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北极星
NSTAR

E-9188H型 智能控制 电火花堆焊修复机

使用说明书



乐清市北极星电子有限公司
YUEQINGSHI NORTH STARELECTRON CO.,LTD

尊敬的用户：您好！

首先感谢您购买公司产品，公司全体员工以真诚的态度对待每一位用户，我们衷心的希望您在使用本公司的产品以后，能为您带来工作的便利、降低费用、节约成本，提高您的产品市场竞争力，希望您能提出宝贵的意见和建议。

公司已通过ISO9001:2000国际质量管理体系认证

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一、质量保证

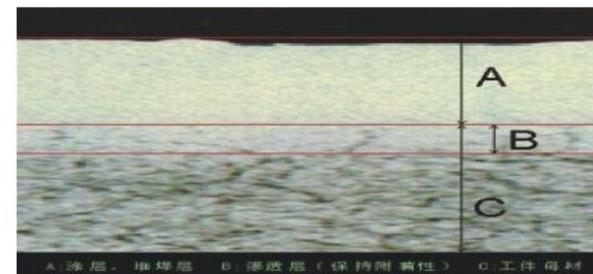
- 公司保证产品在出厂之前经过严格的测试。并保证自购买之日起正常使用条件下的一年内的质量担保。
- 本担保适用于原始客户。质量保证范围是正常使用条件下的产品缺陷。下列的范围不是质量保证范围。
 - 1、不正确的自行修理和改进。
 - 2、产品使用范围外的使用。
 - 3、未经授权，用户自行修理和拆解。
 - 4、产品使用过程中的用户使用不注意外界对本产品引起的损坏。
 - 5、不可抗力因素损坏。
 - 6、不按照本说明书指定的方法错误使用本设备。
 - 任何职员、代理商以及其他人都无权代表公司作任何质量保证。一旦发生正常操作情况下的机器故障，我公司将免费更换或维修设备及其配件。
 - 除此之外，公司尚未以任何形式做出各种形式之担保、表述或默许以及超出本说明书提及之特殊用途。这份质量保证将赋予您合法的权益。

二、电火花堆焊修复机设备原理及应用范围

● 设备原理：

电火花沉积工艺是将电源存储在高能量电能，在金属电极与母材间瞬间高频释放，通过电极材料与母材之间的空气电离，形成通道，使母材表面产品瞬间高温、高压微区；同时离子态的电极材料在微电场作用下熔渗进母材基体，形成冶金结合。由于该工艺是瞬间的高温一冷却过程，不仅使金属表面因淬火形成马氏体，而且在狭窄的沉积过度区形成超细奥氏体组织。电火花沉积工艺不是焊接，也不是喷涂或元素渗入工艺，简单的讲，是介入其间的工艺。

金相显微组织：



● 设备特点：

- 1、无退火和变形
- 2、熔接强度高
- 3、修复精度高
- 4、一机多用：堆焊，表面强化等。
- 5、环保性
- 6、使用性：任何人都容易使用，难焊接的地方也可以进堆焊。
- 7、经济性：在现场立刻修复，提高生产效率，节省费用。
- 8、主机体积：360x300x300mm³
- 9、重量：18Kg

● 设备应用范围：

- 1、钢模具(各种大、小型精密模具)及其产品；
- 2、铝模具、铝合金产品(如汽缸、轮毂等)；
- 3、铸铁件、铸钢件(如汽车部件等，无修复痕迹，可通过金相、拉伸及硬度测试)；
- 4、缸体、轴类、密封件及其他机器零部件；
- 5、电力机械、矿山机械、机床等大型设备等。

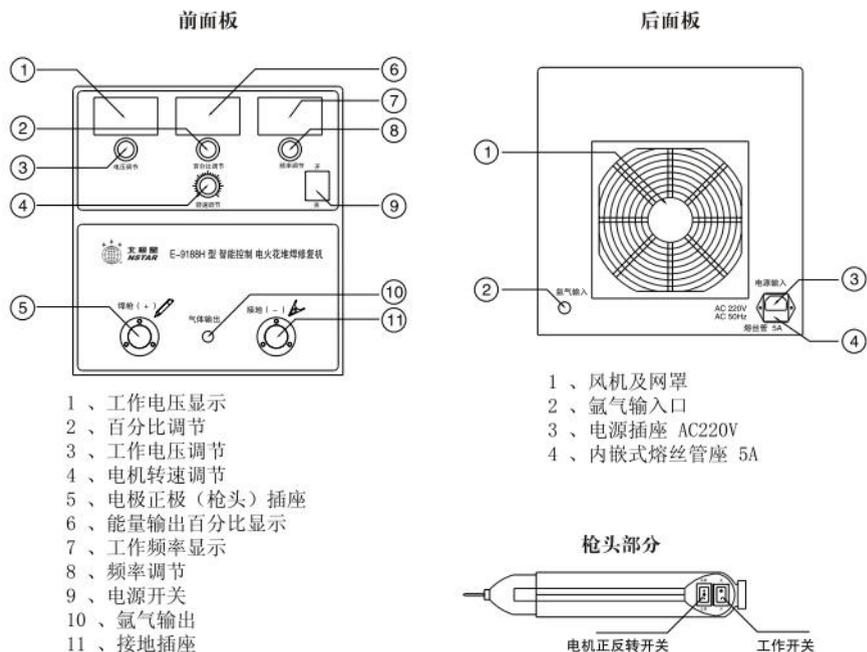
深信贵公司能充分理解本公司设备的使用方法以便取得更多效益和利润。使用说明书会在贵公司使用本公司电火花修复机中提供帮助。

