

① 压力范围	Pressure	Range
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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	00.0 ~ 99.9 kPa	00.0 ~ 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

型号	产品名称	规格
R- 51		正压LC范围标准规格R5(0.5~10kPa)
R- 52		正压LC范围 精密规格 P-200
R- 53		正压LD.LE范围 标准规格
R- 54		正压LD.LE范围 精密规格
R- 55		正压LD.LE范围 精密规格+高精密过滤器
R- 56	过滤器/减压阀	正压LF.MC范围 标准规格
R- 57		正压LF.MC范围 精密规格
R- 58		正压LF.MC范围 精密规格+高精密过滤器
R- 59	1	正压HC范围 标准规格
R- 61		负压VB范围 标准规格
R- 62	1	负压VB范围 精密规格 P-200

② 电源电压	型号 Mode	电源电压 Power Source	备注 Note
Power Source	02	AC90 ~ 110V 200 ~ 240V	
6 直压传感器	型号 Mode	精度 Accuracy	
Gauge Pressure Sensor	01	± 2% F.S.	
②差压传感器	型号 Mode	规格 Specifications	
Differential Pressure Sensor	02	2000 Pa	
❺接点规格	02	NPN 输出 NPN output	
Contact specification	03	PNP 输出 PNP output	预计销售 Now Planned
⑥附加规格 Additional specification	NN	无 Without	
⑦特殊规格 ₩1 Special Specifications	NN	无 Without	

0	External	Option
		1

Model	Product Name	Specifications	
FR- 51		Positive Pressure LC Range Standard spec. R5(0.5~10 kPa)	Positive
FR- 52	Filter/	Pressure LC Range Precision spo	ec. P-200
FR- 53		Positive Pressure LD · LE Range	Standard spec.
FR- 54		Positive Pressure LD · LE Range	Precision spec.
FR- 55		Positive Pressure LD · LE Range Precision spec. and High Performation	nce spc.
FR- 56	Regulator Unit	Positive Pressure LF · MC Range	Standard spec.
FR- 57	Onic	Positive Pressure LF + MC Range	Precision spec.
FR- 58		Positive Pressure LF · MC Range Precision spec. and High Performat	nce spc.
FR- 59		Positive Pressure HC Range	Standard spec.
FR- 61		Negative Pressure VB Range	Standard spec.
FR- 62		Negative Pressure VB Range Pre-	cision spec. P-20

※1) 如嚮详细规格,请联系福田公司

Please contact FUKUDA about the detailed specications.

