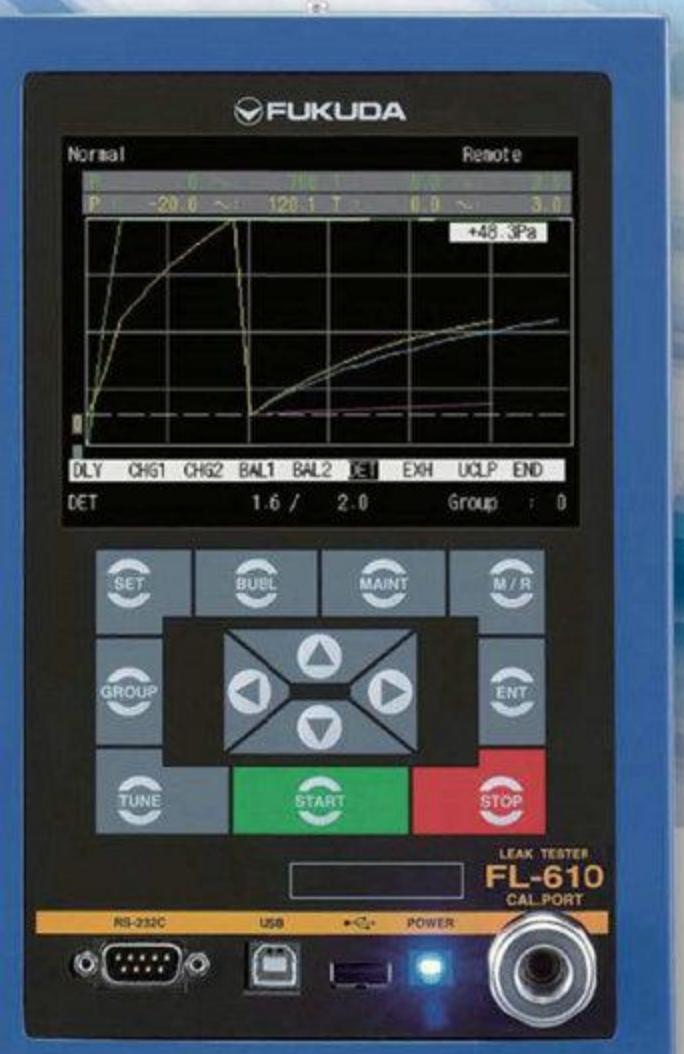


# 无基准气密检漏仪

## FL-610 系列



### Master-Less Leak Tester

#### Master Management Not Needed

There is no need for master management (for maintenance and storage areas), which serves to reduce cost

#### High Accuracy and Short Measurement Time

Detection accuracy is enhanced by comparing master (reference) data structured with measured data, so that leaks can be detected in a short period of time

#### Equipped with USB Ports

Easy processing of I/O data, update software. Measurement results data can be save USB-memory and handling of the data.