请在使用设备之前全面阅读本说明书，以便您能充分了解本设备的优点并能安全有效的操作，以获得最大的利用。

三、功能

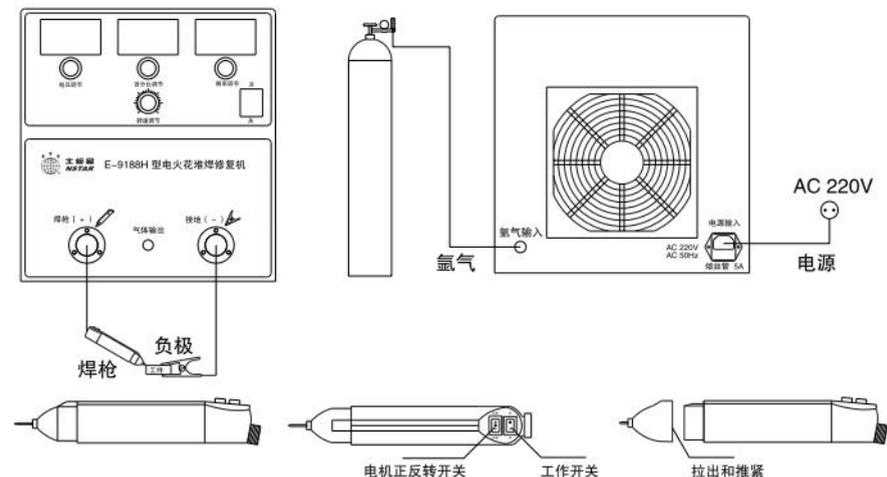
1) 名称和开关按钮功能

在操作时，务必先熟悉各开关及旋钮的功能，下面将对各部分进行详细介绍。



四、安装说明

2-1 安装如图

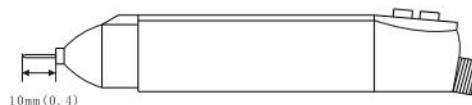


- 注意:**
- 1、安装电极枪时，首先确认配合方向后插入旋紧，切忌不对方向硬插以免造成损伤。
 - 2、连接气管插头时，请平顺向里推管头，一直推到底，再往回拉，拉不出来，证明已插好。
 - 3、确认搭铁线柱旋紧，与工件的接触夹实。
 - 4、切忌随意更换搭铁线，较大的参数变化会对机器造成影响，须在厂家指导下更换。

2-2 电极枪

- 1、用于表面强化和堆焊修复；
 - 2、焊丝旋转方面控制及工作开关在枪头上，旋转速度控制在主机面板上。
- 焊丝的安装：

- 1、根据焊补需求选择相应的焊丝。（所选焊丝必须直，以保证旋转时的同心度）。
- 2、拉出电极枪前帽，松开夹头，插入焊丝后用小钥匙旋紧（确认焊丝在夹头正中，不偏心），推紧前帽。
- 3、安装后焊丝的长度以伸出前帽8mm~12m为宜。这样有利于氩气的良好保护，如需伸出更长则应使用氩气保护套（如图）



- 1) 工作中焊丝的温度上升的速度很快，切不可手碰以免烫伤。请不要在电极枪工作或停下时立刻触摸焊丝。电极枪不用时请放在电极枪支架上（因焊丝温度很高，异物接触后容易粘上）。
 - 2) 请仔细检查使用的焊丝是否匹配（如镍合金的焊丝用于堆焊修复，而碳化钨焊丝则用于表面涂覆强化）。
 - 3) 请确定焊丝夹持正确，转动无偏心现象。若有偏心现象，请重新安装或更换新的焊丝。
- 注意：电极枪钥匙应妥善保管勿丢失。请勿过度用力

电极枪的使用：

- 1、按下枪头上的工作开关按钮，电极枪启动旋转。
- 2、调整转速（SPEED）：电极枪适当的旋转速度是必需的。如果速度太低，焊丝则可能会黏结在基体金属上。请用适当的转速（一般以中等转速为宜）
- 3、调整旋向，如需调整方向须关闭枪头工作开关按钮，待电极枪停止旋转后再按反方向转动的开关。

注意：

- 电极枪不工作时请勿自行拆解；
- 电极枪在工作时，请勿直接更换焊丝，请在电极枪停止旋转时再更换焊丝；
- 如果电极枪温度过高，请先停止一会以使温度降低。
- 如果调整旋向，请务必先关闭工作开关，待电极枪停止旋转后再做调整。

警告：如电极枪发生故障时不要自行修理，速申请维修，对堆焊枪结构的拆解将对产品造成无法修复的损失，损失无法得到补偿。请与我公司或代理商联系修理。

五、操作

现在你就可以准备操作电火花堆焊修复机

- 1、确认各项安装连接是否正确，牢靠。
- 2、打开电源开关（POWER），各项参数应均有正常显示。
- 3、调整氩气流量：按下枪头上的工作开关按钮，此时电极枪旋转，氩气阀打开即可调节流量，范围（3~9L/H）。（合理的流量即可达到保护效果又可节约氩气应根据焊补需求具体调整）

4、参数调整：

电压（VOLTAGE）：工作电压高则输出的能量大

能量输出百分比（PERCENT）：百分比值越高则单点脉冲输出的能量大

频率（FREQUENCY）：频率为单位时间内脉冲输出的次数，（不同的金属材质有着不同的焊补特性，并非频率越高焊补越快，因此根据不同的焊材调整适当的频率）。

注：电阻较大的材质（黑色金属）进行焊补时能量要求越低，使用电压参数20~70、百分比参数30~70、频率参数100~220即可进行理想焊补，电阻较小的材质（铜、铝等）焊补时能量的需求较大，须调节较高的参数，使用电压参数50~70、百分比参数50~70、频率参数200~300可进行理想焊补。

基本操作方法及技巧

电火花修复机被广泛的应用在铸件和模具缺陷的修复上，掌握正确的操作方法才会取得预期的效果。

一、焊前准备：

- 1、工件清理：堆焊前应将工件表面清理干净，不可有油污、杂质、铁锈等。表面氧化的工件应用磨头清理氧化层，以保证焊后良好的结合度。
- 2、按照前面介绍安装检查机器。
- 3、调整电气流量。
- 4、检查焊丝的同轴度

二、焊补

工件清理完毕之后就可以开始焊补了。下面我们将就焊补过程中的操作方法和技巧进行详细说明。焊工在使用前应仔细阅读。

(一) 电极枪堆焊特点：

- 1、焊丝旋转时所接触到的地方即是堆焊的地方。
- 2、焊丝旋转时，旋转的方向比相反方向要堆焊的多，如下图所示

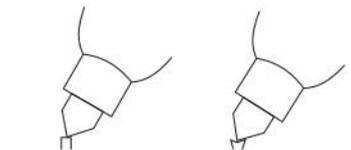


3、电极枪在使用过程中，只需保证焊丝与工件之间轻微接触即可，无须用力施压。

(二) 技巧简介

1、气孔、砂眼的修补

在铸造生产中铸件的气孔砂眼是不可避免的，本机可迅速的修补。调整参数后，只需用焊丝对准修补的位置轻轻涂抹几下即可(如图)