■ 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)	Testing Method	Work/ Fixed Master Comparison (Master-Less) Differential Pressure Method Air Leak Tester	
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	Volume Testing	By employing a flow master, Volume testing and calibration can be done according to actual leak standards.	
差压传感器	VR-55A(2CD)F.S. 2000Pa/5V 被测物侧精度 ± 1%F.S. 基准物例精度 ± 2%F.S.	Differential Pressure Sensor	VR-55A(2CD)F.S. 2000Pa/5V Work Side Accuracy ±1% F.S. Master Side Accuracy±2% F.S.	
	VB型 -101kPa 精度±2%F.S.		VB Range -101 kPa Accuracy ±2% F.S.	
	LC型 50kPa 精度 ± 2% F.S.		LC Range 50 kPa Accuracy ±2% F.S.	
	LD型 100kPa 精度±2%F.S.		LD Range 100 kPa Accuracy ±2% F.S.	
直压传感器	LE型 100kPa 精度±2%F.S.	Gauge Pressure	LE Range 100 kPa Accuracy ±2% F.S.	
	LF型 300kPa 精度±2%F.S.	Sensor	LF Range 300 kPa Accuracy ±2% F.S.	
	MC型 1MPa 精度 ± 2% F.S.		MC Range 1 MPa Accuracy ±2% F.S.	
	HC型 1MPa 精度 ± 2% F.S.		HC Range 1 MPa Accuracy ±2% F.S.	
被测物侧容积	约6.2ml	Work Side Volume	Approx. 6.2 mL	
基准容器容积	约28ml	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	Testing Sensitivity	Standard work of 50mL Used for Leak Experimen ±5% 1mL/mint	
推荐前导压	驱动压300~400kPa	Recommended Pilot Pressure	Driving pressure 300 ~ 400 kPa	
显示	5.7英寸LCD显示(320×R.G.B.)X240 dot TFT色彩	Display	5.7 Inch, LCD(320×R.G.B)×240 dot, Color TFT	
组号设定	0~31(共32组)	Group Setting	0 ~ 31 group (32 Total)	
测试压力自动 控制	自动压力控制器 (APU-70, APU-90, APU-120, APU-130) [※]	Test pressure Automatic Control	Corresponds to Pneumatic Regulators (APU-70, APU-90, APU-120, APU-130)*	
	检测结果单位: Pa, kPa, Pa/s, kPa/s, Pa/min, kPa/min, mL/s, mL/min, Pam ³ /s, Pa/DET, kPa/DET		Testing Unit: Pa, kPa, Pa/s, kPa/s, Pa/min, kPa/min, mL/s, mL/min, Pam ³ /s, Pa/DET, kPa/DET	
显示单位	测试压单位: kPa, MPa, kgf/cm ² , psi, mbar, bar, mmHg, cmHg, inHg	Display Unit	Test Pressure Unit: kPa, MPa, kgf/cm ² , psi, mbar, bar, mmHg, cmHg, inHg	
	REMOTE 50P(外部控制信号)		REMOTE 50P (External Connection Signal)	
	APU SIGNAL 8P (APU控制信号)		APU SIGNAL 8P (APU Connection Signal)	
	EXT VALVE SIGNAL 34P (外部选购阀信号)	External Input/	EXT VALVE SIGNAL 34P (Externally Mounted Option Signal)	
外部输入/输出	RS-232 D-SUB 9P (数据输出信号)	Output	RS-232C D-SUB 9P (Data Output Signal)	
	ANALOG IN 15P (外部模拟信号)		ANALOG IN 15P (External Analog Signal)	
	USB接口 A型接口	9 90 NG	USB Host A connector	
	USB接口 B型接口		USB Function B connector	
温度/湿度范围	0~40℃ 45~85%PH(无结露)	Operation Temperature/ Humidity Range	0~40°C 45~85%RH (With no Precipitation)	
电源	AC90~110V 200~240V	Power Source	AC90~110V 200~240V	
耗电量	约100VA	Applied Current	Approx. 100 VA	
重量	约12kg	Weight	Approx. 12 kg	
语言	日语/英语	Language	Japanese/ English	

主要	产品 📀 气密检漏	仪 🔷 数字压力表	●流量;	十 ●自动压力、流量控制器	🔵 密封性能检	测专用设备
公司·工厂:	天津经济技术开发区第九大 区(300457) 电话:(86)22-59810966 邮箱:sales@boyiqd.com 网址:www.boyiqd.com 北京市丰台区角门18号名流 电话:(86)10-87582461 广州市天河区体育东路122- 2113-2114室(510620)	传真: (86)22-59810963 法来大厦801-805(100068) 传真: (86)10-87582462 号羊城国际商贸中心西塔 传真: (86)20-38870733 泰商务大厦905室 (310002) 传真: (86)571-87850351	武汉办事处: 上海办事处:	电话:(86)27-87156659 传真:(86)27-1 上海浦东陆家嘴金融贸易区向城路58号东; 厦23层D室(200122) 电话:(86)21-68406123 传真:(86)21-	87156657 方国际科技大 -68406266 厦21B3 -65579073 3室 (710082) 4589121	本社: 株式会社FUKUDA 地址:日本东京都练马区贯井3-16-5 Add.:3-16-5,Nukui,Nerima-ku,Tokyo,Japar 电话: (81) 33577-1111 传真: (81) 33577-1002 代理商:
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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 date 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.

Master-Less Air Leak Tester



- ●精度更高,节拍更短 通过比对基准数据和检测数据,排除了形变、压缩热等干扰,最大限度的 保证了精度和节拍。
- 配备USB接口 数据传输和软件升级更加容易。可以快捷的对检测数据进行存储和处理。
- 对应不同检测对象 可设置32种检测条件
- 大尺寸彩屏图形分析 实时显示检测、分析的过程, 波形图和数据分析



流体测量、控制专家 **FKD** FUKUDA CO., LTD.