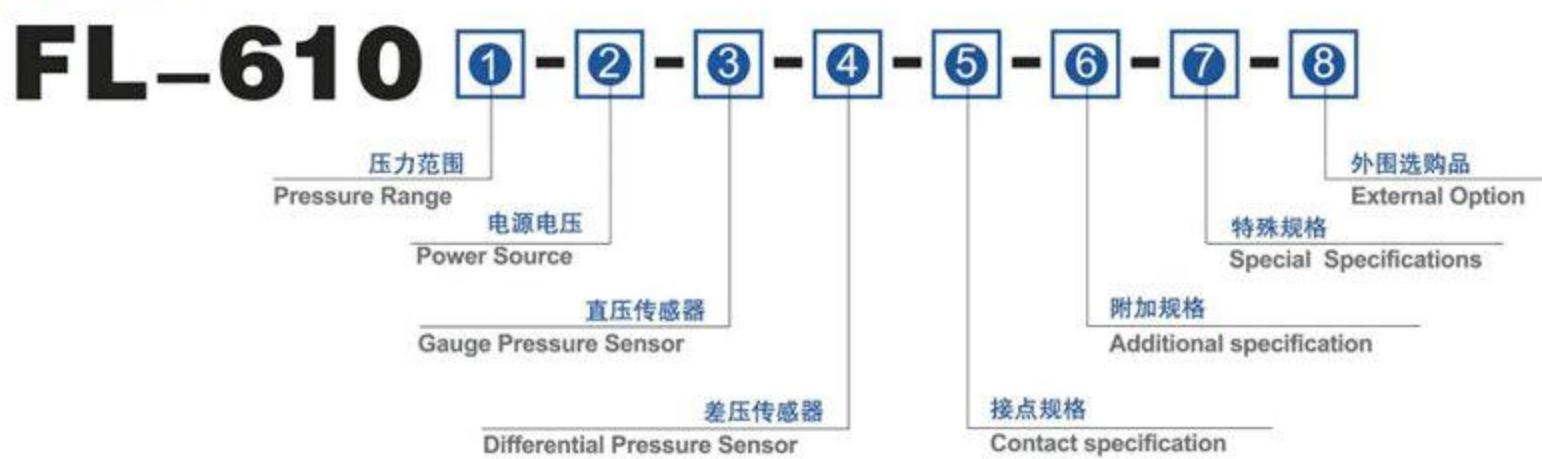
#### A Variety of Parts Covered

32 different types of measurement conditions are configurable

#### Large-sized Graphic Color Display

Processes of on-going measurements, wave forms, and data analysis can be displayed on the screen.

### 型号 Model



#### ① 压力范围 Pressure Range

型号 Mode	使用范围 Applied Pressure Range	设定范围 Setting Pressure Range	显示范围 Indicated Pressure Range
VB	-90.0 ~ -5.0 kPa	-90.0 ~ 0.0 kPa	-99.9 ~ 0.0 kPa
LC	5.0 ~ 20.0 kPa	0.0 ~ 20.0 kPa	0.0 ~ 50.0 kPa
LD	10.0 ~ 99.9 kPa	0.0 ~ 99.9 kPa	0.0 ~ 99.9 kPa
LE	10 ~ 100 kPa	0 ~ 100 kPa	0 ~ 125 kPa
LF	30 ~ 300 kPa	0 ~ 300 kPa	0 ~ 300 kPa
MC	100 ~ 700 kPa	0 ~ 700 kPa	0 ~ 999 kPa
HC	300 ~ 990 kPa	0 ~ 999 kPa	0 ~ 999 kPa

#### ② 电源电压 Power Source

型号 Mode	电源电压 Power Source	备注 Note
02	AC90 ~ 110V 200 ~ 240V	

#### ③ 直压传感器 Gauge Pressure Sensor

型号 Mode	精度 Accuracy
01	± 2% F.S.

