

**HDP1100-D2 型**  
**船用柴油机喷油器试验装置**  
**使用说明书**  
**Fuel Valve Test Pump Unit**  
**Instructions Manual**



(图片供参考，以实物为准)

(For reference, the actual product shall prevail)

制造商：常州艾乐森动力技术有限公司

Maker: AILESEN(CHANGZHOU) POWER TECHNOLOGY CO., LTD

地 址：江苏常州西林街道朱夏墅村委 64 号

Tel: (+86) 13815036227

URL: [www.alsjs.cn](http://www.alsjs.cn)

Email: [412868638@qq.com](mailto:412868638@qq.com)

# Description & Operating Instruction

## For Test Pump Unit

### For

## Marine Diesel Engine Valve

### I. Function

The pump unit, mainly used to measure its spray condition, is an essential test tool for high-power diesel engines. It has the advantages of big power, small size, compact structure and easy operation etc. Suitable for Low Speed Diesel Engine. B&W35-98

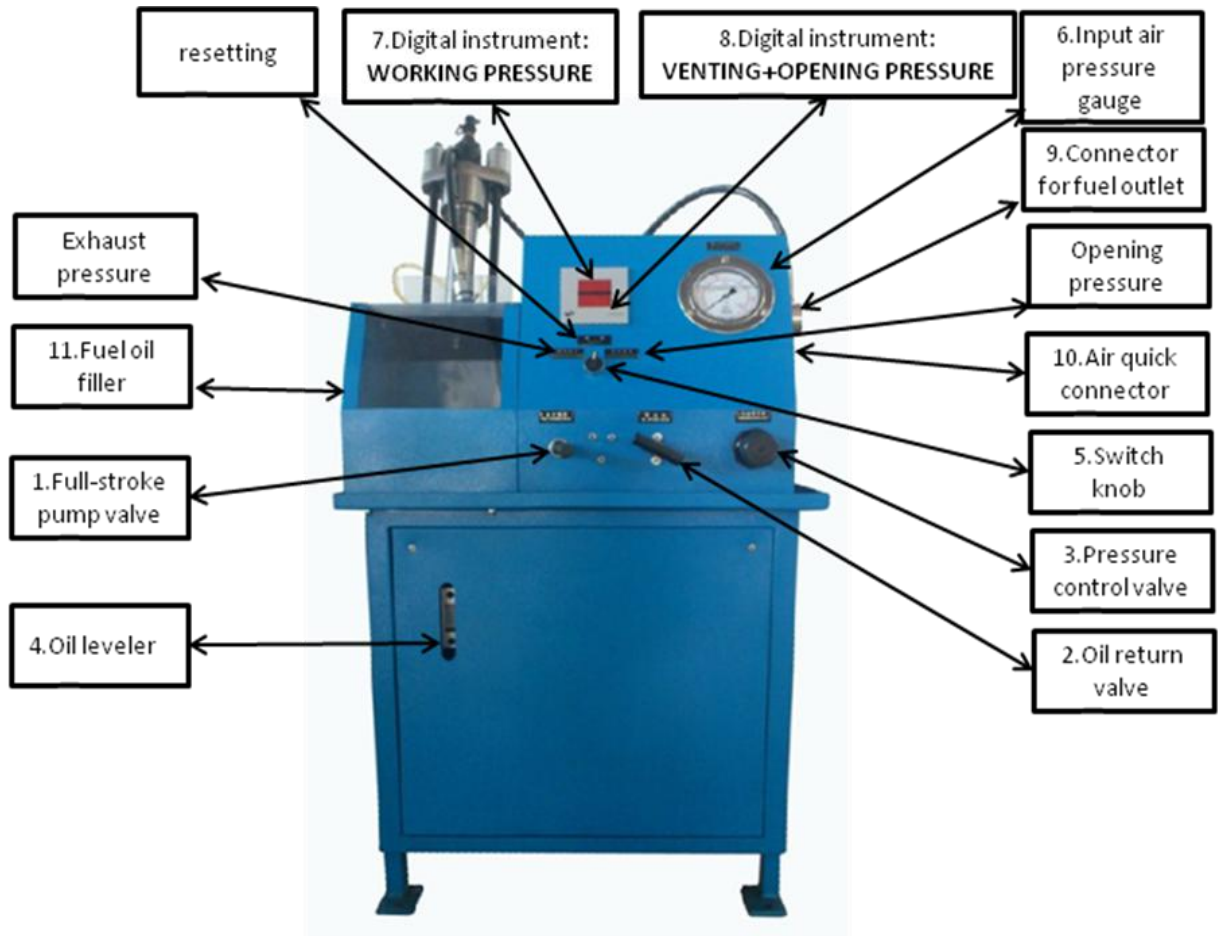
### II. Main technical data

1. Output pressure: Max. 80MPa at 0.7MPa air input.
2. Air consumption: 12 Liters/cycle at 0.7MPa air input.
3. Max. flow of fuel oil: 40ML/cycle at an air input of 0.4Mpa
4. Pumping speed: 30cycle/Min at 0.4MPa air input (no output pressure).
5. Tank capacity: 8L
6. Dimension: 700x450x1120mm
7. Weight: 77kg

### III. Control panel description

- (1). Full-stroke pump valve
- (2). Oil return valve
- (3). Pressure control valve
- (4). Oil leveler
- (5). Switch knob
- (6). Input air pressure gauge

- (7).Digital instrument: **WORKING PRESSURE**
- (8).Digital instrument: **VENTING+OPENING PRESSURE**
- (9).Connector for fuel outlet
- (10).Air quick connector
- (11).Fuel oil filler



#### IV. Preparation before connecting the pump unit

1. Fill the tank with hydraulic oil (viscosity 7—10cSt at 50°C) through filler. Turning the oil return (2) valve counter-clockwise before ventilation for opening and returning oil. The pressure control valve (3) is closed by turning counter-clockwise. Only slowly and clockwise to turn and open the Pressure control valve until required pressure.