缺陷表面比焊丝直径大时

方法一：

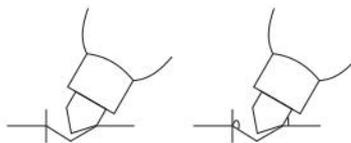
●你不想碰到堆焊以外的地方时，请选用本方法。

●仅对疤痕内部进行操作

●先用焊丝把周围涂层以后，由中心开始向边缘进行堆焊，整个过程中，应力求使堆焊层均匀光滑。一般采用在补焊区域慢慢画圆圈的方式。缺陷边缘应保留有足够的修补余量。

●敲平相当重要

●请注意电极枪的堆焊角度。



方法二：

●允许碰到堆焊以外的地方时，请选用本方法。

●先对周边进行堆焊，然后逐渐对中间部分进行堆焊。你可以看到堆焊层逐渐增高。

注意：(1)在堆焊之前应该先对内孔进行处理。

(2)反复的敲平是孔洞堆焊最重要的步骤。

(3)如果你不小心触及堆焊部位以外的地方，请确信对其进行修复以避免伤痕，否则，该处有可能显现出痕迹。

2、边角及分型线(模具缺陷)修复

确认磨损大小及上下模接触形状以后用色笔在周围做标记。

●焊丝堆焊方向时从模具方向往外或从外向模具方向，按照模具分型线水平进行堆焊即可。

●以画圆圈方式进行堆焊，边缘部分确认堆焊高度。

●一般模具上下模接触损伤部位堆焊以后进行打磨抛光，后进行试生产。看到产品后对分型线再进行修复工作，这时堆焊部分凸出来的话，相对模具容易受损伤，而且凸出来部分周围很多伤疤，所以堆焊以后打磨抛光非常重要。

注意：对注塑模具而言，如果模具一边堆的太高，则有可能损坏另外一边，请确信准确标出要修复的地方，以免损坏其他部位。

●请注意避免伤及边缘的其他部位

图片1

电极枪放在修补区域的内侧并朝外，你可以在工作的过程中看见边缘，堆焊过程中不断的画圆圈可以获得致密的堆焊层。

图片2

当电极枪朝里是，你不能看见你所要堆焊的边缘线。

当且仅当不能有其他堆焊方位可以选择时，选择本方法。

图片3

对产品边缘进行堆焊时，请保持与边缘线平齐，并顺时针旋转电极枪，用两只手保持电极枪沿着边缘线，并防止左右摆动



图片1



图片2



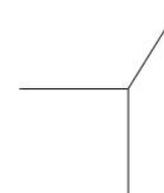
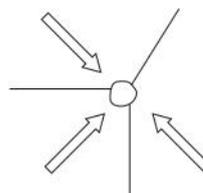
图片3

注意：

- (1)仅对于表面进行修复；
- (2)尽量沿着边缘线以避免伤及其他部位；
- (3)平稳堆焊，并反复敲打；
- (4)用两只手握紧电极枪，以避免电极枪滑到边缘外；
- (5)结合修补的具体情况，针对具体问题进行选择。

3、尖角及角落修复

堆焊方法同上，对部位堆焊时敲平相当重要。尖角部分先堆焊以后用敲平成圆形再达到一定程度，以水平方向成角会有效一些。碰到堆焊以外的地方时，请选用本方法。

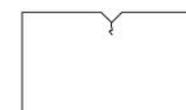
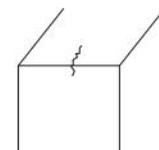


尖角焊接

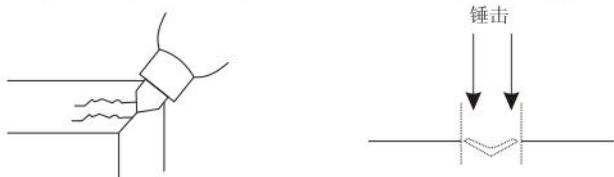
4、裂纹

●为获得更好的堆焊效果，请清理干净裂纹的油脂、污物、铁锈等。

●用小的锉刀把裂纹锉开一些，如下图：



●请平行于裂纹线进行堆焊、并用低频率、低功率(参照附录B)进行打底,然后如上述的堆焊方法进行堆焊,请注意本步骤应该平行于裂纹线,先对裂纹边缘进行堆焊,并请反复敲打。如下页图:



●然后,垂直于裂纹方向进行中间堆焊,敲打是必需的步骤。如下图:



5、铝模具堆焊修复

●铝合金堆焊

(1)简述:

铝金属导电性良好,所以在堆焊的部位应该比黑色金属保持更多的瞬时能量。在移动焊丝到下一个部位时,应持续保持放电一段时间,以达到堆焊的效果。

(2)焊丝的露出保护套的长度应不长于10 mm为宜。

(3)初始参数设置:(无打底过程,直接堆焊)

(4)提高操作技巧

——针孔

针孔的直径一般小于1mm

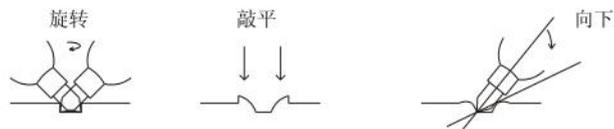
把焊丝放在孔的位置,并进行堆焊,如下图所示,保持电极枪与工件表面成 $45^{\circ} \sim 60^{\circ}$ 角。



——孔洞

●当孔洞的尺寸小于焊丝的外径,所以堆焊表面如下图所示,请确信堆焊的高度高出边缘线时,然后进行敲平(参考章节3—3)。

●当孔洞的尺寸大于焊丝的外径,所以堆焊表面如下图所示,把焊丝放进孔内进行堆焊。不要移动电极枪。



●边角和分型线

确认磨损大小及形状以后用色笔在周围做标记。仅当一边发生损坏时,相对比较处理好,如下图1所示,水平沿着边缘进行修复。当条件不允许电极枪沿着模具向外进行修复时,可采取如下图2所示的方法,并请确定电极枪水平放置。当边上两边都受损时,请按下图3进行操作。

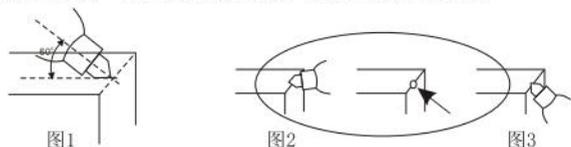


图1

图2

图3

六、故障诊断与排除

请确定所有连接(如电源线、地线等)按照要求正确连接。

1) 供电中断或漏电

电源指示灯不亮,风扇不转,表明保险丝熔断、或外接电源故障,请检查电源或更换保险。

2) 机器异常反应

长时间操作使设备过热,这时应散热后再使用。

3) 电源指示灯显示正常,风扇旋转正常,而电压、频率等无显示时可能是机器内部故障,请联系维修。

4) 风机不转且电源指示灯亮时,可能是风机故障,请联系厂家更换风机。

5) 电极枪旋转而工作时无输出工作电流(无火花、不放电)时,请检查接地线是否接触良好,否则与厂家联系。

6) 按下工作按钮,电极枪不转,但用电极碰工件时有放电火花,则可能是电极枪故障,联系厂家。

7) 电极枪没有氩气流出(堆焊部位熏黑)

