前 言 Foreword

感谢您选用“LNTECH（莱恩）”牌冲床模具下死点检知器！
Thanks for choosing "LNTECH" Brand Punch Mold Bottom Dead Point Detector!

本说明书中仅使用“下死点检知器”作为冲床模具下死点检知器的简称。
Only use "Bottom Dead Point Detector" in the Manul for short(hereinafter called ‘B.D.C Detector’).

下死点检知器适用于精密五金冲压加工(精密端子等)，针对高速自动冲压过程中产品压伤、材料厚度异常、冲件重叠等难以目视侦测的不良情况加以精确检测并适时停机，有效的保护模具，提高产品质量和产量，弥补人为疏失，降低不良率，实现高品质自动化检测。

B.D.C detector is fit for use in Precision hardware stamping processing(precision terminal), to prevent the crush damage and detect the material abnormal thickness and overlaid during the high-speed automatic punching process meanwhile break the stroke at right time, protect the mold effectively, improve the product's quality and output, make up for the personal oversight, reduce the defective rate, bring about the high quality&automation detection.

如果其安装位置不正确，或不按说明书与相关安全作业条例操作，或冲床执行机构故障，都可能使其无法起到检测作用。因此，安装下死点检知器之前，请仔细阅读说明书，充分理解有关事项，尤其是说明书中标出的“警告”、“注意”等内容；在使用过程中，请正确理解下死点检知器的工作性能，严格按照本说明书所提出的要求，制定相应的安全作业条例。

It is unable to exert the protective function if the installation is incorrect or the operation don’t follow this manual and ordinance related to the safe operation or the execution of the machine have faults. Please read this manual carefully and fully apprehend its contents in particular apprehend about the items stressed as "warning", "attention" and so on ,before installation and use the protector.In operating, please understand correctly and fully the operating performance about the protector, operate strictly according to the requests proposed in this manual, and stipulate relevant security working rule.

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The contents of this instruction manual are explained by Shandong Laien Optic-electronic Technology Limited Company, if you have any unclear items, please contact us.

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the contents of this instruction manual may be changed without prior notice for further improvement of the product.

3） 本使用说明书虽经精心制作，但如果您发现有不明之处或异常时，请通知本公司。
Though we have carefully drawn up the contents of this instruction manual, if there are any aspects that are not clear, or any error that you may notice, please contact us.

LNTECH

目 录 Catalogue

1.基本介绍 Basic Introduction

1.1 用途 Usage

⑴ 下死点检知器主要用于检测产品压伤、材料厚度异常、冲件重叠等不良情况的发生。
The B.D.C Detector is used for the detecting crush damage, abnormal thickness, overlaid material and so on.

⑵ 适用于精密五金冲压加工(精密端子等)，广泛应用于各种连续及单冲模冲床等设备，能全方位多角度对模具进行保护，提高工作效率及产品质量，降低生产成本，提高市场竞争力。
Fit for high precision hardware punching process (precision terminal etc.), widely used in the punch with diversified successive and single stroke, can protect thoroughly the mold at multi-angle, improve working efficiency and quality, reduce production cost, increase the market competition.