#### ④ 差压传感器 Differential Pressure Sensor

型号 Mode	规格 Specifications
02	2000 Pa

#### ⑤ 接点规格 Contact specification

型号 Mode	输出 NPN output	输出 PNP output	备注 Note
02			预计销售

#### ⑥ 附加规格 Additional specification

型号 Mode	规格 Specification
NN	无 Without

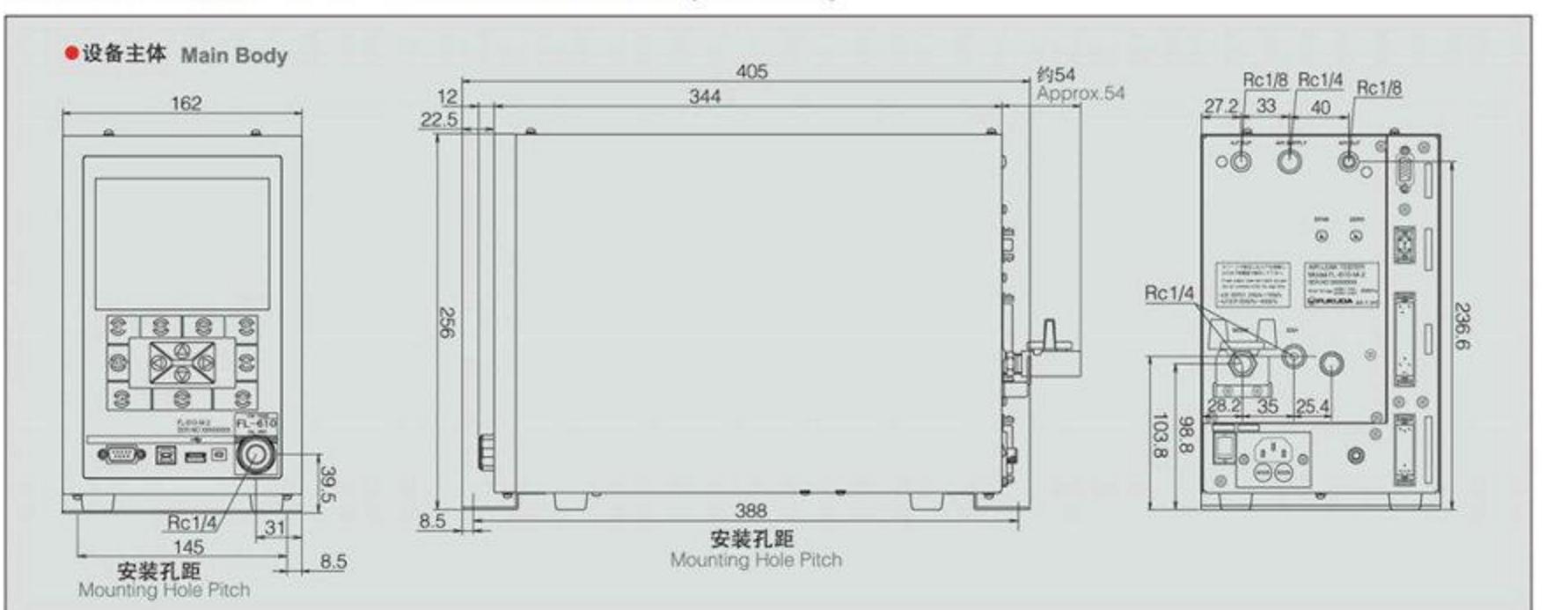
#### ⑦ 特殊规格 \*1 Special Specifications

型号 Mode	规格 Specification
NN	无 Without

\*1) 如需详细规格,请联系福田公司

Please contact FUKUDA about the detailed specifications.

### 外形尺寸(单位: mm) External Dimensions (Unit: mm)



### 规格 Specifications

测定方式	被测物、固定基准物差压比较方式 (无基准物)
容积测定	使用定流量发生器或手动校正器进行容积测定和校准
差压传感器	VR-55A (2CD) F.S. 2000Pa/5V 被测物侧精度 ± 1% F.S. 基准物侧精度 ± 2% F.S.
直压传感器	VB型 -101kPa 精度 ± 2% F.S. LC型 50kPa 精度 ± 2% F.S. LD型 100kPa 精度 ± 2% F.S. LE型 100kPa 精度 ± 2% F.S. LF型 300kPa 精度 ± 2% F.S. MC型 1MPa 精度 ± 2% F.S. HC型 1MPa 精度 ± 2% F.S.
Gauge Pressure Sensor	VB Range -101 kPa Accuracy ±2% F.S. LC Range 50 kPa Accuracy ±2% F.S. LD Range 100 kPa Accuracy ±2% F.S. LE Range 100 kPa Accuracy ±2% F.S. LF Range 300 kPa Accuracy ±2% F.S. MC Range 1 MPa Accuracy ±2% F.S. HC Range 1 MPa Accuracy ±2% F.S.
Work Side Volume	Approx. 6.2 mL
Master Tank Volume	Approx. 28 mL
测定精度	50mL标准被测物1ml/min的测试条件下, 测定误差在 ± 5% 以内
推荐前导压	驱动压300 ~ 400kPa
显示	5.7英寸LCD显示 (320×R.G.B.) X240 dot TFT色彩
组号设定	0 ~ 31 (共32组)
Test pressure Automatic Control	Corresponds to Pneumatic Regulators (APU-70, APU-90, APU-120, APU-130) *
显示单位	检测结果单位: Pa, kPa, Pa/s, kPa/s, Pa/min, kPa/min, mL/s, mL/min, Pa <sup>3</sup> /s, Pa/DET, kPa/DET 测试压单位: kPa, MPa, kgf/cm <sup>2</sup> , psi, mbar, bar, mmHg, cmHg, inHg
External Input/Output	REMOTE 50P (外部控制信号) APU SIGNAL 8P (APU控制信号) EXT VALVE SIGNAL 34P (外部选购阀信号) RS-232C D-SUB 9P (数据输出信号) ANALOG IN 15P (外部模拟信号) USB接口 A型接口 USB接口 B型接口
温度/湿度范围	0 ~ 40°C 45 ~ 85%RH (无结露)
电源	AC90 ~ 110V 200 ~ 240V
耗电量	约100VA
重量	约12kg
语言	日语/英语

\* APU可选 (请参考FL-600系列“可选设备”选项)

\* APU is an option. (Please refer to the FL-600 series Additional Equipments.)