请检查氩气流量计、氩气管道是否完好,以及氩气管口是否打开,管道是否堵塞。

注意:

电极枪由于内部结构复杂,严禁自行拆卸修理,如有问题发生及时与购买处联系,否则容易导致电极枪电机及齿轮严重损毁;如自行修理,您的权益将得不到保障。

七、设备维护

为使设备得到充分利用,阶段性的保养、维护和清理是必要的。

注意事项: ●电火花修复机输入为220V交流电源。

●请不要自行修理本设备,发生故障请与公司或代理商联系维修

7-1 清理设备外表面

设备面板变脏时,请用湿布擦干净。

注意事项: ●请在清理设备之前关闭电源。

●请勿使用苯或其他挥发性的溶剂清理本设备。

7-2 检查各连接电缆和氩气管道

7-2-1 检查电缆

检查交流电源线外皮是否划伤或插销损坏。

7-2-2 检查氩气管道

每次使用之前,请仔细检查氩气管口和相配合接口是否正确连接。请确信没有其他连接混乱或电线外皮损伤现象。

7-3 注意事项

7-3-1 本设备产生高压,请当心电击或设备损坏。

7-3-2 操作过程中,焊丝将产生高温,应避免直接接触焊丝,即使你关闭电源,焊丝的温度在一段时间内还是相当高。

7-3-3 使用本设备时,请注意保持机器周边环境整洁,以防大量金属粉尘被吸入机器堆积造成主控线路板短路造成元件烧毁,严重时烧毁机器主线路板。

7-3-4 使用本设备时，请不要与其他高频放电设备近距离一起使用，以防线路干扰造成机器损毁。

焊丝及相应设备参数设置

注：1. 焊丝伸出气体保护套外的长度

2. 堆焊时，氩气流量为3-9L/min，铝和铜堆焊为3-5 L/min。

3. 所有涂覆(打底)时，请使用较低的输出电压、百分比和放电频率。(如下表)

名称及规格	材料	输出功率百分比	电压 (v)	放点频率 (Hz)	用途
HS-1 Φ3.2×100mm	合金钢	30-60	25-60	100-190	堆焊修复 (HRC40)
HS-2 Φ2.4/3.2×100mm	合金钢	30-70	40-65	100-220	堆焊修复/表面强化 (HRC55-62)
HS-3 Φ2.4/3.2×100mm	铁合金	30-60	20-60	100-220	堆焊修复 (HB180-220)
HS-4 Φ2.4×100mm	铁合金	30-60	20-60	100-220	堆焊修复 (HRC35)， 用于镜面模具。
HS-5 Φ2.4×100mm	铁合金	30-60	20-60	110-220	1045，用于腐蚀表面 修复 (HRC34)
HS-6 Φ2.4×100mm	合金	30-60	20-60	100-220	铸铁/铸钢堆焊修复 (HRC29)
HS-7 Φ2.4/3.2×100mm	铝合金	40-75	40-75	180-300	用于铝合金堆焊修复
HS-8 Φ2.4×100mm	铜合金	50-75	40-75	220-320	用于铜合金修复

八、注意事项

不要将焊枪转速调节到最高或最低段，这样能有效的提高焊枪使用寿命；使用冷焊机时需要佩带保护眼镜和手套；工作过程中因电极产生较高温度，切勿电极碰触人体；该设备工作中，电压、频率仪表产生一定的波动，属于正常现象

九、设备成套件

主机	1台
带2.5m线地线夹	1组
焊枪	1把
电源线	1根
气体软管3m	1组
保护眼镜	1副
氩气表接头	1支
说明书	1本

产品合格证

品名	
型号	
出厂编号	
检验员	
备注	检验合格、准予出厂

产品保修卡

客户姓名		联系电话	
详细地址			
产品型号		出厂编号	
购机日期		发票号码	
购机地点			
经销商			
故障发生日期			
故障现象			
维修记录			

产品保修细则

- 1、自购买之日起，本公司负责主机保修一年，对元件正常的损坏，本公司负责免费修理。
- 2、保修期内因不正当使用或自行拆卸导致损坏，如需修理，则要适当收取修理费和零件费。
- 3、保修期内，如产品有任何质量问题，可凭保修卡或购机发票到本公司或就近的分公司维修。
- 4、保修卡请妥善保管，并在保修时出示本卡和购机票据，如遗失，则本公司不负责免费维修。



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北极星
NSTAR

**E-9188H Type Intelligent-control Electric-spark
Repair Welder
User's Manual**



YUEQINGSHI NORTH STARELECTRON CO.,LTD

Dear Users: How are you!

Congratulations on your purchase of the production of our company! Our company treats every customer in a faith attitude and we sincerely hope that our products can bring you conveniences, lower and reduce costs, improve your product market competitiveness after using our products. We hope your can put forward valuable comments and suggestions.

Our company has passed ISO9001: 2000 international quality management system certification.

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I. Quality guarantee

Our company ensures that the product has passed the strict testing prior to leaving the factory, and ensures the quality warranty within one year from the date of purchase under normal use condition.

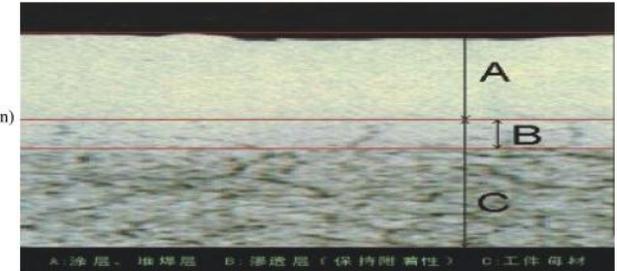
- This warranty applies to the original customers. Quality assurance range is related the product defects under normal use condition. The following situations are not within the scope of quality guarantee.
 1. Incorrect repair or improvement by oneself.
 2. Use outside of the product serviceable range.
 3. Repair or disassembly by oneself without authorization.
 4. The damage to this product caused by user's wrongly use in the product service process.
 5. Damage due to the force majeure factors.
 6. This device is wrongly used not in accordance with the methods specified in the instruction.
- No any staff, agent and other personnel have the right to make any quality assurance on behalf of our company. In case the mechanical fault occurs under normal operating conditions, our company will replace or repair the device and accessories free of charge.
- Except for it, our company has not made various form guarantees, expressions or tacit consents in any forms, and guarantee for the special purpose beyond referred to in this instruction. This quality assurance will be given to your legal rights.