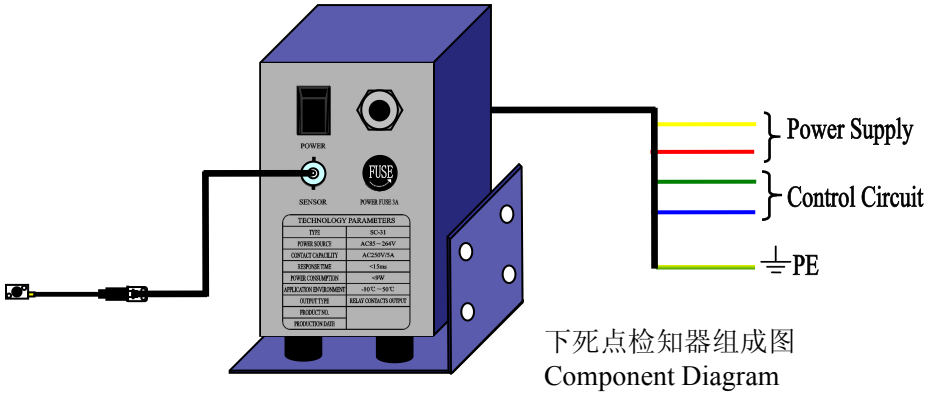
1.2 特点 Features

- 接线简单，易于操作 Simple wiring, ease of operation
  按键设置简单，显示一目了然，极易操作。
  Simple Button Setting, clear at a glance, easy operation.
- 抗振性能好 Anti-vibration
  元器件焊接采用 SMD 技术，并有多项抗震措施。
  By adoption of SMD soldering tech, several means of anti-vibration.
- 使用寿命长，可靠性高 Long-lasting, high reliability
  继电器触点输出，继电器寿命大于 200 万次（寿命达到，可更换）。
  Safety relay contacts output, relay life more than 2,000,000 times (replaceable once expired).
- 抗干扰能力强 Perfect anti-interference
  装置对电磁信号等具有良好的抗干扰能力。
  Good anti-interference to electromagnetism signal etc.
- 精度高 High Precision
  检测精度最小能够达到 1μm。Min. Detection Precision is up to 1um.
- 具有自锁功能 Self-locking function
  模具检出装置检出异常，向压力机输出断开信号，压力机滑块立即停止，当异常排除后，压力机滑块不能自动恢复运行，只有按动复位开关，装置向压力机输出接通信号后，压力机滑块才能够再次运行。
  When the abnormality is detected, the device sends stop signal to brake the press slide, after the fault is removed, the press slide can't move again until press the reset button while the device sends the connection signal to press.
- 前次值比较 Last Time Value Comparison
  监视前次下死点值与当前下死点值并将其进行对比。通过前次值比较可以忽略传感器环境特性的误差，进而检测出冲床的废料上跳，使冲床停止运作。
  It monitors bottom dead point value by comparing the last bottom dead point value with present value. The error of the sensor environmental characteristic can be disregarded by this method. It will stop a press machine when it detects slug coming up during press stamping is performed.

1.3 组成 Constitute

下死点检知器由主机、感应器、感应器固定座、感应体、信号线缆等组成(如下图)。

The B.D.C detector consists of host machine, inductor, inductor stand, induction body, cable signal etc (as below diagram).



下死点检知器组成图
Component Diagram

1.4 技术参数 Technical Parameter

SC-31/ SC-32			
工作电源 Power Supply	AC85～264V	使用温度 Cir. Temperature	-10℃～50℃
功耗 Power Consumption	<9W	环境湿度 Humidity	20℃，RH≤85%
输出类型 Output	继电器触点输出 Relay Contacts	装置外壳 Housing	钢板 Steel
输出触点容量 Output Contacts Capacity	AC250V/5A（COSΦ=0.3）	主机尺寸 Host Machine Dimension	180L*71W*110H(SC-31) 180L*88W*110H(SC-32)
继电器寿命 Relay Life	AC250V/3A（COSΦ=0.3）， 2,000,000 times	感应器尺寸 Inductor Dimension	30L*20W*8H

1.5 标准配置 Standard Configuration

（SC-31）		（SC-32）	
描述：一台主机，一个检测点 Description: a host and a check point		描述：一台主机，两个检测点 Description: a host, two testing point	
标准配置名称 Product	数量 Quantity	标准配置名称 Product	数量 Quantity
主机 Host Machine	1 台 1pc	主机 Host Machine	1 台 1pc
感应器 Inductor	1 件 1pc	感应器 Inductor	2 件 2pc
感应器固定座 Fixed stand for Inductor	1 件 1pc	感应器固定座 Fixed stand for Inductor	2 件 2pc
感应体 Induction Body	1 件 1pc	感应体 Induction Body	2 件 2pc
信号线缆 Signal Cable	1 条 1pc	信号线缆 Signal Cable	2 条 2pc

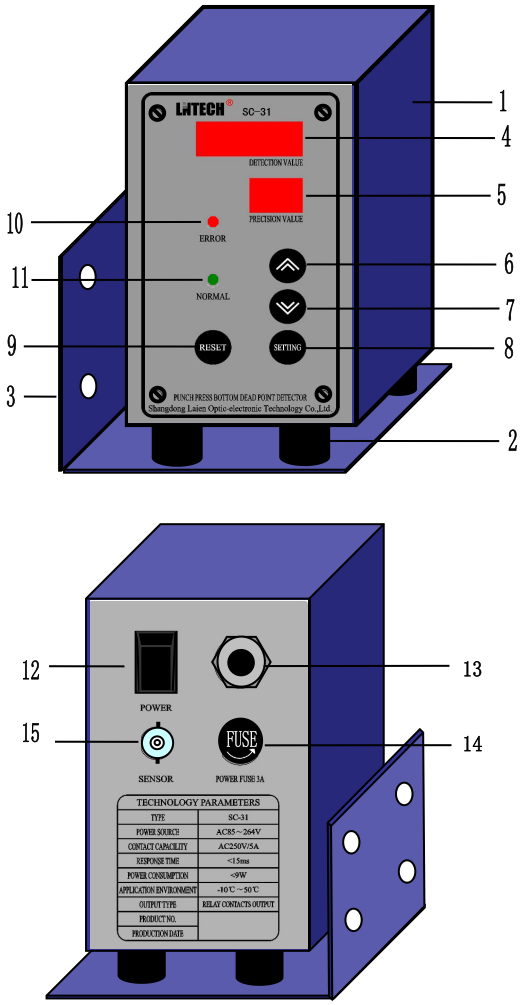
2 装置的主要部件 Main Parts

2.1 主机 Host Machine

下死点检知器主机主要用于为感应器提供电源并处理信号，利用继电器输出闭合、断开信号，通过控制线缆与冲床的行程控制回路连接，或与其他设备的安全保护电路连接，达到保护模具安全的目的。

