

# Linton

## SLICER QP850+



## 1. 设备构成 Equipment Composition

### 1.1 设备说明 Equipment Description

金刚线切片机是使用电镀金刚线切割硅片的专用设备。QP850+金刚线切片机是Linton经过十余年打磨、大批量供货、在不同客户场景下广泛应用、在深入理解国内外用户需求的基础上、结合客户使用中不同代系的产品优缺点及大量的经验、验证等开发研制出的最新产品。该设备采用整体式结构布局，主轴箱支撑及进给滑台支撑为一体式铸件，线管理系统位于机床后部两侧，气动系统在机床后部下面两侧，电气柜位于机床后部上面，冷却水路系统位于机床后侧，切割液箱位于切割室底座下面，板式热交换器和过滤筒位于机床的后侧。占地面积更小，整体刚性更强、设备更加稳定牢靠，振源分散，利于减少振动。

Diamond wire slicers are specialized machines for cutting silicon wafers using electroplated diamond wire. QP850+ diamond wire slicer is the latest product developed by Linton after more than ten years of continuous optimization and improvement, mass delivery, widely used in different customer scenarios, based on in-depth understanding of the needs of domestic and foreign users, combined with the advantages and disadvantages of different generations of products in use by customers and a lot of experience, verification, etc. The machine adopts a monolithic structure layout, the spindle box support and feed slide support are integrated castings, the line management system is located on both sides of the rear of the machine, the pneumatic system is located on both sides under the rear of the machine, the electrical cabinet is located on the top of the rear of the machine, the cooling water system is located on the rear side of the machine, the cutting fluid tank is located under the base of the cutting chamber, the plate heat exchanger and the filter cartridge are located on the rear side of the machine. It has a smaller footprint, stronger overall rigidity, more stable and reliable equipment, and the vibration source is dispersed, which is conducive to reducing vibration.

### 1.2 主要部件及系统组成

Main components and system composition

#### 1.2.1 动定支承主轴箱及切割辊系统;

Dynamic and fixed-support spindle box and cutting roller system.

#### 1.2.2 工件进给装置;

Workpiece feeders

#### 1.2.3 线管理及张力系统;

Line management and tensioning systems.

#### 1.2.4 冷却系统;

Cooling systems.

#### 1.2.5 主轴冷却系统;

Spindle cooling systems.

#### 1.2.6 切割液供给系统;

Cutting fluid supply systems.

#### 1.2.7 气动系统;

Pneumatic systems.

#### 1.2.8 温度控制系统;

Temperature control systems.

#### 1.2.9 电气总线控制系统。

Electrical bus control system.

1.3 控制系统：汇川控制系统。

Control system: Huichuan control system.

## 2. 设备主要技术参数 Main technical parameters of the equipment

序号 No	项目 Item	性能要求 Description	备注 Remarks
1	被加工件最大断面尺寸 Maximum cross-sectional size of machined parts	230×230mm	
2	被加工件最大长度 Maximum length of machined part	≤850mm×1 根或等长拼接棒 ≤850mm×1 or equal length splicing bar	
3	金刚线线径 Diamond wire diameter	≥Φ0.035mm;	
4	最高工作运行线速度 Maximum operating line speed	40m/s (2400m/min)	
5	收线轮最大储线量 Maximum thread storage capacity of reel	120km	
6	线运行方式 Line operation mode	双向/单向 Bidirectional/Unidirectional	
7	金刚线张力 Diamond wire tension	3~20N	
8	主辊直径 Main roller diameter	Φ180mm×3 根 (210 规格)	210&182
9	主辊数量 Number of main rollers	3 根 3 roots	标配 Standard
10	主辊驱动电机功率 Main roller drive motor power	3×92kw	标配 Standard
12	主辊水平轴距 Horizontal axis distance of main roller	420mm	
11	主辊垂直轴距 Vertical axis distance of main roller	330mm	
14	过轮直径 Overwheel diameter	Φ160mm	(一体化) (Integration)
12	过轮数量 Number of passing rounds	4 个 4pcs	

金刚线切片机 DW Slicer QP850+

13	张力轮数量 Number of tension wheels	2 个 2pcs	
14	进给滑台行程 Feed slide stroke	315mm	
15	切割进给速度 Cutting feed speed	0~9mm/min	
16	进给快速移动速度范围 Feed rapid traverse speed range	30~500mm/min	
17	进给慢速移动速度范围 Feed slow moving speed range	5~30mm/min	
18	切割液箱最大容量 Maximum capacity of cutting fluid tank	500L	
19	切割液泵最大流量 Maximum flow rate of cutting fluid pump	240L/min	
20	切割液温度 Cutting fluid temperature	15~30°C, 温度波动±1°C 15 to 30°C, temperature fluctuation ±1°C	
21	噪音 Noise	80dB 以下	
22	机床总功率 Total machine power	306kw (三相四线制) 306kw (three-phase four-wire system)	额定 Rated
23	机床运行平均功率 Average power of machine operation	100~150kw	
24	机床外形尺寸 Machine dimensions	4900×2000×3250mm	长×宽×高 Length×width×height
25	上料方式 Feeding method	前端上料 Front-end loading	