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## 无基准检漏仪 Master-Less Leak Tester

### FL-610 系列

# 福田检漏仪升级版

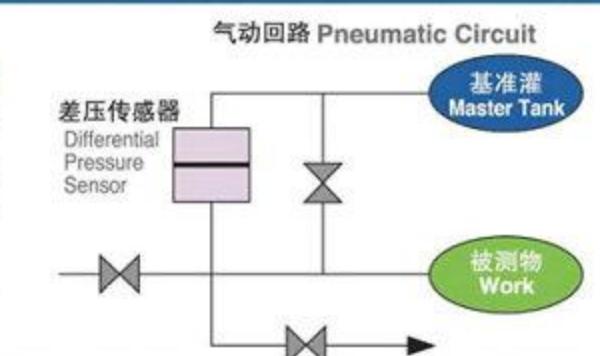
## Evolving Leak Testers of FUKUDA

无基准检漏仪通过内置的差压传感器进行泄漏检测。检漏仪得到的检测数据不仅包括了被测物本身泄漏所得到的数据，也包括了检测环境的变化（压缩热，工件温度，外界环境温度，工装密封性下降）得到的数据。FL-610系列可以采集这些外界因素并以数据的形式进行数字化处理。FL-610系列可以有效地缩短检测节拍，提高检测精度。

A master-less leak tester detects leaks by using the embedded differential-pressure sensor. Measurement differential pressure data is detected by leak testers as including not only factors due to leak but also measurement environmental variation (compressed heat, work temperature, ambient temperature, sealing structure deterioration, etc.). The FL-610 series visualizes such external factors in order to digitalize them as data. The FL-610 series is a leak tester which can shorten measurement time, enhancing detection accuracy.

### 什么是无基准检漏仪？ What is a master-less leak tester?

在基准对比检测法中，检测结果是和基准数据进行对比，而不是通过传统的连接基准物为标准进行对比。基准物的维护和贮存必然会面临寿命损耗，压缩热积累或者扩散。采用这种方法，可检测的容积范围广泛，小容积和大容积均可有效的进行检测。