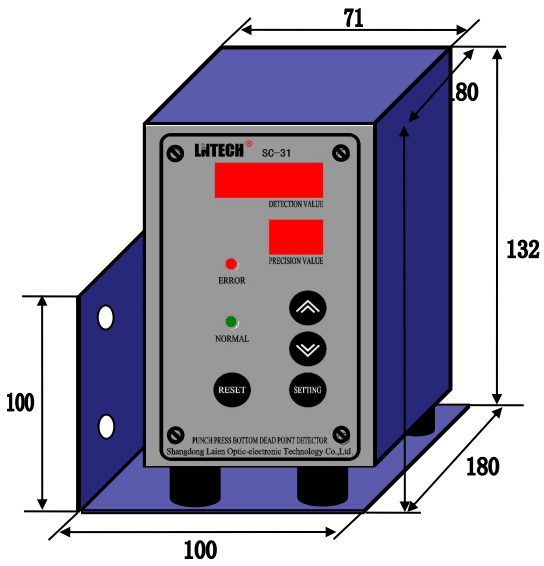
The host machine is used for power supply and signal processing, output the "Close" and "Open" signal by safety relay, through the connection between the control cable and stroke control circuit in punch, or the protection circuit in other equipments, to protect the mold.

2.1.1 各部件名称 Parts Name

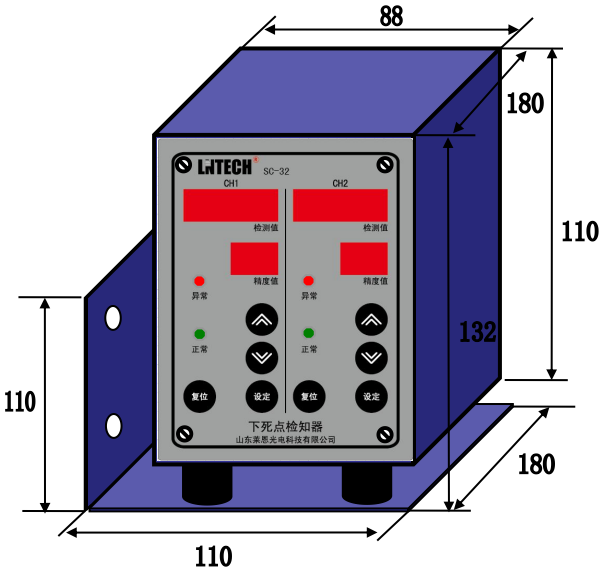


1. 下死点检知器外壳 Housing
2. 减震器 Shock Absorber
3. 下死点检知器托板 Tray
4. 检测值显示器 Detection Value Display
5. 精度值显示器 Precision Value Display
6. 向上键 Up Button
7. 向下键 Down Button
8. 设定键 Setting Button
9. 复位键 Reset Button
10. 异常指示灯 Fault Indicator
11. 正常指示灯 Normal Indicator
12. 电源开关 Power Switch
13. 控制线缆接头 Control Cable Port
14. 电源保险 Power Fuse
15. 感应器接头 Inductor Connector

2.1.2 部件外形尺寸（单位：㎜）Parts Dimension (Unit: mm)