II. Principle and applicable range for electric-spark repair welder

● Equipment principle:

Electric-spark deposition process is aimed to instantaneously release (high frequency) the high-energy electric energy stored in power supply between the metal electrode and base metal, and form a channel through the air ionization between the electrode material and base metal, so that the base metal surface generates the instant high temperature, high pressure micro- area; while the ionic state electrode material is melted and infiltrated in the base material matrix under the action of the micro-electric field to form a metallurgical bonding. Because the process is an instant high temperature--cooling process, the martensite not only is formed on the metal surface due to the quenching, the ultrafine austenite structure is also formed in a narrow deposited transition region. Electric-spark deposition process is no the welding, nor is spraying or element infiltration process. In short, it is the process between them. Metallographic microstructure:

- A: Coating, surfacing welding layer
- B: Permeability layer (to maintain adhesion)
- C: Base metal of the work piece



● Device characteristics:

1. No annealing or deformation
2. High fusion joining strength
3. High repair precision
4. Serves several purposes of a machine: surfacing welding, surface hardening etc.
5. Environmental protection
6. Applicability: anyone is easy to use, the position where it is difficult to weld can also be conducted the surfacing welding.
7. Economy: immediately repair on the scene, to improve the production efficiency and save the cost.
8. Host size:360×300×300mm³
9. Weight:18Kg

● Device's applicable range:

1. Steel mold (a variety of large and small precision molds) and its products;
2. Aluminum mold, aluminum alloy product (such as cylinder, wheel hub, etc);
3. Iron casting, steel casting (such as automobile parts, there are no repair marks, can pass through the microstructure, tensile and hardness testing);
4. Cylinder body, shaft, sealing element and other machine components;
5. Large equipments such as electrical machinery, mining machinery, machine tool, etc.

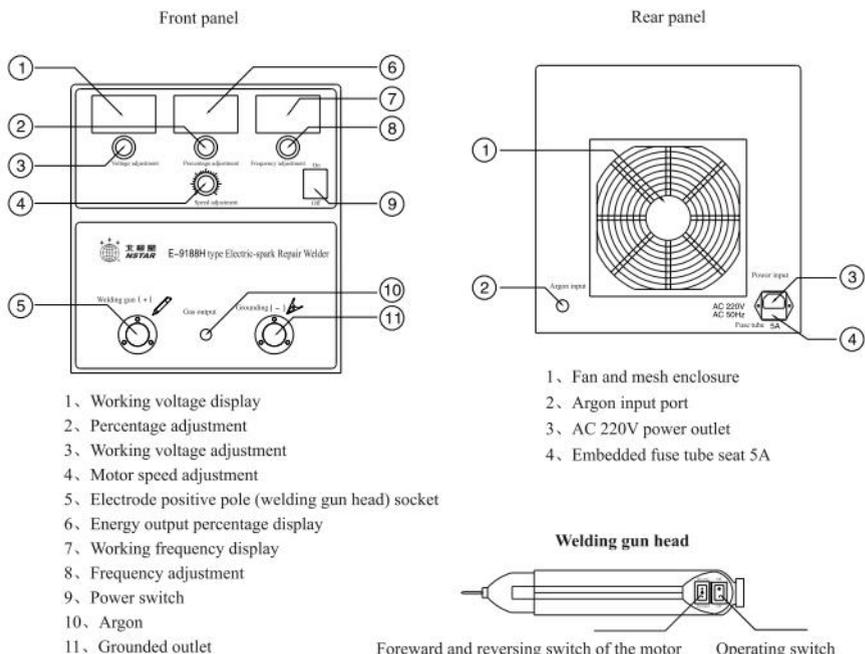
We believe that your company can fully understand the use methods of our company's device in order to obtain more benefits and profits. Instructions will provide the assistance when your company uses our company's Electric-spark Repair Welder.

Please read the instruction fully before using the device, so that you can fully understand the advantages of this device and can operate it safely and effectively to achieve the maximum utilization.

III. Function

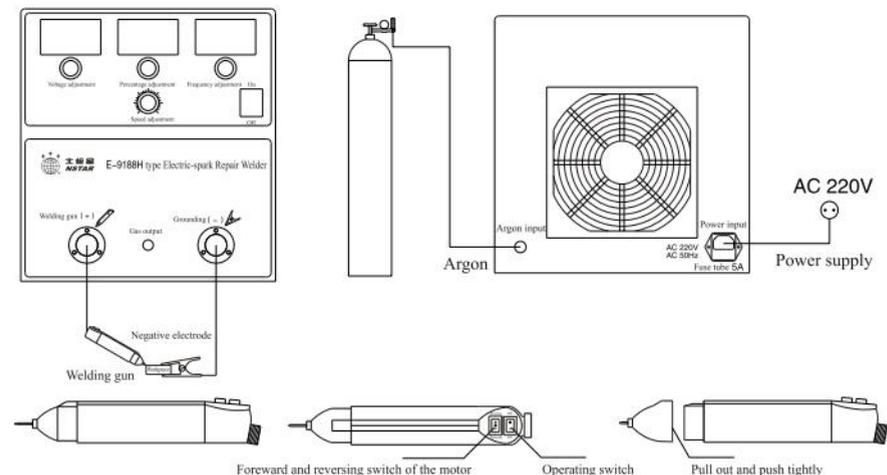
1) Name and switch and button functions

In the operation, must be first familiar with the functions of the various switches and buttons, the various parts will be described in detail in the following.



IV. Installation instructions

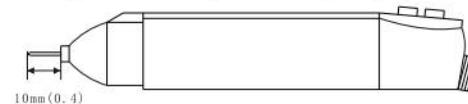
2-1 Installation as shown in figure



- Note:**
1. When installing the electrode gun, first insert and screw down it after confirming the matching direction, it is not allowed to forcibly insert in the wrong direction so as to avoid the damage to it.
 2. When connecting the windpipe plug, please smoothly push the tube head inward until it has been pushed to the end, and then pull it back. If it is not pulled out, it is confirmed that it has been inserted in place.
 3. Confirm that the bond strap column is tightened, and contact with the work piece is clamped.
 4. It is not allowed to arbitrarily replace the bond strap, a larger change in the parameters will impact the machine, the bond strap must be replaced under the guidance of the manufacturer.

