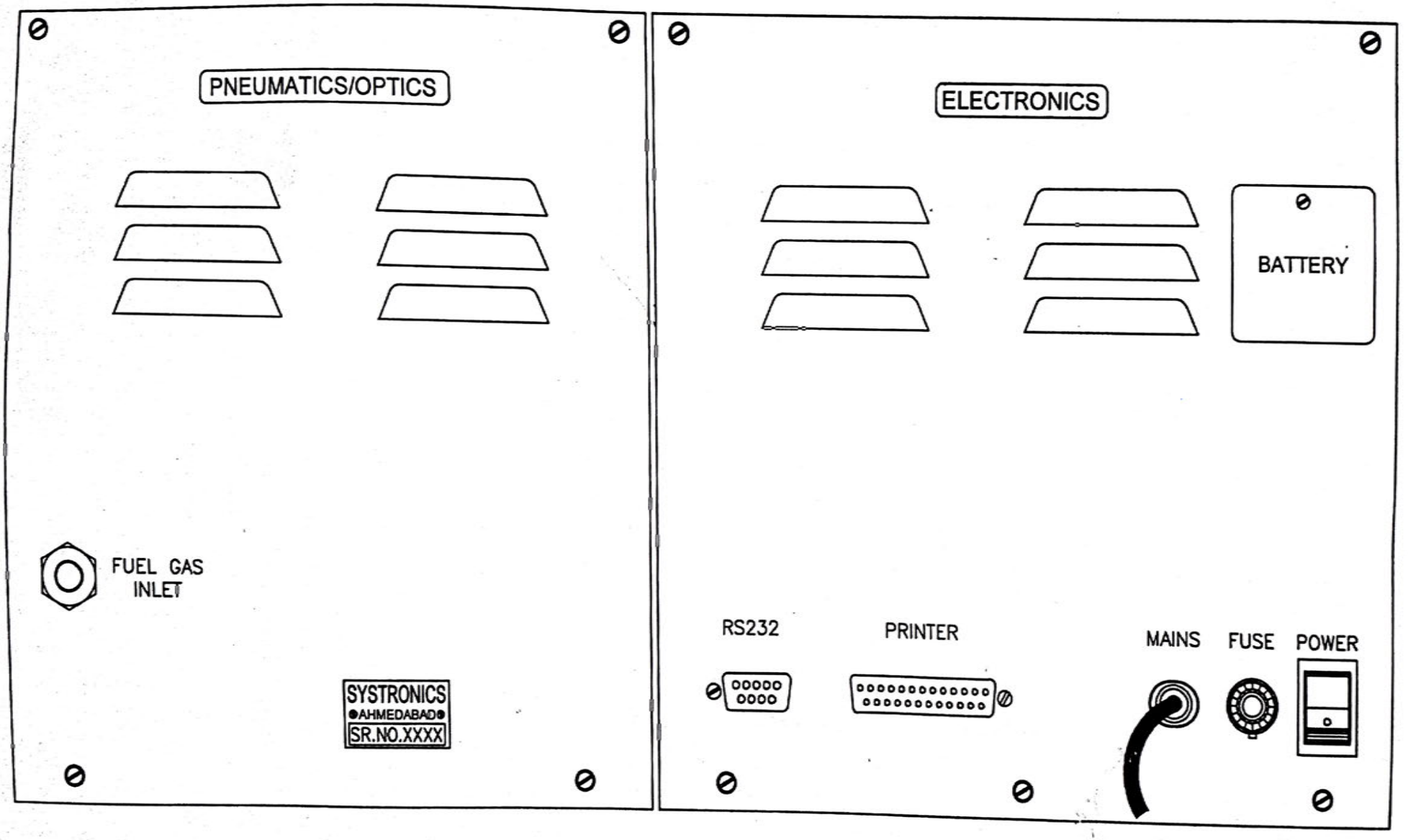


FIG.3: REAR PANEL (1027)