2. Compressed air is led through a flexible hose to the air inlet (10) on the right side of the cabinet.
3. The oil injector is mounted on the bracket on the left side of the cabinet.

The fuel valve is mounted on the seat found on the left side of the cabinet. Connect one end of high pressure flexible hose to the quick connector and the other end 1/4" to the fuel oil outlet connector (9). The pump unit should be mounted according to the specification. The test pump unit is now ready for use.

## V. Operation instructions

Pre-testing preparations (for each inserted oil nozzle)

1. Before performing any of the tests, the slide-valve must be completely filled with test oil.
2. Switch knob (5) to reset position.
3. Turn pressure control valve (3) clockwise, until the test pump unit worked.
4. Now open the oil return valve (2) count-clockwise. When clear oil without air bubbles tickles from the oil return hole through the breathing-pipe, the valve is full.
5. Turn pressure control valve (3) count-clockwise to switch off air supply.

### A: Opening Pressure

1. Switch knob (5) to RESET position. Close oil return valve (2) -turn it clockwise .
2. Turn pressure control valve (3) clockwise ,until the WORKING PRESSUER (8)

is between 100bar and 150bar. Switch knob (5) to **OPERATING PRESSURE** position.

3. Turn pressure control valve (3) clockwise slowly , Increase pressure , until opening pressure is reached. The **opening pressure** is shown on the Manometer (8) .The pump stops automatically.
4. Turn pressure control valve (3) counter-clockwise and off the air supply. Open oil return valve (2) -turn it counter-clockwise .

### **B: Venting function**

1. Switch knob (5) to **RESET** position. Close oil return valve (2) -turn it clockwise .
2. Switch knob (5) to **VENTING PRESSURE** position. Turn pressure control valve (3) clockwise , until the **WORKING PRESSURE** (8) is shown  $\approx 150$ bar. Turn pressure control valve (3) counter-clockwise and off the air supply. The pressure on the manometer (8) is decrease slowly, when the internal leak slide valve opens. The **venting pressure** is shown on the Manometer (8) that the zero is shown before.
3. Open oil return valve (2) -turn it counter-clockwise .

### **C: Leak Test**

1. Switch knob (5) to **RESET** position. Close oil return valve (2) -turn it clockwise .
2. Switch knob (5) to **OPERATING PRESSURE** position. Adjust pressure control valve (3) turn it clockwise to increase the working pressure until displayed **WORKING PRESSURE** (8) is 10-20bar below the opening pressure. The pressure value should be stable .
3. Turn pressure control valve (3) counter-clockwise and off the air supply. Open oil return valve (2) -turn it counter-clockwise .

## D: O-ring Seal Test

1. Switch knob (5) to **RESET** position. Close oil return valve (2) -turn it clockwise . Plug venting hole with plug in fuel-injection valve.
2. Switch knob (5) to **VENTING PRESSURE** position. Turn pressure control valve (3) clockwise ,until the WORKING PRESSUER (8) is shown  $\approx 10\text{MPa}$ . Turn pressure control valve (3) counter-clockwise until the air pressure is zero.
3. Read pressure from WORKING PRESSURE display (8) . The pressure value should be stable.
4. Open oil return valve (2) -turn it counter-clockwise .

## VI. Repair and maintenance

1. The air supply must have an effective air-water separator.
2. The VG10 or VG15 hydraulic oil must be filtered carefully before filling into oil tank.
3. Keep the pipes and connectors clean and intact with no leakage.
4. The oil filter should be cleaned once a month.
5. When old oil filter clogged, it should be replaced a new one.
6. It is necessary to renew Y type HP seal ring if high pressure pump leaks when cylinder piston is working.
7. The gauges must always be checked and maintained clear and sensitive. If any dull and damage found, it must be inspected, repaired and replaced.
8. If the cylinder can not move when the air pressure at  $0.15\text{MPa}$ , check the clearance of reversing valve. Standard clearance is  $+0.03/+0.01$ . If necessary, replace the O-ring in time.