SC-31

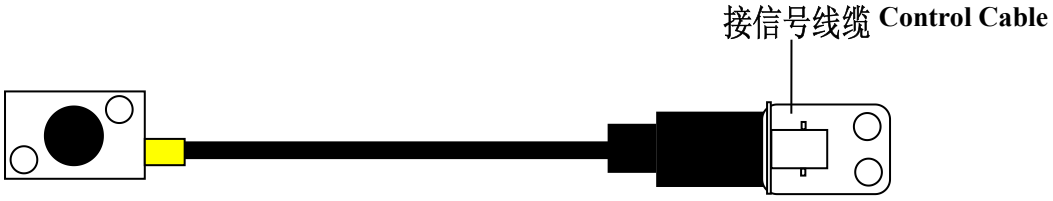


SC-32

2.2 感应器、感应体及固定座 Inductor, Induction Body and Fixed Stand

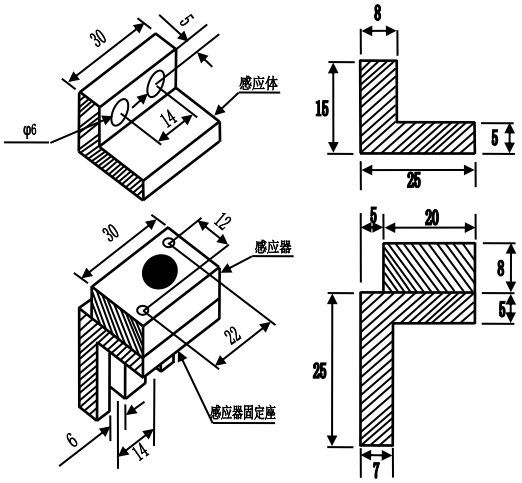
与感应体靠近时，感应器产生检测信号，然后该信号输入到下死点检知器主机进行处理。

When the induction body approaching, inductor generates detection distance signal, then send the signal to host machine to process the same.



感应器、感应体及固定座尺寸（单位 mm）

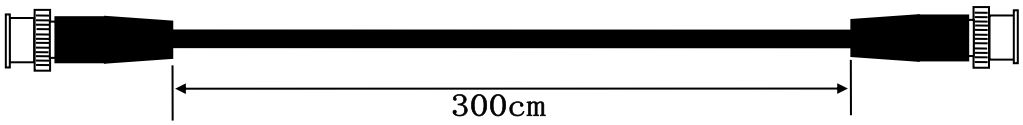
Sensor inductor and a fixed block size (Unit: mm)



2.3 其它部件 Other Parts

2.3.1 信号线缆 Signal Cable

用于连接下死点检知器主机与感应器。It is used to connect the host machine and inductor.



3.安装 Mounting

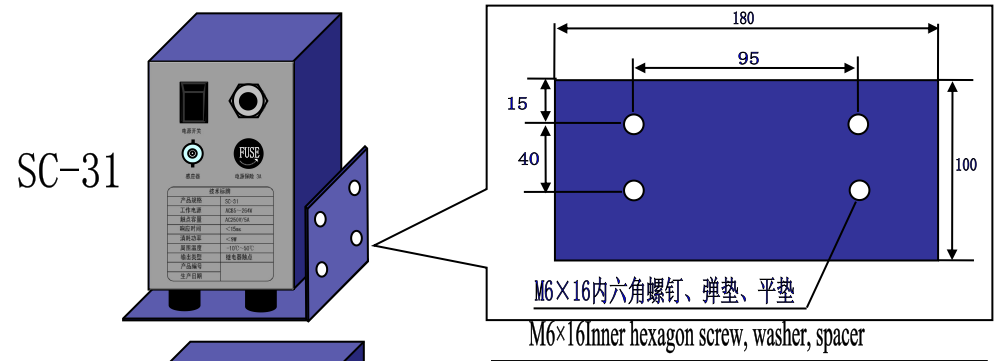
⚠ 注意

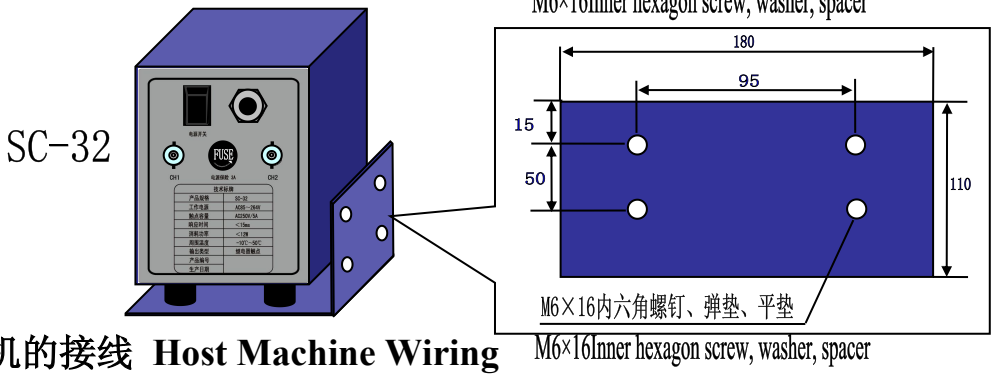
安装前，请按照装箱清单核对装箱器件！
开始安装时，要关闭冲床电源，避免发生危险！
Before installation，please check over the components as the packing list.
Make sure of punch power off before installation to prevent the electric shock.