2-2 Electrode gun

1. It is used for the surface hardening and surfacing welding repair;
 2. Welding wire rotating control and operating switch are set up at the gun head, and the rotation speed control is set on the panel of the mainframe body.
- Welding wire installation:**
1. Select the appropriate welding wire according to the needs of the welding repair. (Selected welding wire must be straight, to ensure the concentricity in the rotation).
 2. Pull out the front cap of the electrode gun, loosen the chuck, tighten it with small key after inserting the welding wire (confirm that the welding wire is in the middle of the chuck and without eccentricity), push tightly the front cap.
 3. After installation, the length of the welding wire shall prevail that 8mm to 12m is extended from the front cap, which it is conducive to the good protection of argon. If it is necessary to extend more, the argon protective sleeve should be used (as shown in Figure)



- 1) The temperature rise of the welding wire is fast in the work, it is not allowed to touch it by hand so as not to burn. Please do not immediately touch the wire when the electrode gun is working or stops. Electrode gun shall be placed on the electrode gun rack when not in use (because the temperature of the welding wire is very high, it is easily affixed with the foreign body when contacting).
 - 2) Please check carefully whether the used welding wire is matched (for example: the nickel alloy welding wire is used for surfacing welding repair, and tungsten wire is used for surface coating strengthening).
 - 3) Make sure that the welding wire is clamped correctly, there is no the eccentric phenomenon in the rotation. If there is the eccentric phenomenon, it shall be reinstalled or replaced by new welding wire.
- Note:** The keys of the electrode gun should be kept properly, and not lost. The excessive force shall be not applied

Electrode gun use:

1. Press the button of the operating switch on the gun head, the electrode gun starts rotating.
2. Adjustment of the rotation speed (SPEED): the proper rotation speed of the electrode gun is essential. If the speed is too low, the welding wire may be bonded on the substrate metal. Please use the appropriate rotation speed (generally suitable for medium rotation speed)
3. Adjustment of the rotation direction. If it is necessary to adjust the direction, shall close the operating switch button of the gun head, and then press the opposite direction rotation switch after the electrode gun stops rotating.

Note:

- Do not arbitrarily self-disassemble the electrode gun when not in use;
- When the electrode gun is at work, do not directly replace the welding wire, please replace the welding wire again when the electrode stops turning;
- If the electrode gun temperature is too high, please shut down the electrode gun for a while in order to lower the temperature.
- If it is necessary to adjust the rotation direction, shall close the operating switch, and adjust after the electrode gun stops rotating.

Warning: If the electrode gun is failed, don't repair it by oneself, shall put forward the application for the maintenance immediately. If the structure of the repair welder is dismantled, it will cause the irreparable loss to the product, the loss can not be compensated. Please contact our company or agent for maintenance.

V. Operation

Now you're ready to operate the electric-spark repair welder

1. Confirm that the installation connection is correct and reliable.
2. Turn on the power switch (POWER), the parameters should be normally displayed.
3. Adjusting the argon gas flow: press the operating switch button on the gun head, then can adjust the flow by rotating the electrode gun and turning on the argon valve, range (3 to 9L/H). (The reasonable flow can either achieve the protective effect or save the argon, the specific adjustment should be conducted based on the welding repair requirements)

4. Parameter adjustment:

- Voltage (VOLTAGE):** the higher the working voltage, the larger the output energy
- Percentage of energy output (PERCENT):** the higher the value of the percentage, the larger the output energy of the single point pulse
- Frequency (FREQUENCY):** the frequency refers to the number of the pulse output per unit time (different metal materials have different characteristics of welding repair, not the higher the frequency, the faster the welding repair, so the appropriate frequency is adjusted according to different welding materials).
- Note:** When the material (black metal) with larger resistance is welded, the energy demand is lower, the ideal welding repair can be conducted using voltage parameter of 20 to 70, percentage parameter of 30 to 70, frequency parameter of 100 to 220; When the material with lower resistance (copper, aluminum, etc.) is welded, the energy demand is greater, the higher voltage parameter shall be adjusted, the ideal welding repair can be conducted using the voltage parameter of 50 to 70, percentage parameter of 50 to 70, frequency parameter of 200 to 300.

Basic operation methods and techniques

Electric-spark repair welder is widely used to repair the defects of the casting and mold. The anticipative effect can be obtained only after mastering the correct operation methods.

I. Preparation prior to welding

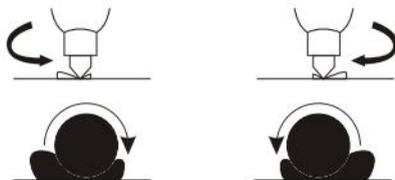
1. Work piece cleaning: prior to surfacing welding, the work piece surface should be clean and without oil stain, impurity, rust and so on. The work piece with surface oxidation shall be cleaned for the oxide layer with the grinding head, in order to ensure a good combination after welding.
2. Install and inspect the machine in accordance with the above-mentioned introduction.
3. Adjusting the argon gas flow.
4. Check the coaxiality of the welding wire

II. Welding repair

After the work piece cleaning is completed, can begin the welding repair. Now we will describe the operation methods and techniques in the process of welding repair in detail. Welder should carefully read it before use.

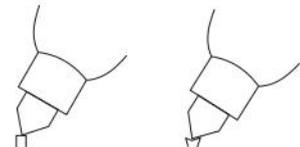
Welding repair features of the electrode gun:

1. The position where the welding wire contacts in the rotation refers to the surfacing welding position.
2. When the wire is rotating, more surfacing welding shall be conducted in the rotation direction than in the opposite direction, as shown in Figure below
3. In the use of the electrode gun, just shall ensure that there is the light contact between the welding wire and work piece and without excessive force.



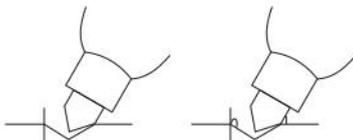
Technique introduction

In the foundry production, the porosity and sand hole in the casting are inevitable, the machine can quickly repair them. After adjusting the parameters, only align the welding wire to the repair location, and lightly coat it a few times (as shown in Figure)



When the defect surface is larger than the welding wire diameter
Method 1:

- If you do not want to contact the position outside the surfacing welding site, please use this method.
- Operate only within the scar
- First coat around the defect surface with the welding wire, then start the surfacing welding from the center to the edge, should try to make uniform and smooth surfacing layer in the whole process. It is commonly used to slowly draw the circle in the welding repair area. The sufficient patching margin should be retained at the edge of the defects.
- It is very important to flatten
- Please pay attention to the surfacing welding angle of the electrode gun.