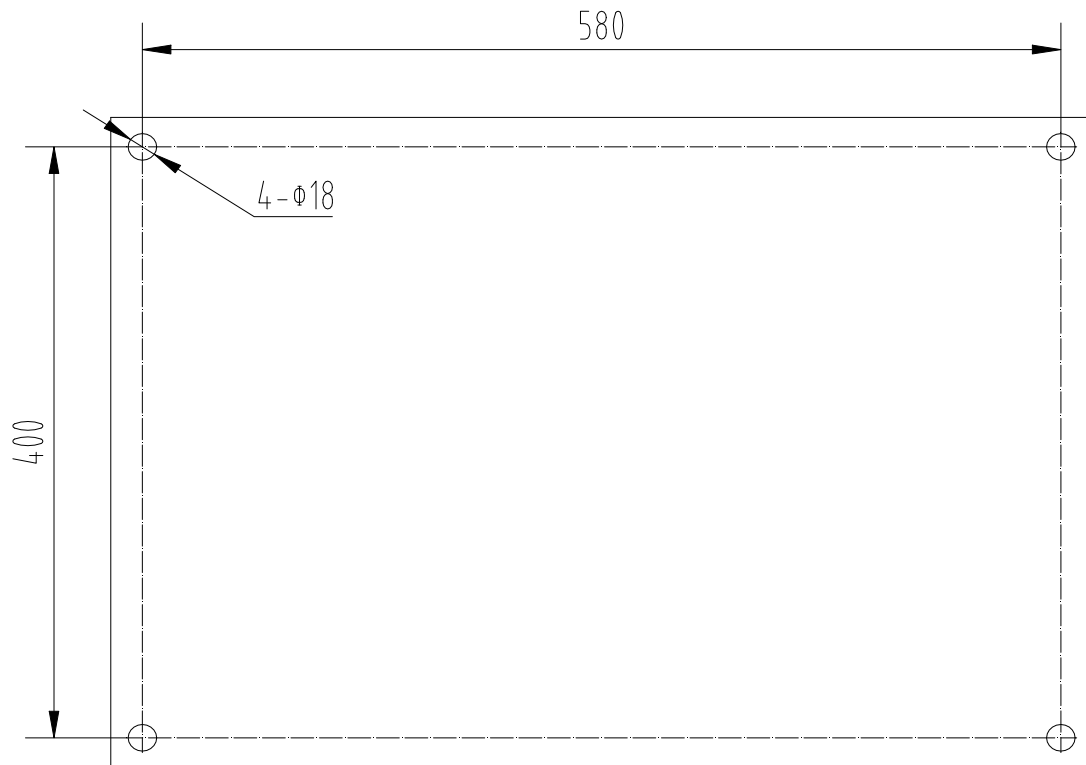
## VII. Leak check and overhaul

1. First close oil return valve (2) and Pull the fuel injector joints
2. Open the pressure control valve (3) until working pressure gauge (7) indicates up to 35~80MPa. Close the pressure control valve (3) .It is allowed for the indicator stabilizing in 5 minutes to drop 1MPa. If none of the pipe joint is found leakage, but the working pressure gauge (7) indicators are cannot stabilized, the oil return valve (2) and the sealing of input & output connectors at both ends of HP oil tank must be checked. Then check whether the oil return valve (2) is leaked. Close the pressure relief valve (2) under pressure and disconnect the return pipe of connecting oil tank of oil return valve (2) .If any leakage found in the oil tank, then the oil return valve (2) must be ground.
3. Check connectors of input end and output end. Dismantle two connectors to check, grind and remove sundries. If necessary, grind valve seat or renew steel balls.

## VIII. Lubrication instruction

The pump should be pre-lubricated by adding VG10 or VG15 hydraulic oil in airline before operation. Otherwise it will decrease the efficiency of the pump. All valves should be lubricated periodically. Apply a thin coat of grease on the active components and spools. If primary air driving parts dismantled, a thin coat of clean grease should be applied on the whole inner surface of cylinder and piston O-rings for protection and antirust.

## IX. Drawing for installation holes in test pump unit foundation.



## X. Digital Gauge Instruction

The digital gauge that can display OPENING PRESSURE and VENTING PRESSURE accurately with the pressure sensor made by Germany.

### Specification

1. Measuring ranges:

OPENING PRESSURE: 0—1400bar



VENTING PRESSURE: 0—1600bar

With the function of maximum value of measurements hold.

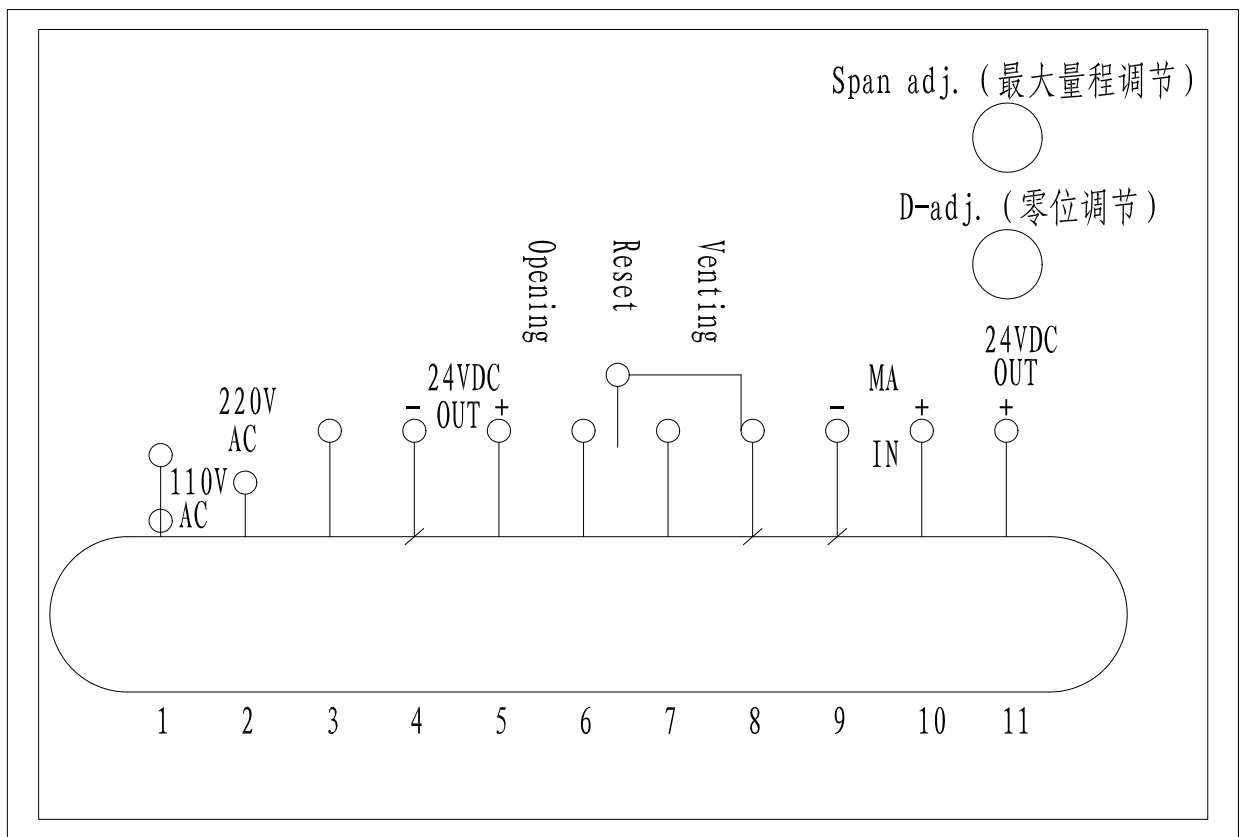
2. Accuracy: 1

3. Power Supply: 110VAC or 220VAC,  $\pm 20\%$ .

Wiring Diagram:

1	2	3	4	5	6	7	8	9	10	11
N	110V AC	220V AC	GND	+24V DC	OPENING PESSURE	VENTING PRESSURE	RESET	GND	Sensor (-)	Sensor (+)

N: Zero line.