3.1 主机的安装 Host Machine Mounting

根据下死点检知器的外形尺寸在床壁上选择合适的位置（防止碰撞，便于操作，易于维护），按下图进行安装（单位：mm）：

To find the proper position to mount the host machine as per the machine dimension (anti-collision, ease of operation and maintenance), please refer to below diagram (Unit: mm):

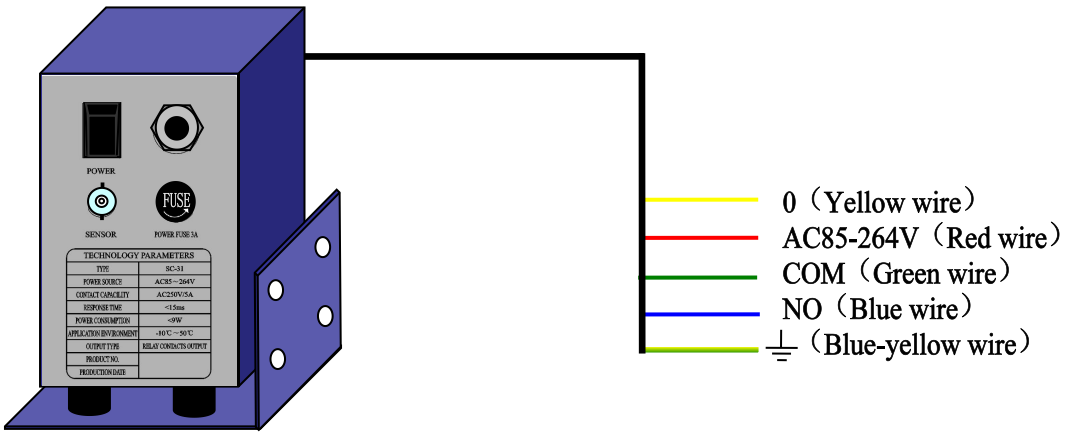




3.2 主机的接线 Host Machine Wiring

警告

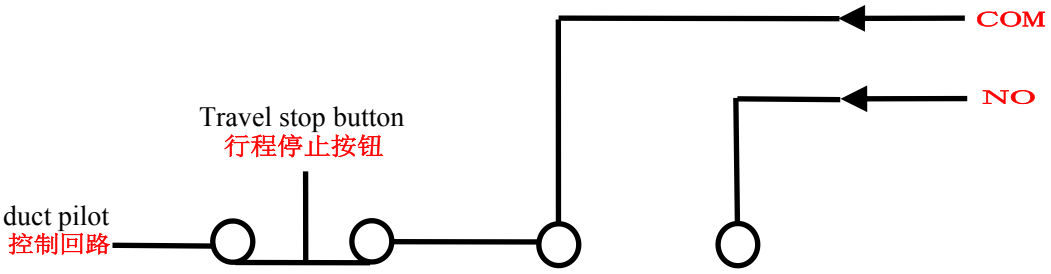
为避免发生危险，接线前，必须关掉冲床电源，严格按照接线图接线！
下死点检知器的内部线路不允许改造！
Must make sure punch power off before wiring to prevent the danger, strictly according to the wiring chart!
Not allowed to any change in the inner circuit!



控制线缆为 5 芯线，分别为：黄（0）、红(VCC)、蓝（NO）、绿（COM）、黄绿线（⏚）。
Control cable is 5 core wire: yellow(0), red(VCC), blue(NO), green(COM), yellow-green(⏚).

(1) 黄、红线为电源线，接 AC85～264V，此装置为自动变压。**注：应按标示接入电源，切勿接错。**
Yellow、red wire connected with the power: AC85～264V, automatic transformation in device.
Mark: need connect properly power as indication, ensure never wrong connection.

(2) 绿、蓝线为常开输出接点：COM（绿色线）和 NO（蓝色线）应按下图所示的连接方式接入冲床行程停止控制回路中。工作时，COM、NO 闭合，冲床正常运行，异常时，COM、NO 断开，冲床停止。
Green, blue wire is the N/O output contact: COM(green) and NO(blue) should be connected with punch stroke braking control circuit strictly as below drawing. Under working, COM, NO is closed, punch runs normally, COM,NO is open against faults detected, punch stops run.



(3) 黄绿色线为地线，应与冲床的电气接地点牢固连接。

Yellow-green wire is the PE, should have good connection with Punch Grounding.

⚠ 警告

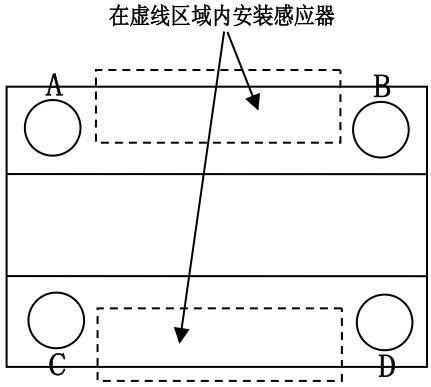
1. 接地线必须良好接入冲床的电气接地点！
   Must have good connection with punch grounding！
2. 安装电源时，必须检查冲床所使用的电压是否与装置的输入电压相符（AC85～264V）！
   Required to check the volt supplied to punch if the same or not as the detector's input volt （AC85～264V）!