无基准检漏仪 Master-Less Leak Tester 福田检漏仪升级版 FL-610系列 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。

The differential pressure value generally increases in a gradient over time. In contrast, compression heat influence or deformation factor has a characteristic to converge with time. Taking advantage of this characteristic, factors (variation factors under the particular environment) other than leaks = master data can be obtained by deducting line components from the entire differential pressure value (see the diagram below). That is, Master Data is differential pressure data which belongs only to the work that reflects pressure variation factors (compression heat, ambient temperature, work characteristics, and sealing characteristics)

For the reason of creating master data that standard udgment, this measurement process is done for a longer detection time compared to the usual measurement processes. It does not matter whether the object work has leak or not; it is important whether the measurement is done under an equivalent environment to the usual location of where measurements take place.

*Conducting mastering measurement according to environmental

variation updates the master data, so that more accurate

※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。 Measurement results, pressure values, and settings values are output. A RS-232C connector or a USB function connector can
- be selected.

组号设定功能 Group Settings

• 可以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

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

CAL检测功能 CAL Open Test Function

deterioration can also be diagnosed.

● 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,将定流量发生器(型号FFM-100)连接到 被测物上,此时被测物被看做带着漏孔。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

●2-8L的大容积被测物可以选用旁路充气设备 (CBU-600型),如需测量更大容量的被测物,请咨询 联系我公司。

Works from 2L to 8L can be measured by selecting the option for the pressurization bypass unit (CBU-600). Works with even a greater capacity. Please feel free to consult us about this



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.

■ 图表界面 Graph Scree



● 检测结果会以图表的形式显示。每个光标点处(图中黄 线)的详细数据也会被显示。能够进行工程能力的评价。 Measured data is graphically displayed. The detailed data at each point of the cursor (the yellow line in the figure) is also displayed. The process performance is appreciable from the graph.

数据 根:	据特定环境可以选择不同的数排	居输出方式
	a output methods can be selected according	
USB 内存 USB memory USB memory Eukupa Pokupoka Pokupa Pokupa Pokupa Pokupa Pokupa Pokupa Pokupa Pokupa Poku	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 memory makes data portable, so that the settings values of separate testers can be copied and entered. Settings of testers can be easily configured, especially where there are multiple testers, where the testers are changed, or where a new work is measured. Software update can also be easily performed by using USB memory. Data can be stored for a longer time without connecting the tester to a computer. Data can be managed for data analysis which is performed when operation conditions are confirmed or causes are investigated where malfunctions occur.
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 驱程以后,可以输出和RS-232接口相对应的通信数 据。	Data is managed or analyzed by outputting data to a computer. The installation of a specific driver on the computer allows the same data which is output from a RS-232C connector to be output to serial communication.
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。	This connector conducts serial communication in order to output data by means of a connection with a computer or sequencer. Output data can be selected from several different kinds of output modes depending on the data to be output.
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")。	When the measurement results need to be printed out and attached to a product, connect the tester to a printer using the RS-232C connector (type: BL-80RSII) (See the section "Additional Equipment" for details).
RS-232端口 RS-232C connector 打印输出	 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。 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 	connector to be output to serial communication. This connector conducts serial communication in order to output data by means of a connection with a computer or sequencer. Output data can be selected fro several different kinds of output modes depending on the data to be output. When the measurement results need to be printed out and attached to a product, connect the tester to a printer using the RS-232C connector (type: BL-80RSII) (See





※根据上边的波形图可以确定检测环境和检测参数,发生故障 时可以追踪原因。 settings values at start-up are verified, and causes can be traced where trouble occurs.



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.

		Ren	ote		
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	+				
			-	~	
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	_				
-	-				
	EXH	LICL	PEN	D	1
	2.91	Grou		0	

- A:检测类型:基准检测/普通检测
 - Mastering / Normal
- B:检测曲线
 - 绿色:测试压 黄色:差压值 蓝色:基准值 紫色: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
- From wave data, measurement conditions are confirmed, F: Scale settings for graphic display

	マニュアル	
		A:检测结果判定
		B:检测结果数值
	+NG: +0150.	C:检漏仪的操作状态(保持模式)
	-NG: -0150	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
).	Da /min	A : Determination result of the measurement
	Pa/min	B : Numerical value of the measurement result
		C: Operational status of the leak tester (Hold mode)
		D: Internal pressure of the work during measurement
15		E : Set value for determining acceptable or unacceptable works
	グループ: 0	