Warning 1

Please contact accurately according to the wiring diagram.

## **XI. Failures and solution**

### **I. The pressure has not established:**

1. Check fixing screw of the fuel injector whether or not is compress tightly (nut).
2. Check the test oil whether or not is the hydraulic oil in accordance with the provisions of this manual (please use the specified oil ).
3. Check filter according to the prescribed cleaning time (replacement and cleaning oil filter).
4. Check the oil level whether or not is too low (increased testing oil).

### **II. The fuel valve Test pump unit does not work:**

1. Check the air pipeline connected with the machine (replacement joint and the air pipe).
2. Check the pressure regulating valve (3) and the Input air pressure gauge (6) whether there is pressure (replacement pressure regulating valve).

### **III. pressure leakage:**

1. Check the joints leakage within the machine (fixed joints).

2. Check the oil return valve leakage (repair the oil return valve or replace the oil return valve).
3. Check the oil flow of the high-pressure pump input and output (cleaning or replacing the input and output joint).

IV. The pressure gauge at zero pressure is not zero:

When the test pressure is released, adjusting the digital display rear "0-adj" button to return to zero. The numerical display increases when clockwise rotation. The numerical display decreases when counterclockwise rotation (if no response change pressure gauge and/or pressure sensor).

V. Digital instrument does not display:

1. Check the digital instrument power supply input terminal (1, 2 terminal is 110VAC; 1, 3 terminal is 220VAC. According to the choice of the set of input conditions on the ship, please consult the ship electrical engineers).
2. Check the input power, if there is electricity and no show you need to replace the digital instrument.

VI. Digital instrument displayed messy code:

Replace the pressure sensor, if still displayed messy code please replace the digital instrument.

## 一、使用说明

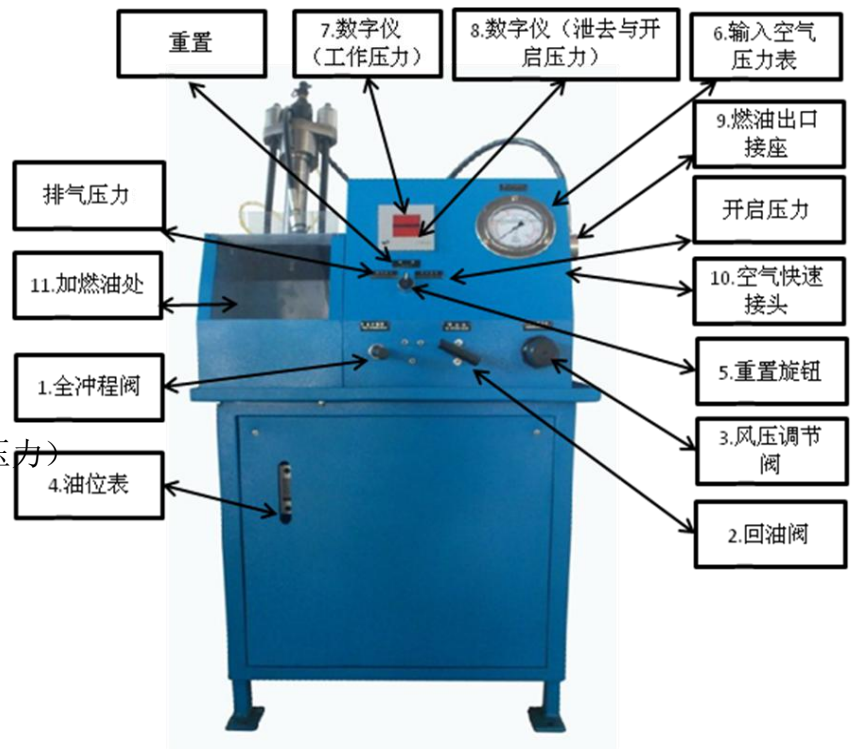
本产品具有功率大、体积小、结构紧凑、操作简便等优点，该试验装置主要用于现代大功率船用柴油机测量其喷油器喷雾状况，是大功率柴油机必备的检测工具。适用 B&W 低速柴油机 35-98 机

## 二、主要技术数据：

1. 输出压力：输入空气压力在 0.7MPa 时，输出压力为 80MPa。
2. 空气耗量：输入空气压力在 0.7MPa 时，空气耗量为 12L/每个循环。
3. 燃油流量：在输出压力下，输入空气压力为 0.4MPa 时，40mL/每个循环流量。
4. 泵速：输入空气压力为 0.4MPa 时，约 30 次/min（输出压力为 0）。
5. 油箱容积：8L。
6. 外形尺寸：700×450×1120mm
7. 重量（净）：77kg

## 三、外观图名称

1. 全冲程阀
2. 回油阀
3. 风压调节阀
4. 油位表
5. 重置旋钮
6. 输入空气压力表
7. 数字仪（工作压力）
8. 数字仪（泄去与开启压力）
9. 燃油出口接座
10. 空气快速接头
11. 加燃油处