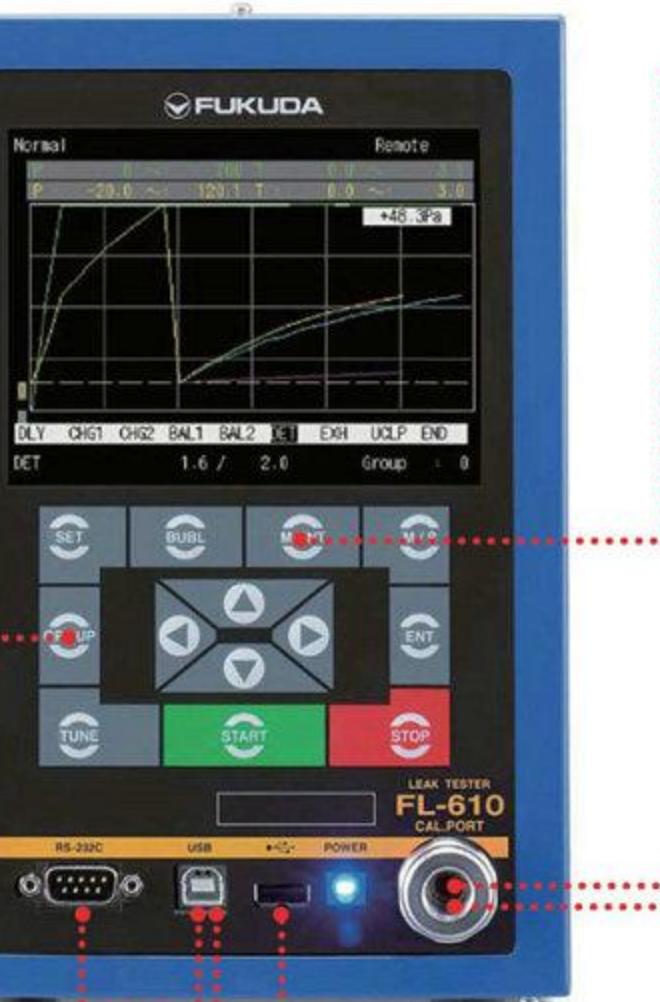
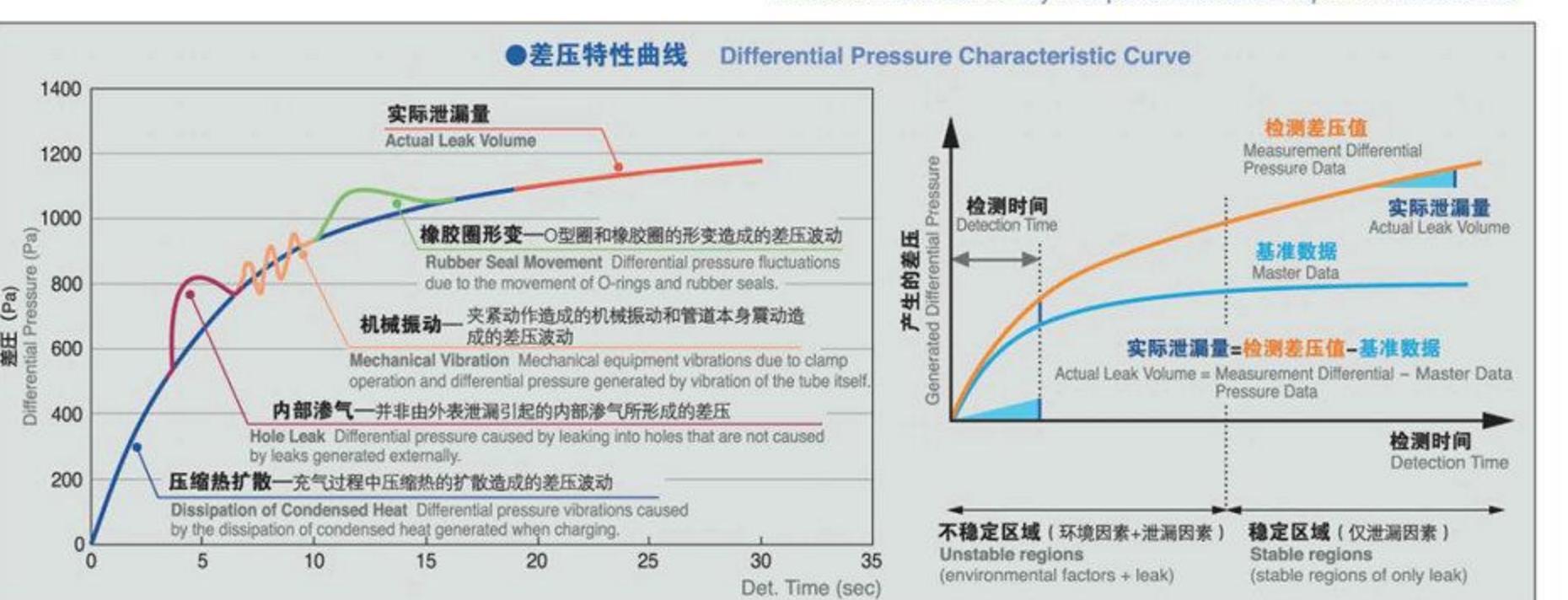


In the master comparison method, comparison measurements are performed on master data instead of using the work (master) which becomes the standard to judge by. There is no need for masters. Management of masters for maintenance and storage areas related to age deterioration, heat accumulation, or heat release characteristics is unnecessary. A wide variety of works from small to large capacities can be measured.