Method 2:

- When it is allowable to contact the position outside the surfacing welding site, please use this method.
 - First conduct the surfacing welding around the defect surface, and then gradually conduct the surfacing welding on the middle part. You can see that the surfacing layer is gradually increased.
- Note:** (1) Prior to the surfacing welding, should first handle the inner hole.
(2) It is the most important step of the hole surfacing welding to repeatedly flatten.
(3) If you are not careful to touch the position outside the surfacing welding site, make sure to repair it in order to avoid scar, otherwise, there might appear a trace in the position.

2. Edge and corner and parting line (mold defect) repair

After confirming the wear size and contact shapes of the upper and lower mold, make the markings around them using color pencil.

- Wire surfacing welding direction is outward from the mold direction or to the mold direction from outside, shall conduct the horizontal surfacing welding according to the parting line of the mold.
- Conduct the surfacing welding by drawing a circle, confirm the surfacing welding height at the edge part.

● In general, if there are the contact damaged sites on the upper and lower dies of the mold, they shall be polished after surfacing welding, and then put into trial production. The parting line is repaired again after seeing the product. If the surfacing welding part is protruded, the mold is susceptible to damage, and there are a lot of scars around the partial protrusion, it is very important to polish after surfacing welding.

NOTE: As to the injection mold, if one side of the mold is piled up too high, the other side may be damaged. Make sure to accurately mark the place to be repaired, so as not to damage the other sites.

- Please pay attention to avoid the damage to the other sites of the edge

Fig. 1

Electrode gun is placed at the inner side in the repair area and outward, you can see the edge in the work course, the dense surfacing layer can be obtained by continuously drawing the circle in the surfacing process.

Fig. 2

When the electrode gun is set inward, the edge line of surfacing welding would be out of your sight. If and only if no other surfacing welding position can be chosen, choose this method.

Fig. 3

When the edge of the product is conducted the surfacing welding, please remain it flush with the edge line and clockwise rotate the electrode gun, keep the electrode gun along the edge lines by both hands, and to prevent it from side to side.



Fig. 1



Fig. 2



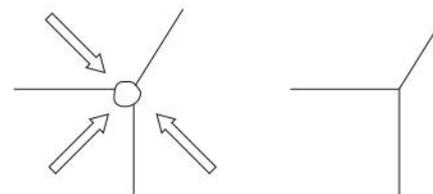
Fig. 3

Note:

- (1) only surface is repaired;
- (2) keep along the edge line as far as possible in order to avoid the damage to the other sites;
- (3) smooth surfacing welding, and repeatedly beat;
- (4) clench the electrode gun by both hands in order to prevent the electrode gun from slipping out of sideline;
- (5) Combined with the specific repair conditions, choose based on the specific issues.

3. Sharp angle and corner repair

Surfacing welding method is as mentioned above, it is very important to beat out when conducting the surfacing welding on the site. Sharp angle part is first conducted the surfacing welding and beaten out for forming to reach a certain level, it may be more effective to form the angle in the horizontal direction. When encountering the position outside the surfacing welding site, please use this method.



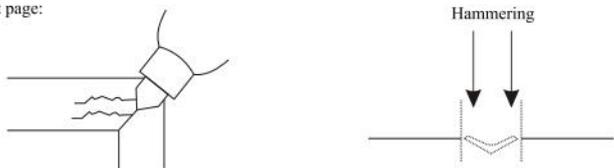
Sharp angle welding

4. Crack

- In order to obtain a better surfacing welding effect, please clean the grease, dirt, rust and so on in the crack.
- File the crack a larger opening using a small rasp, as shown in Figure below:



● Please conduct the surfacing welding which is parallel to the crack line, and conduct the padding with the low frequency, low-power (see Appendix B) , then conduct the surfacing welding as above-mentioned surfacing welding method. Please note that this step should be parallel to the crack line, first conduct the surfacing welding of the crack edge, and repeatedly beat it. As shown in Figure on next page:



● Then, conduct the middle surfacing welding perpendicular to the direction of the crack, the beating is the necessary step. As shown in Figure:



5. Aluminum mold surfacing welding repair

● Aluminum alloy surfacing welding

(1): Introduction

Aluminum alloy has the good electrical conductivity, so more transient energy should be maintained at the surfacing welding site compared with the ferrous metals. When moving the welding wire to the next site, the electric discharge should be continuously maintained for some time, so as to achieve the surfacing welding effect.

(2)The length of the welding wire exposed in the protection sleeve should be no longer than 10 mm.

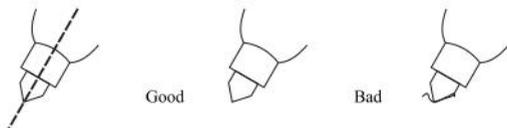
(3)Initial parameter setting: (no bottoming process, direct surfacing welding)

(4)Enhance operating skills

Pinhole

Pinhole diameter is generally less than 1mm

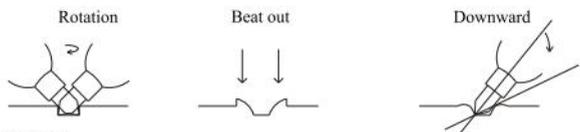
The welding wire is placed in the hole location, and conducted the surfacing welding, as shown in Figure below, 45 to 60 angle is maintained between the electrode gun and work piece surface.



Hole

● When the hole size is smaller than the outer diameter of the welding wire, the surfacing welding surface is as shown in Figure below, make sure that the surfacing welding height is above the edge line, and then beat out (see chapter 33).

● When the hole size is larger than the outer diameter of the welding wire, the surfacing welding surface is as shown in Figure below, place the welding wire into the hole to carry out the surfacing welding. Do not move the electrode gun.



● Edge angle and parting line

Make the marking around the wear position using color pencil after confirming the wear size and shape. It is easy to treat only when one side is damaged, as shown in Figure 1.

Horizontally repair along the edge. When it is not allowable to repair along the mold by the electrode gun outward, may take the methods as shown in Figure 2 below, and make sure that the electrode gun is horizontally placed. When both sides of the edge are damaged, please operate as shown in Figure 3 below.