## 四、使用前的准备

1. 通过加燃油处把 10# 或者 15# 液压油 (50℃时, 粘度 7—10cSt) 加入油箱, 在通气前必须按逆时针方向旋转回油阀 (2), 用来打开回油。按逆时针方向旋转风压调节阀 (3) 关闭空气。使用时只能缓慢顺时针调节风压调节阀 (3), 直到所需的空气压力。
2. 空气输入用软管引导到箱体右侧“空气进口”座 (10)。
3. 将喷油器安装在该装置左边的托架上, 把高压软管一端接在喷油器上, 另一端 G1/4"接在“喷油出口接座”(9)上, 喷油器须按照规定安装。至此, 喷油器方可投入试验。

## 五、HDP1100-D2 型喷油器试验台的使用

预试验准备 (对每一个插入的喷油嘴进行):

- 在进行任何试验之前, 该滑阀必须用试验油完全充满。
- 将按钮 (5) 置于重置位置上。
- 顺时针方向旋转调压阀 (3), 直到本喷油器试验台工作。
- 现在, 逆时针方向打开回油阀, 当没有气泡从从喷油器回油孔通过, 回油管冒出清洁的油时, 说明阀充满了。
- 逆时针方向旋转风压调节阀 (3), 关闭气源。

### A: 开启压力

- 1、将旋钮 (5) 置于重置位置。顺时针关闭回油阀 (2)
- 2、顺时针旋转调压阀 (3) 直到数字仪表 (8) 在 100bar 到 150bar 之间, 置旋钮 (5) 于开启压力位置。
- 3、顺时针旋转调压阀 (3) 缓慢增加压力直到油头开启。开启压力值显示在表 (8) 上, 泵自动停止工作。
- 4、逆时针旋转调压阀 (3) 断开气源, 逆时针旋转打开回油阀 (2)。

### B: 泄放功能

- 1、将旋钮 (5) 置于重置位置, 顺时针关闭回油阀 (2)
- 2、旋钮 (5) 置于排气压力的位置, 顺时针旋转调压阀 (3) 直到工作数字仪表 (8) 的压力  $\approx 150\text{bar}$  时, 逆时针旋转调压阀 (3) 断开气源, 数字

仪表（8）的压力显示值将缓慢下降，当油头的泄漏滑块打开时，表（8）上瞬间归零前显示的数值即为泄放压力。

3、逆时针旋转打开回油阀（2）。

#### C: 泄漏试验

1、将旋钮（5）置于重置位置，顺时针关闭回油阀（2）

2、将旋钮（5）置于开启压力位置，顺时针旋转调压阀（3）增加压力，直到数字仪（8）显示的压力低于开启压力 10-20bar, 从数字仪显示屏（8）读取数值，读取的数值应保持数分钟基本稳定。

3、逆时针旋转调压阀（3）断开气源，逆时针旋转打开回油阀（2）。

#### D: O 型圈环密封试验

1、将旋钮（5）置于重置位置，顺时针关闭回油阀（2），用螺栓闷牢喷油器回油孔

2、旋钮（5）置于排气位置，顺时针旋转调压阀（3），数字仪表（8） $\approx$  100bar 时，逆时针旋转调压阀（3）降低压力表（6）使读数为 0bar 。