3.3 感应器、感应体及固定座的安装 Inductor, Induction Body and Stand Mounting

⚠ 注意

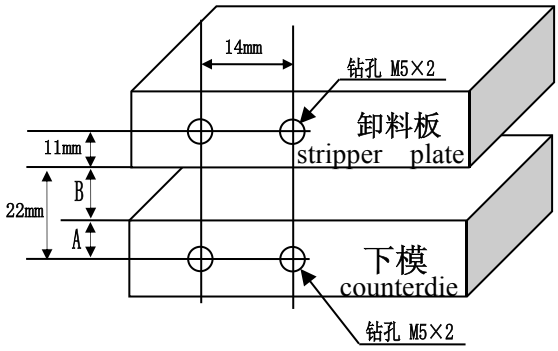
主机安装接线完成后，应做详细检查，确保接线正确。检查无误，方可对感应器进行安装调试！
You should have a detailed check after finish the host machine mounting and wiring to make sure of wiring is no problem. Then to mount and adjust the inductor!

The installation of sensors in the area of the dotted line



如上图，将感应器安装在下模具距柱 ABCD 内侧任一点，安装有如下两种方法：
Pictured above, install the sensors from the lower mold column ABCD medial point, installation has the following two ways：

① 使用感应体及感应器固定座按下图对感应器进行安装。
Use of inductor and sensor fixed according to the plans for installation of sensors.



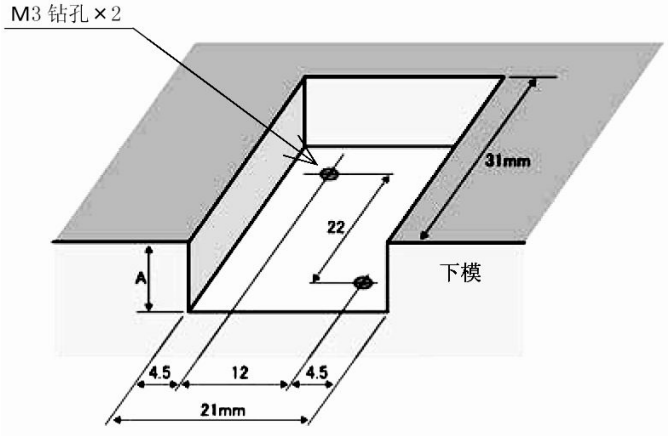
在上图所示尺寸上钻孔。A=（22－B）mm
In the picture above dimensions on drilling .A = (22- B) mm

B 为冲床放入材料后卸料板与下模之间的距离，紧密结合时 B = 0 mm。
B to punch into the material after the distance between the stripper plate and the lower die, B = 0 mm when together.

② 在模具上嵌入感应器。
Sensors embedded in the mold.

此方法将卸料板作为感应器，并在模具内留出空间安装感应器。
This method will be stripper plate as sensors and make room to install sensors in the mold.

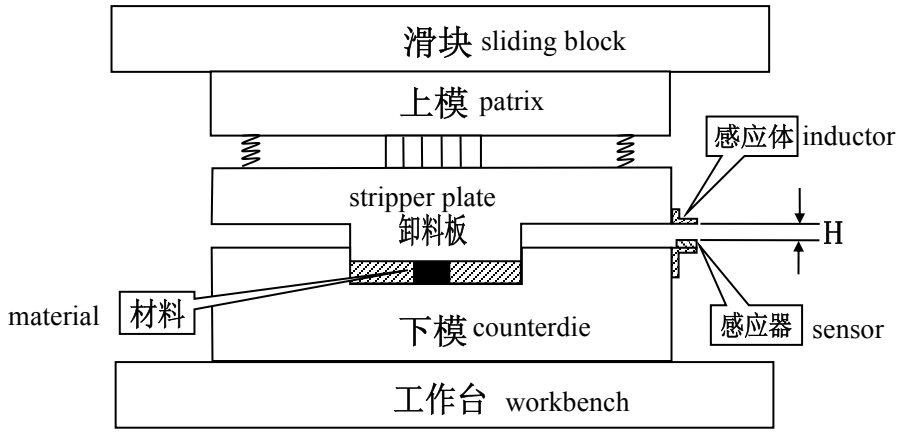
A=(9-B) mm，此时 B 为冲床卸料板与下模之间的距离，其中 9mm 包括感应器的厚度 8mm、感应器与卸料板间隔 1.0mm。
A = (9 - B) mm, B for punch at this time the distance between the stripper plate and the lower die, the thickness of the 9 mm including sensor 8 mm sensor and stripper plate spacing of 1.0 mm.