WARRANTY

SYSTRONICS warrants that each instrument manufactured & sold by SYSTRONICS or Systronics' authorised Dealers /Distributors is free from defect. Instrument performs as per laid down specification if the same is operated as per the instruction suppled with it. The period of WARRANTY is one year from the date of invoice. Any defect in the instrument or deviation in the performance as per the specification shall be examined by Systronics' authorised person for rectification and /or replacement of the same. Photocell/photodiode, PMT, Lamps/Bulbs, conductivity cell, electrodes, grating, mirrors, filters, lenses, sensors etc... are not covered under warranty as these are glass / optical / consumable parts

WARRANTY SHALL BE VALID ONLY IF:

- The instrument is operated as per the instruction supplied with it
- Repairing / servicing of instrument carried by authorised person.
- Copy of this Warranty Registration Card is sent to SYSTRONICS duly filled within 15 days after receipt/ installation of the instrument by email to **admn@systronicsindia.com**

WE ARE NOT LIABLE IN THE CASE OF

- Any loss or damage resulting from incorrect installation or related to the installation, inspection and maintenance
- Any defect caused by accident , misuse , negligence , alteration , modification or substitution of any of the components/parts or any attempt at internal adjustment by unauthorised persons
- It is let on hire

THIS WARRANTY DOES NOT COVER ANY LOSS OR DAMAGE

- Resulting from fire, flood, exposure to weather conditions and any other natural calamities.
- Any consequential or resulting injury, damage or loss arising from any causes whatever.

No person is authorised to assume in our name or on our behalf any other obligation or liability or vary any of terms of this warranty

SYSTRONICS

List of All India Sales and Service Centres

City	Address	Phones Nos.	Fax No.	E-mail
Bengaluru	#146/4, Shantala Plaza, 2nd Floor, 8th Main, 14th Cross, Malleshwaram, Bengaluru 560 003.	080-23341126,	080-23362554	bangaluru@systronicsindia.com
Bhopal	262, First Floor, Major Shopping Centre, Opp. Hotel Tulsi Exotic, Zone-II, M. P. Nagar, Bhopal 462 011. (M.P.)	0755-2555343	0755-4951945	sysbpl@systronicsindia.com
Bhubaneswar	Plot No. 315, Saheed Nagar, Bhubaneswar 751 007	0674-2544591		bbsr@systronicsindia.com
Chennai	146/8, Second Floor, Millenium Towers, (Near Mehta Bus Stop) Nelson Manickam Road, Chennai 600 029.	044-23745360	044-23744883	syschennai@systronicsindia.com
Hyderabad	2-2-674/A/3, Shivam Road, (Above Karur Vyasya Bank) New Nallakunta, Hyderabad 500 013. (Telangana)	040-27423584	040-27401547	hyd@systronicsindia.com
Kolkata	10, Princep Street, Kolkata 700 072.	033-22371298	033-22251265	kolkata@systronicsindia.com
Mumbai	38, Vijay Condominium, Ground Floor, Mehra Industrial Compound, A.K. Road, Sakinaka, Andheri (E), Mumbai 400 072.	022-28505089	022-28506243	mumbai@systronicsindia.com
New Delhi	403, 4th Floor, Sethi Bhawan, 7, Rajendra Place, New Delhi 110 008	011-25758809	011-25758810	delhi@systronicsindia.com
Thiruvananthapuram	T.C. 9/1387, "Lakshmi", Temple Road, Sasthamangalam, Thiruvananthapuram 695 010.	0471-2724738	0471-2317047	trivandrum@systronicsindia.com
Res. Rep. Chandigarh				chandigarh@systronicsindia.com
Guwahati				anupsarkar@systronicsindia.com
Jaipur				jaipur@systronicsindia.com
Lucknow				lucknow@systronicsindia.com
Nagpur				nagpur@systronicsindia.com
Raipur				raipur@systronicsindia.com
Regd. / Head Office	B/116-129, Supath-II Complex, Near Juna Wadaj Bus Terminus, Ashram Road, Ahmedabad-380013. Web : www.systronicsindia.com CIN : U32201 GJ1973PLC002437	079-27556077 079-27553589	079-27552902	admn@systronicsindia.com
Works	89-92, Naroda Industrial Area, Naroda, Ahmedabad - 382 330. Gujarat, India.			