3、从数字仪表（8）读出数值，显示的数值应保持数分钟基本稳定。

4、逆时针打开回油阀（2）

### 六. 维修与保养

1. 压缩空气系统必须安装可靠的汽水分离器。

2. 油槽内必须充满 VG10 或者 VG15（10#或者 15#）液压油。

3. 必须保证管线及接头清洁无泄漏。

4. 过滤器每月必须清洗一次。

5. 油箱内吸入式过滤器，在吸油量跟不上时，必须更换新的过滤器。

6. 气缸内活塞工作时如果发现排气中有泄漏现象时，必须及时更换高压油缸 Y 型密封圈。

7. 压力表必须反应灵敏可靠，否则必须进行检查、修理或者更换。

8. 如果压缩空气的压力达到 0.15MPa 而气缸仍然没有工作，则必须检查换向阀的间隙。标准间隙是公称尺寸+0.03/+0.01，否则及时更换 O 型圈。

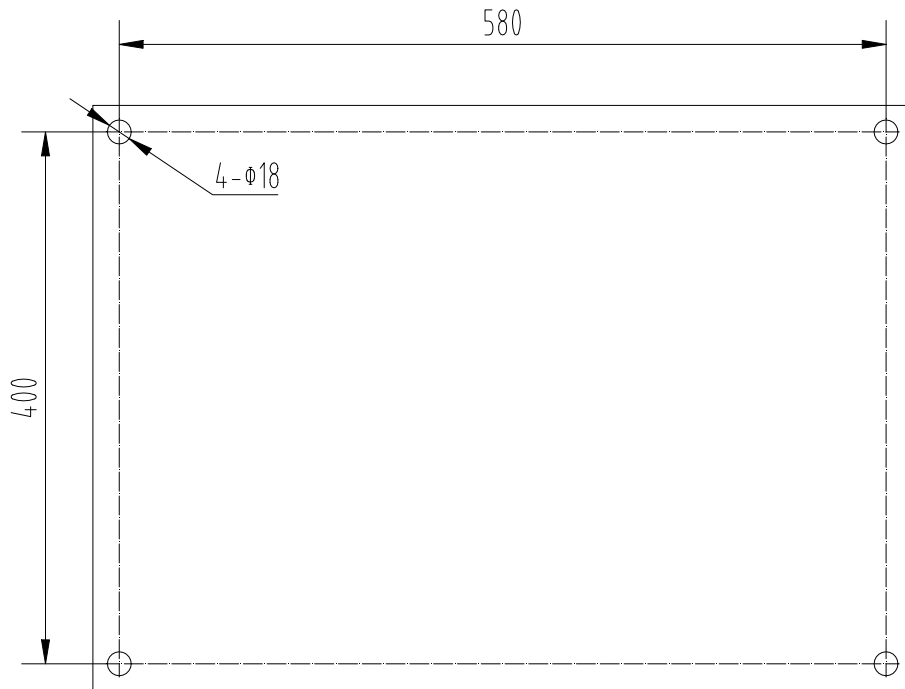
## 七、 泄漏的检查及修理

1. 首先关闭回油阀（2）。拔出喷油器相连接头。
2. 打开风压调节阀（3）。工作压力表(7)显示的数值上升到 350~800 bar 以上时，关闭调压阀（3）。工作压力表(7)显示的数值 5 分钟内相对稳定，允许下降 10bar 为正常。如果各管路接头未发现泄漏现象而工作压力表(7)显示的数值不能稳定则必须检查回油阀（2）、高压油缸两端的输入和输出接头的密封性。检查回油阀（2）有无泄漏，在无压力情况下关闭回油阀（2），拆开回油阀联通油箱的排油管，如果油管中有油滴漏，则须研磨回油阀。
3. 检查输入和输出接头，拆开两接头检查凡尔线，研磨或清除杂物，检查钢球情况，或者更换钢球。

## 八、 润滑说明

气缸使用前必须在机内空气管路加入适量的 10#或者 15#液压油予以先润滑。否则将使气缸工作效率降低。气阀应该经常润滑，在运动构件及阀芯上涂上一层薄润滑脂。如果空气驱动的主要零件拆卸后，装配时也要在气缸的整个内壁和活塞 O 型圈上涂上一层薄薄的清洁的润滑脂以保护剂防锈。