⚠ 注意

1. 调节感应器前模具里请先装入材料。
   Please load material in the mold before adjusting the inductor.
2. 感应器应安装在适当位置（装在不容易产生跳屑的位置最佳），以便调整检测距离 H 及拆卸感应器或感应体。
   Should mount the inductor in the right position(not affected by the slug),in order to adjust the detection distance(H) and detach inductor or induction body.
3. 感应体装在冲床脱料板上，感应器装在下模板，注意位置水平。
   Fix the induction body onto punch stripper plate, inductor onto the bottom mold in horizontal.
4. 感应器与感应体应安装在同一条垂直线上。
   Keep the inductor and induction body fixed in the same vertical line.

3.4 感应器的设定 The sensor set



H 即为检测距离

H: Detection Distance

① 感应器、感应体安装完成后，将感应器通过信号线连接到主机，并确定连接牢固。
Sensor and inductor after the installation is complete, the sensor through signal lines connected to the host, and determined the connection is firm.

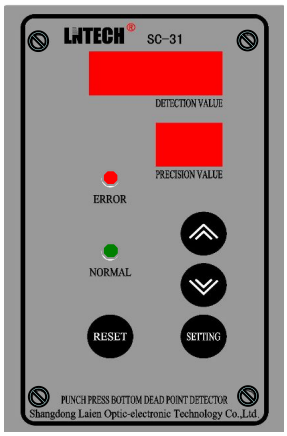
② 打开电源开关使装置上电，装置预热后按下“设定”键进入“感应器设定模式”，此时“精度值”数值闪动。
Device open the power switch to on electricity, press set button to enter after preheating inductor setting model, numerical accuracy value flashing at this time.

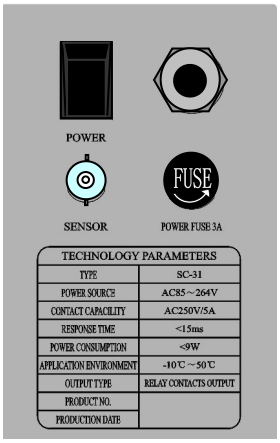
③ 将冲床运行至下死点位置（冲床内含材料），并调整感应器与感应体之间的距离“H”，使 H=0.8mm-1.2mm（理想值为 0.9mm-1.1mm），“检测值”数值显示为 400-600（理想值为 450-550）。调整完成后紧固感应器固定座，并将冲床运行到上死点。
Will press run (punch containing materials) to bottom dead center position, and adjust the distance between the sensor and the inductor H, make H = 0.8 mm to 1.2 mm (ideal value of 0.9 mm to 0.9 mm), numerical display values for 400-600 (ideal value of 450-550).
Adjustment after the completion of the clamp sensor fixed, and will press run to the top dead center.

④ 安装确认。再次将冲床运行到下死点位置，并确认“检测值”数值显示在 400-600 范围内。
Installation qualification will punch to run to the bottom dead center position again, and confirm the numerical display values in the range of 400-600.

⑤ 感应器设定结束，按下“设定”键返回到装置工作状态。
Sensor set to end, press set button to return to the device working condition.

4 使用 Operation





4.1 面板说明 Interface Instruction

1.指示灯 Indicators

1)正常指示灯：绿灯，工作正常时亮，此时继电器吸合；异常时不亮，此时继电器断开。
Normal Indicator: Green, light on when runs normally, relay close(contacts pull-in); light off when abnormal, relay open(off-contact).

2) 异常指示灯：红灯，工作异常时亮，此时继电器断开，正常时不亮，此时继电器吸合。
Abnormal Indicator: Red, light on when abnormal, relay open(off-contact),is not on when runs normally, relay close(contacts pull-in).

2.按键 Press Button

1) 设定键：用于转换工作状态。
Setting Button: to shift the working status.

2) 向上键：用来调整精度值的增大。
Up Button: to increase precision value.

3) 向下键：用来调整精度值的减小。
Down Button: to reduce precision value.

4) 复位键：冲床异常后按此键可恢复正常工作。
Reset Button: to restart the punch to move only after press the button when punch stops as the fault detected.

3.显示 Display

1) 检测值：对冲床上下模（或感应器和感应体）之间距离的显示。
Detection Value: display the distance between punch's upper and bottom mold(inductor and induction body).

2) 精度值：根据所需精度，显示所设定的误差大小。
Precision Value: according to the precision required to set the tolerance.