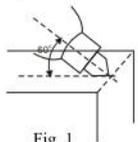


Fig. 1

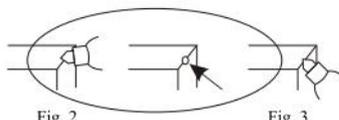


Fig. 2

Fig. 3

VI. Fault Diagnosis and elimination

Make sure that all connections (such as power line, ground wire, etc.) are connected correctly as required.

1)Power supply interruption or electric leakage

Power indicator light is off, the fan does not turn, it indicates that the fuse is burned out, or external power is failed, check the power supply or replace the fuse.

2)Abnormal reaction of the machine

The device is overheated due to the long time operation, it should be used after cooling.

3)When the power indicator light is shown normally, the fan is rotating normally but the voltage and frequency are not displayed, it may be the inner fault of the machine, please contact with the maintenance personnel.

4)When the fan does not rotate and power indicator light is on, it may be the fan failure, please contact with the manufacturer to replace the fan.

5)When the electrode gun is rotating but does not output the operating current in the work (no spark, no discharge), please check whether the grounding wire is in good contact condition, otherwise contact with the manufacturer.

6)Press the working button, the electrode gun does not turn, but there is the discharge spark when the electrode gun touches the work piece, the electrode gun may be failed, please contact with the manufacturer.

7)There is no the argon flowing out of the electrode gun (the surfacing welding site is smoked black)

Please check if the argon gas flow meter and argon gas piping are intact, and if the argon pipe port is opened, the pipeline is blocked.

Notes:As the internal complex structure, the electrode gun is prohibited to self-disassemble and repair. If the problem is found, please contact with the seller. Otherwise, the electrode gun motor and gear are damaged easily and seriously; if it is repaired by yourself, your rights will not be guaranteed.

VII. Device maintenance

To make full use of device, the periodic maintenance, maintenance and cleaning are necessary.

Note:● Electric-spark Repair Welder input is the 220V AC power.

● Please do not repair this device by oneself. If it is failed, please contact with our company or agent for the maintenance

7-1 Device's external surface cleaning

When the device panel becomes dirty, wipe with a damp cloth.

Note:● Please turn off the power before cleaning the device.

● Do not use benzene or other volatile solvent to clean the device.

7-2 Check the connecting cables and argon gas pipeline

7-2-1 Check the cable

Check if the AC power cord external skin is scratched or plug is damaged.

7-2-2 Check the argon gas pipeline

Before each use, carefully check if the argon gas pipeline port and matched connector are connected correctly. Please make sure that there is no the other confusion connection or wire external skin damage phenomenon.

7-3 Notes

7-3-1 This device can generate the high voltage, please pay attention to the electric shock or damage to the device.

7-3-2 In the operation, the welding wire will produce the high temperature. Please avoid to directly touch with the welding wire, even if you turn off the power, the temperature of the welding wire is still quite high in the period of time.

7-3-3 When using this device, please pay attention to maintaining the clean surrounding environment of the machine, so as to prevent that the excessive metal dust is inhaled in the machine for the accumulation, resulting in the line short-circuit of main control circuit board and burning of the component, the main circuit board of the machine will be burned under the serious condition.

7-3-4 When using this device, it shall be not used together with the other high-frequency discharge devices in the close distance to prevent the line interference from damaging the machine.

Parameter setting of the welding wire and corresponding device

Note: 1. Length of the welding wire exposed in the gas protection sleeve

2. When the surfacing welding, the argon gas flow is 3-9L/min, the aluminum and copper welding is 3-5 L / min.
3. When coating (prime coating) fully, use the lower output voltage, percentage and discharge frequency. (As shown in Table below)

Name and specifications	Material	Output power percentage	Voltage (v)	Discharge frequency(Hz)	Purpose
HS-1 Φ3. 2×100mm	Alloy steel	30-60	25-60	100-190	Surfacing welding repair (HRC40)
HS-2 Φ2. 4/3. 2×100mm	Alloy steel	30-70	40-65	100-220	Surfacing / surface hardening (HRC55-62)
HS-3 Φ2. 4/3. 2×100mm	Ferroalloy	30-60	20-60	100-220	Surfacing welding repair (HB180-220)
HS-4 Φ2. 4×100mm	Ferroalloy	30-60	20-60	100-220	Surfacing welding repair (HRC35), used for the mirror mold.
HS-5 Φ2. 4×100mm	Ferroalloy	30-60	20-60	110-220	1045, used for the corrosion surface repair (HRC34)
HS-6 Φ2. 4×100mm	Alloy	30-60	20-60	100-220	Cast iron / cast steel surfacing welding repair (HRC29)
HS-7 Φ2. 4/3. 2×100mm	Aluminum alloy	40-75	40-75	180-300	Used for aluminum surfacing welding repair
HS-8 Φ2. 4×100mm	Copper alloy	50-75	40-75	220-320	Used for copper alloy repair

VIII. Notices

Do not adjust the speed of the welding gun to the highest or the lowest segment, it can effectively improve the service life of the welding gun; when using the cold welding machine, shall wear the protection glasses and gloves; the high temperature will be generated due to the electrode in the work. The electrode is no allowed to touch the human body; in the device work, the voltage and frequency meter may generate a certain fluctuation, which it is normal

IX. Set parts of the equipment

Mainframe.....	One set
Ground clamp with 2.5m wire.....	One group
Welding gun.....	One piece
Power cord.....	One piece
Gas hose 3m.....	One group
Protection glasses.....	One pair
Argon meter connector.....	One piece
Instruction.....	One copy

Product certificate

Product name	
Model	
Exwork serial number	
Inspector	
Remark	Only permit the qualified products leave factory, after examining

Maintenance card

Customer name		Telephone	
Detailed address			
Model		Exwork serial number	
The date of purchasing machine		Receipt serial number	
The place of buying machine			
Dealer			
The date of breakdown			
Breakdown			
Service record			

Regulation of maintenance:

1. The company is responsible for the main engine maintain in a year, in the warranty time we will change the normal damage part for the free.
2. In the warranty period because you can not use right, or disassemble voluntarily, which causes the damage, if need repair, we will account the repair expense and the components expense suitably.
3. In the warranty period, if the product has any quality question, you can repair the product in the company or the near subsidiary company service depend on the maintenance card or the receipt of buying machine.
4. Please take care of the maintenance card properly, when repair, please show this card and the receipt of buying machine, if lose them, the company will not be responsible for the free service.