九、喷油台底座安装孔示意图：



十、关于数字显示器及传感器说明

测量量程：开启压力 0-1400bar

排放压力 0-160bar

精度等级：1

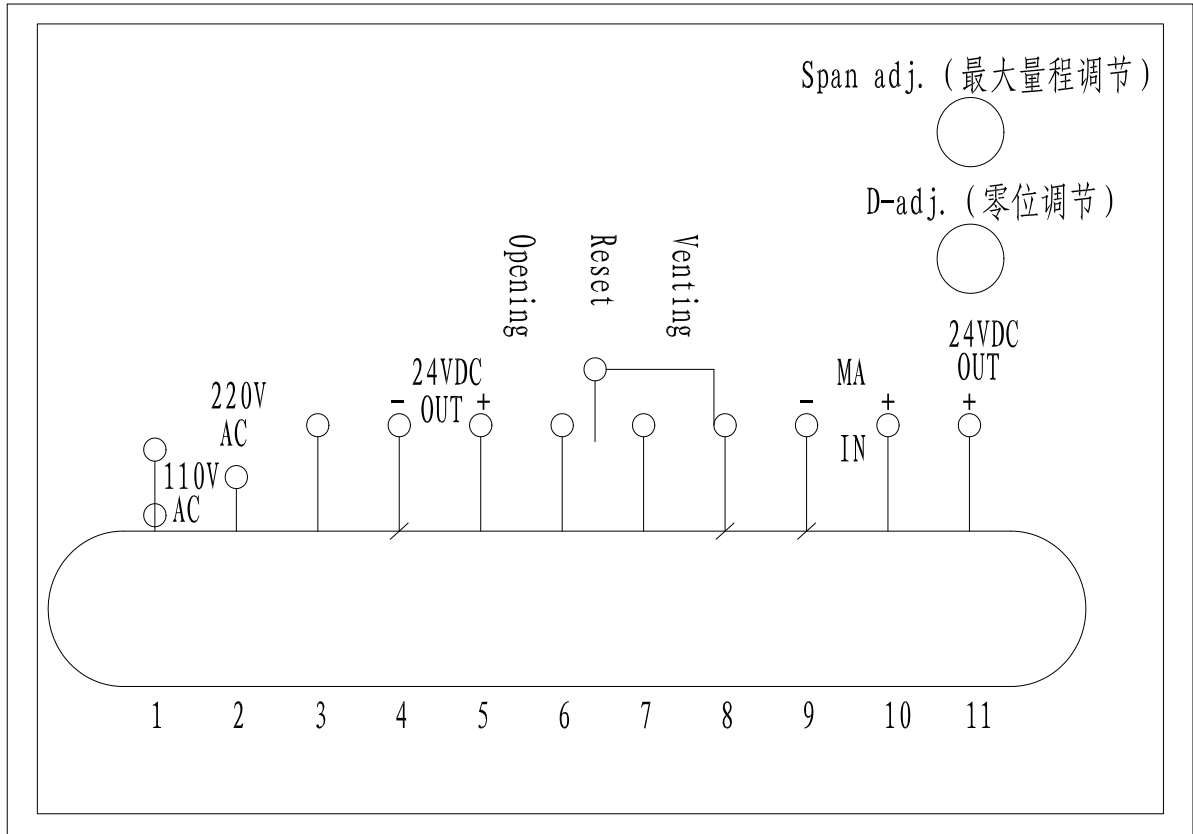
电 源： 110VAC 或 220VAC, ±20%。

数显表初始数据： -2 至 2 属正常现象

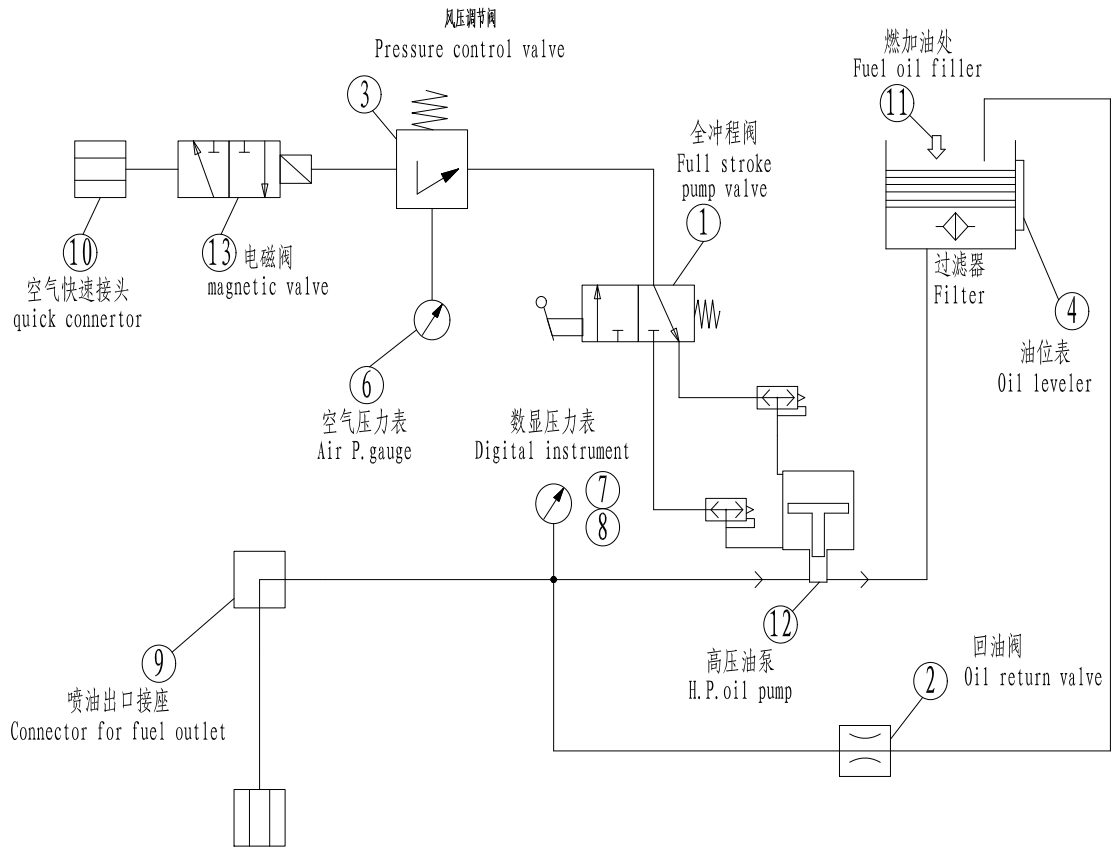
接线图：

1	2	3	4	5	6	7	8	9	10	11
N	110V AC	220V AC	GND	+24V DC	OPENING PESSURE	VENTING PRESSURE	RESET	GND	Sensor (-)	Sensor (+)