4.2 操作 Operation

⚠ 注意

使用之前，请使装置开机预热,以便达到稳定状态。
Please warm up the detector after power on before use the device.

1. 本装置上电，此时装置进入工作状态。
   Power on, then the device into the working state.
2. 使用向上键和向下键对精度值进行设定。“精度值”数值显示范围为 00-99，用户可根据实际需要的精度进行调整。
   Use the up and down keys to precision value for setting precision numerical display range of 00-99, the user may be adjusted according to the actual need of precision.
3. 按“复位”键。指示灯显示为绿灯亮、红灯灭。
   Press reset key indicator display for the green on the red off.
4. 运行冲床。
   Run the punch.
5. 当检出异常时，本装置将向冲床输出停止信号，指示灯显示为绿灯灭，红灯亮。待用户排除故障后，再返回至第 3 部操作。
   When abnormal detection, this device will stop to punch output signal, the indicator light display for the green light, red light after being user troubleshooting, and back to the third operation.

注意：在冲床正常工作过程中，不允许调整感应器与感应体的位置。
在冲床正常工作过程中，不允许对装置进行操作。

Note: in the process of punch work, are not allowed to adjust the sensor and the position of the inductor.

5.检查与保养 Check and Maintenance

5.1 使用注意事项 Notes

- 每次使用之前必须检查下死点检知器对冲床的控制是否正常，步骤参照操作中所述。
  Before put into operation check if the device controls the press normally,refer to the Debugging---Operation.
- 使用过程中不得随意变动感应器、感应体的位置。
  During operation, do not change the position of inductor, induction body.
- 当出现故障时，应由专业人员维修。
  When a malfunction happened, only professional technicians are allowed for repairing.
- 拆装下死点检知器及线缆时，应先关掉电源，由专业人员操作。Before uninstalling device and wire cables, must turn off the power first .It is operated only by professional technicians.
- 使用过程中，注意不要让工件、工具、废料等碰撞下死点检知器。
  During operation, do not let work pieces, tools or waste matters hit the protector.
- 使用下死点检知器，每次异常致冲床滑块停止后，待冲床排除故障后，必须按一下复位按钮，冲床才能再次运行。
  When a device with a reset button is applied, the slide of press stops at once every time when fault detected; only by pressing reset button , the slide could move downward (or press re-start).

5.2 检查与保养 Check and Maintenance

下死点检知器的检查和保养对保证安全作业是非常重要的，为了充分有效地使用下死点检知器，应当对其进行定期检查和保养。具体检查和保养要求见下表：

It is important to check and make maintenance for the detector so as to ensure operator’s safety. Periodical check and maintenance shall be made. A detail for check and maintenance is showed as below Form

项目 Item	内　容 Content	方　法 Method	实施周期 Period
检查 Check	感应器的检查 Inductor Check	检查并确认感应器运行正常 Check and Ensure of inductor runs normally	半个月 Half Month
	信号线缆的检查 Signal Cable Check	确认信号线缆连接良好 Ensure of good connection	1 个月 One Month
	紧固件的检查 Fasteners Check	检查并确认全部紧固件连接牢固 Check and ensure of fasteners fixed well	6 个月 six month

保养 Maintenance	紧固件的紧固 Fixed Fasteners	将松动的螺丝拧紧 fix the loose screw	根据情况 as actual condition
	除进行定期检查外，作业开始前仍需要检查 Besides routine check, also need the same check before work		

6 故障检查与排除 Troubleshooting

故障现象 Fault Phenomenon	故障原因 Reason	解决方法 Solution
下死点检知器不工作，各指示灯均不亮 The detector does not work, all indicators light off	无电源电压 No power	检查电源及接线，提供正确电源 Check power and wiring, provide proper power source
	电源保险管断路 Power fuse melt	更换同等规格保险管，故障排除后自动恢复 Replace the same fuse, will recover once remove the fault
	电源变压器损坏 Transformer broke down	更换电源变压器 Change power transformer
下死点检知器正常工作，冲床不能工作 Detector works well, but punch can't work	下死点检知器输出接点与冲床之间的连接断开 Off-contact between detector's output contacts and punch	重新接线，并保证接线牢固 Renew wiring, make sure of fixed wiring
	冲床电气故障 Punch electrical fault	检修冲床电气 check punch electric circuit
下死点检知器断续工作，指示灯时断时通 Detector keeps working but indicators on and off intermittently	控制线缆连接处接触不良 Poor contact in control cable	紧固控制线缆压线螺钉 Fix screw crimped control cable
下死点检知器检出异常，冲床不停止工作 Punch can't stop even fault detected	输出接点间的控制电路短路 Short in the control circuit of output contacts	检修输出接点间的冲床线路 check punch circuit among output contacts