### 基准测试 Mastering Measurement

泄漏引起的差压值会随着时间逐步升高。与其相反，压缩热和形变因素的影响却会随着时间趋于稳定。利用这一特征，可以把除了泄漏以外的其他因素（特定情况下各种因素）产生的数据（就是基准数据），从整个的检测曲线中去除（详见下列图表）。由此可知，基准数据反映了因外部环境因素（压缩热，外部温度，被测物特性，密封特性）的影响而产生的差压值。为了得到基准数据，基准检测过程要比一般检测过程花费更长时间。此时，被测物是否泄漏是无关紧要的，重要的是，基准检测所处的环境与平时进行泄漏检测时的环境要尽量相似。

※根据环境因素的影响，基准检测实时的更新基准数据，所以在对应的检测环境下，检测结果更加精确。



### 串口通信输出 Serial connection output

● 可输出检测结果、压力值和设定值。可选择RS-232端口或者USB端口。  
Connecting the manual calibrator or flow master (type: FFM-100), or the flow meter with a precision needle valve to the CALPORT can generate an artificial leak. This serves to obtain the volume of the work connected from the leak rate of the artificial leak generated.

### 组号设定功能 Group Settings

● 可根据被测物和检测环境的不同，设定0~31组（共32组）对应的测试参数。  
Changes of works and conditions settings can be saved under different conditions which can be divided into groups 0 to 31 (32 different types).

### 输入/输出检测功能 I/O Check Function

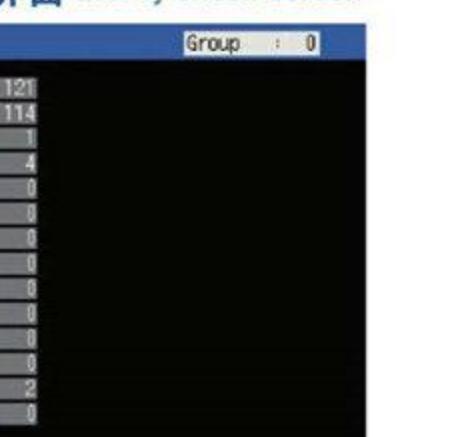
● 检漏仪的输入和输出可以单独操作及显示。通过监测连接的外部设备的信号或者手动输出的信号，可以确定外部设备端口的工作状态。  
The input/output of the leak tester can be indicated or operated individually for confirmation. The interface with external devices can be confirmed by monitoring the signal of the external device connected or by manual output of the signal.

### 分析 Analysis

### 检漏仪的屏幕可以显示数据分析 Measurement results data can be analyzed on the tester's screen.

FL-610的内存可以临时储存并显示最多1000次检测数据。FL-610关闭的时候，所有数据清零。  
As to data analysis function, the FL-610 can temporarily save the measurement results up to around 1000 times in its memory and indicate these results. Saved data in the memory is cleared when FL-610 is turned off.

### 质量检测界面 Quality check Screen



● 一组内的测试次数、合格品/不合格品的数量、检测结果明细可以一目了然的显示出来。由此可以判断不合格率。  
Breakdown information of the measurement results such as the number of measurement in the group, the number of acceptable and unacceptable parts is displayed. It can use judgment of a defective fraction.

### 自诊断功能 Self Check Function

● 在维护模式下，当阀体发生故障或者传感器信号断路时，机器会报警。传感器的敏感度下降也能被检测到。  
In the maintenance mode, this function gives a warning where an operational malfunction of the valves or a sensor disconnection is discovered. Sensor defects due to sensor deterioration can also be diagnosed.

### CAL检测功能 CAL Open Test Function

● 如果在前面板上的CALPORT打开的状态下，进行一般检测，可以用来检测设定的容积和测试节拍是否合适。  
检测进行时，将定流发生器（型号FFM-100）连接到被测物上，此时被测物被看做带着眼孔。操作员可以根据检测结果判断被测物的容积和测试节拍是否匹配。  
Usual measurements are done under conditions where the CAL PORT on the front panel is released. This function can be utilized for confirming work volume configured and verifying proper tact time.  
Where measurements take place connecting an acceptable work to the flow master (Type: FFM-100), measurements are done as if the acceptable work was a work with leak. The user can know whether the work volume and tact time is proper from the leak rate measured.

### 容积测定功能 Volume Measurement Function

● 将手动校正器或者定流量发生器（型号FFM-100），或者配备有精密针型阀的流量计连接在CALPORT接口上，可以产生一个人为泄漏。根据产生的泄漏率，可以计算出被测物的容积。  
Connecting the manual calibrator or flow master (type: FFM-100), and the flow meter with a precision needle valve to the CALPORT can generate an artificial leak. This serves to obtain the volume of the work connected from the leak rate of the artificial leak generated.