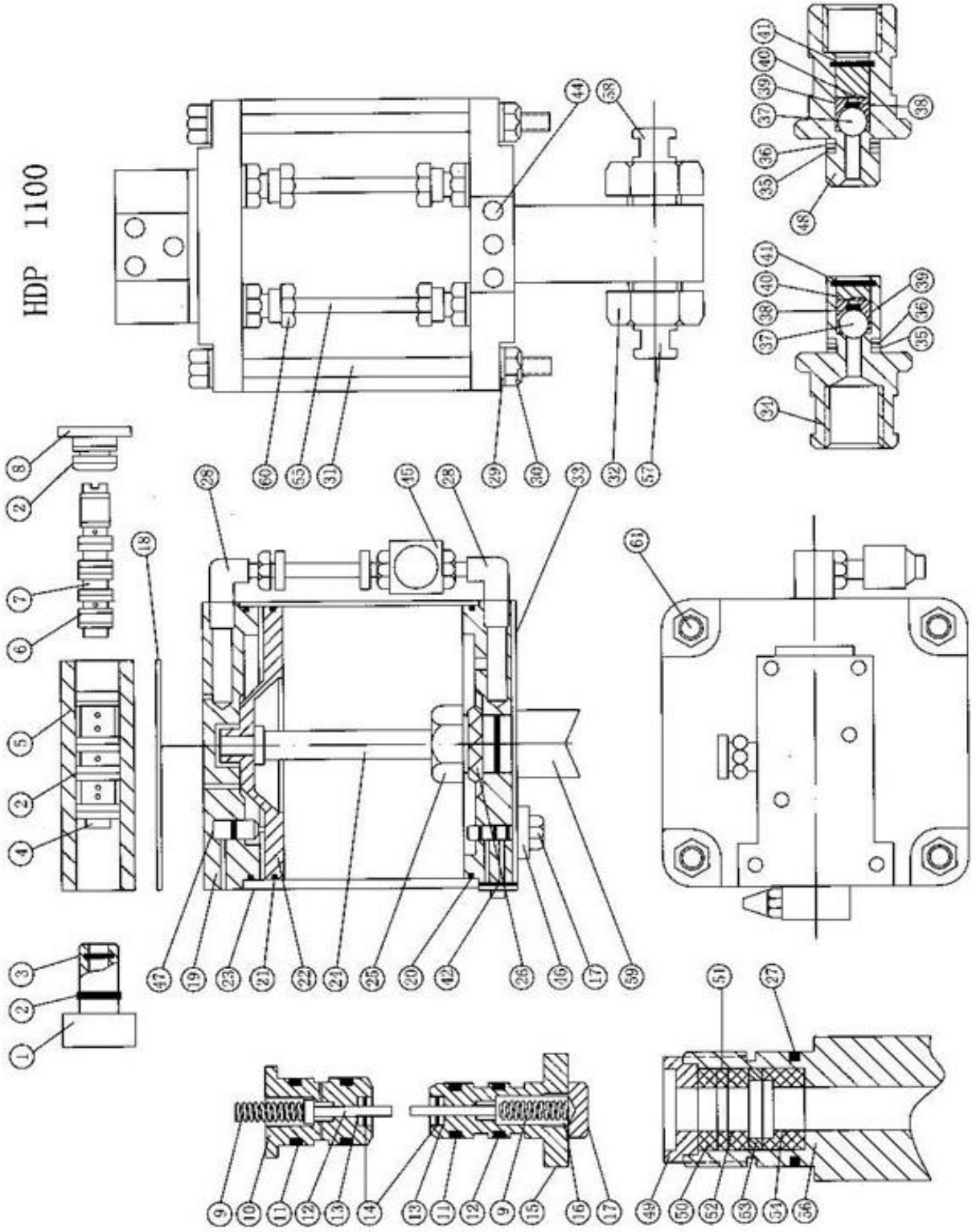




# Diagram



HDP 1100



订货号	名称	名称	图号	数量
Order No.	Name	Name	Specification	QTY
1	Plug	气控阀前端板	HDP-4-1	1
2	O-ring	O 型圈	D30.1x1.8	7
3	O-ring	O 型圈	D18.6x1.8	1
4	Sleeve	衬套	HDP-4-5	1
5	Valve seat	气控阀座	HDP-4-4	1
6	O-ring	O 型圈	D22x1.5	8
7	Spool	阀芯	HDP-4-6	1
8	Plug	气控阀后端盖	HDP-4-2	1
9	Spring	弹簧	Φ8.1xΦ1x31	2
10	Valve body	上限位阀座	HDP-3-4	1
11	O-ring	O 型圈	D18x1.9	5
12	Valve	上、下限位阀	HDP-2-3-18	各 1
13	O-ring	O 型圈	D7x1.9	2
14	Washer	内挡圈	Φ10	2
15	Valve body	下限位阀座	HDP-3-18	1
16	O-ring	O 型圈	D12x1.9	1
17	Plug	螺塞	HDP-3-17	1
18	Seal	密封垫	HDP-4-8	1
19	Top cap	气缸上盖	HDP-3-1	1
20	O-ring	O 型圈	D200x3.1	2
21	O-ring	O 型圈	D200x5.7	1
22	Air piston	气活塞	HDP-3-6	1
23	Cylinder tube	气缸	HDP-3-19	1
24	Piston	活塞	HDP-3-5	1
25	Gland nut	上螺母	HDP-2-9	1
26	Nut	扁螺母	HDP-2-14	1
27	O-ring	O 型圈	D45.8x3.55	1
28	Fitting	接头	HDP-3-8	2
29	Washer	垫圈	Φ12	12
30	Nut	六角螺母	M12	12
31	Pin bolt	双头螺栓	HDP-3-9	2
32	Gland nut	螺母	HDP-2-3	2
33	Bottom cap	气缸下盖	HDP-3-16	1
34	Fitting inlet	进油接头体	HDP-2-1	1
35	O-ring	O 型圈	D20x2.4	4

36	Ball	钢球	Φ 1/2 "	2
37	Spring	弹簧	Φ 8x0.3x12	2
38	Retainer	单向阀座	HDP-2-4	2
39	Spring	弹簧	Φ 16.9x Φ 1.2x14.5	2
40	Washer	孔用弹性挡圈	Φ 17	2
41	Seal	密封垫	HDP-3-12	1
42	Plug	盖板	HDP-3-11	1
43	Screw	内六角螺钉	M5x16	3
44	Silencer	单向消音器	HDP-2-23-0	1
45	Pilot valve assy.	下限阀	HDP-3-18-0	1
46	Pilot valve assy.	上限阀	HDP-3-4-0	1
47	Fitting inlet	出油阀体	HDP-2-17	1
48	Bearing	封圈	HDP-2-8	1
49	Spacer	调整轴套	HDP-2-10	1
50	Back-up ring	垫圈	HDP-2-11	1
51	Seal	V 型圈	UN20x30x8	1
52	Support ring	支撑环	HDP-2-13	2
53	Bearing	下导套	HDP-2-15	1
54	Air tube	空气导管	HDP-3-13	1
55	Cylinder head	高压油缸体	HDP-2-7	1
56	Inlet valve assy.	进油阀	HDP-2-1-0	1
57	Outlet valve assy.	出油阀	HDP-2-17-0	1
58	High pressure oil pump	高压油泵	HDP-2-0	1
59	Fitting	接头	G1/8 "	4

# 常见故障与排除

## （一）、压力建立不起：

- 1、检查喷油器固定螺杆的螺母是否压紧（压紧螺母）。
- 2、检查试验用油是否符合本说明书规定的液压用油（更换规定用油）。
- 3、检查过滤器是否按规定时间清洗（更换和清洗滤油器）。
- 4、检查油箱的油位是否过低（增加试验用油）。

## （二）、试验台不工作：

- 1、检查连接试验台的空气管路是否畅通（更换接头和气管）。
- 2、检查风压调节阀（3）和输入空气表（6）是否有气压（更换风压调节阀）。

## （三）、压力泄漏：

- 1、检查试验台内部各接头是否有渗漏现象（拧紧接头）。
- 2、检查回油阀是否渗漏（研磨回油阀杆、更换回油阀）。
- 3、检查高压油泵输入和输出接头是否有回油现象（拆开两接头清洗或更换两进出接头）。

## （四）、压力表在零压力时不归零：

在试验台压力完全释放后，调节数显表后部“0-adj”旋钮使之归零。顺时针方向增大，逆时针方向减小。（如无反应调换压力表和压力传感器）。

## （五）、数显表不显示：

- 1、检查数显表电源输入端（1、2端为110VAC；1、3端为220VAC。根据船上情况选择那组输入，请咨询船上电气工程师）。
- 2、检查输入端是否有电，如有电的情况下不显示（更换数显表。）

## （六）、数显表乱码：

更换压力传感器如仍为乱码请更换数显表。