### USB接口 USB Connectors

● USB接口及其应用让数据的传输和软件的升级更加简单。各项设置也可以容易的被更改。  
Adoption of USB hosts and USB functions makes it easier to input/output data and update software. Settings can also be re-configured easily.

### 大容积被测物的检测 Measurement of Large Capacity Works

● 检漏仪的输入和输出可以单独操作及显示。通过监测连接的外部设备的信号或者手动输出的信号，可以确定外部设备端口的工作状态。  
The input/output of the leak tester can be indicated or operated individually for confirmation. The interface with external devices can be confirmed by monitoring the signal of the external device connected or by manual output of the signal.

### 数据 Data

### 根据特定环境可以选择不同的数据输出方式 Data output methods can be selected according to particular circumstances.

#### USB 内存 USB memory



- 内存：2GB
- 数据：100万次读写
- 2-GB Memory
- Data : One million times

USB内存让数据易于转移，不同检漏仪的设定参数可以很容易的被复制和输入。检漏仪的参数可以很方便的重置，尤其是当有多台检漏仪，或者更换检漏仪，或者新增被测物时。

使用USB内存也使得软件升级变得更加简单。即使检漏仪不和电脑相连，数据也可以长期保存。当操作环境变化，或者发生故障寻找原因时，可以进行数据管理分析。

#### USB功能端口 USB function connector

数据可以输入电脑进行管理分析。电脑安装专用驱动以后，可以输出和RS-232接口相对应的通信数据。

#### RS-232端口 RS-232C connector

通过电脑和串口的连接，进行串口通讯。通讯模式可以有多种选择。

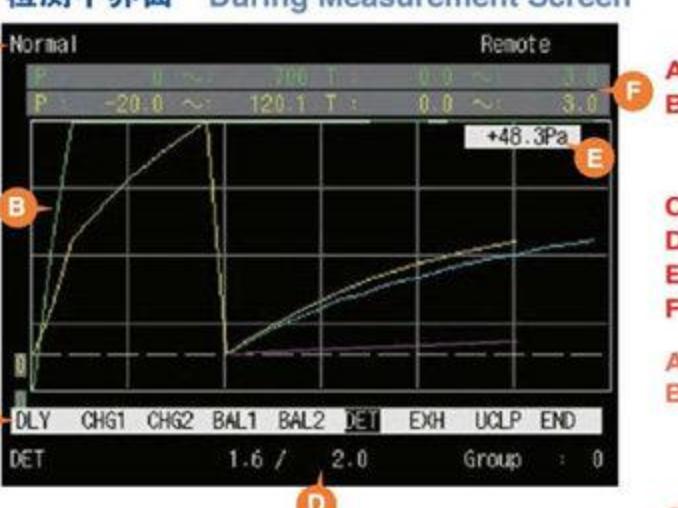
#### 打印输出 Printout

当检测结果需要打印出来，作为产品的附件资料时，可以将一台使用RS-232端口的打印机（型号BL-80RSII）连接到检漏仪（详见选型表中“可选设备”）。

### 显示 Displays

### 福田检漏仪以多种形式显示多种数据 FUKUDA's leak tester Displays a variety of data in various forms.

#### 检测中界面 During Measurement Screen



- A : 检测类型：基准检测/普通检测 Mastering / Normal
- B : 检测曲线 Green: 测量压 Yellow: 差压值 Blue: 基准值 Purple: 基准数据修正后的差压值
- C : 检测环节与当前环节
- D : 环节已用时间/环节设定时间
- E : 当前差压值
- F : 图表显示的范围设定

- A : Measurement type: Mastering/ Normal
- B : Measured data graph
- Green: Gauge pressure Yellow: Differential pressure sensor value
- Blue: Master data Purple: Differential pressure value corrected by master data

- C : Processes and the current process
- D : Process elapsed time/ Process set time
- E : Current sensor value
- F : Scale settings for graphic display

#### 检测结果界面 Measurement Results Screen



- A : 检测结果判定
- B : 检测结果数值
- C : 检漏仪的操作状态（保持模式）
- D : 检测时被测物的内部压力
- E : 判断产品是否合格的设定值

- A : Determination result of the measurement
- B : Numerical value of the measurement result
- C : Operational status of the leak tester (Hold mode)
- D : Internal pressure of the work during measurement
- E : Set value for determining acceptable or unacceptable works