### 3. 设备其它通用要求 Other general requirements for equipment

#### 3.1 设备通用要求 General requirements for equipment

序号 No	项目 Item	性能要求 Description	备注 Remarks
设备水电气要求 Equipment water, electricity and gas requirements			
1	冷却供水温度 Cooling water	8~14°C	

## 金刚线切片机 DW Slicer QP850+

	supply temperature		
2	供水压力 Water supply pressure	0.3~0.4Mpa	
3	回水压力 Return water pressure	≤0.15Mpa	
4	回水流量 Return water flow	≥200L/min	
5	供水量 Water supply	10-12m <sup>3</sup> /h	
6	供气压力 Air supply pressure	0.4~0.6Mpa	
7	供气量 Gas supply volume	120m <sup>3</sup> /h	
8	供电电压频率电流 Supply voltage frequency current	380V/50Hz/350A (峰值 450A)	
9	电源电缆线 Power Cable Wires	3×150+70mm <sup>2</sup> (三相四线制, 铜线) 3×150+70mm <sup>2</sup> (three-phase four-wire system, copper wire)	
10	整机冷却功率 Cooling power of the whole machine	110kw	
11	排气量 Exhaust volume	3~5m <sup>3</sup> /min	
设备主要机械精度 Main mechanical accuracy of the equipment			
1	金属端主辊跳动 Main roll runout at metal end	≤0.02 m m	
2	轴箱锥面径向跳动 Radial runout of shaft box taper	≤0.003 m m	
3	主轴锥面与锥孔接触率 Spindle taper to taper bore contact ratio	≥80%	
4	竖直进给直线度 Vertical feed straightness	≤0.005mm/150mm	
5	主轴轴线同轴度 Spindle axis coaxiality	≤0.15mm	
6	振动 Vibration	主轴振动≤3m/s <sup>2</sup> ; Spindle vibration ≤ 3m/s <sup>2</sup> .	
		收放线轮主轴振动≤3m/s <sup>2</sup> ; Vibration of the spindle of the take-up and payoff wheel ≤ 3m/s <sup>2</sup> .	

## 金刚线切片机 DW Slicer QP850+

7	钢线扭转: Steel wire twisting.	<5 圈 <5 laps	
8	整机水平 Whole machine level	X: 0.04/1000; Y: 0.04/1000;	
设备通用要求 General requirements for equipment			
1	润滑系统 Lubrication System	具备主要轴承箱自动加油/加脂 Automatic greasing/greasing of main bearing boxes	
2	机台插座 Machine socket	具备防水防溅保护 With water and splash protection	
3	安全感应系统 Safety sensing system	具备安全防护门/观察窗口/急停开关/安全培训 With safety guard door / observation window / emergency stop switch / Safety Training	
4	设备外观 Equipment appearance	设备整洁完整, 金属件表面光滑无毛刺、生锈 The equipment is neat and complete, the surface of metal parts is smooth and hairless Thorns, rusting	

## 3.2 设备机械设计特点 Equipment mechanical design features

## 3.2.1 夹具采用碟簧夹紧;

Clamping with disc springs

## 3.2.2 动定轴箱与主辊连接采用整体锥面连接方法;

The dynamic stator box is connected to the main roller by the integral taper connection method.

## 3.2.3 主要支撑部件为铸件材料;

The main support components are of cast material.

## 3.2.4 主轴箱配置独立冷却系统;

Spindle box equipped with independent cooling system.

## 3.2.5 进给滑台为四导轨结构, 连城专利技术, 支撑稳定, 利于保证硅片 TTV;

The feed slide is a four-rail structure with Linton's patented technology, which provides stable support and helps to ensure the TTV of silicon wafers.

## 3.2.6 三轴三电机结构, 三个主辊均有主电机驱动, 利于大规格硅片切割;

Three-axis, three-motor structure, with three main rollers driven by the main motor, facilitating the cutting of large-size silicon wafers.

## 3.2.7 设备维修方便性:

Ease of equipment maintenance.

设备布局各部件系统之间空间大, 维修方便, 切割液过滤筒在机床后边, 张力电机及排布线系统在机床马达房内, 气动控制元件均在设备两侧, 有足够的维修和更换空间, 易于拆卸。

The layout of the equipment has a large space between each component system and is easy to maintain. The cutting fluid filter cartridge is at the back of the machine, the tension motor and the row of wire system are in the

motor room of the machine, and the pneumatic control components are on both sides of the equipment, which has enough space for maintenance and replacement and is easy to disassemble.

### 3.3 设备电气要求

Equipment electrical requirements

3.3.1 供电电压频率电流：380V/50Hz/350A（峰值450A）；

Supply voltage frequency current: 380V/50Hz/350A (peak 450A).

3.3.2 设备电源总线采用铜芯线缆，电缆规格3×150+70mm<sup>2</sup>；

Copper-core cable for the power bus of the equipment, cable specification 3×150+70mm<sup>2</sup>.

3.3.3 电气控制采用人机界面方式；

Electrical control by means of human-machine interface.

3.3.4 具有线速、主电机温度、动定轴箱温度、扭矩、张力检测实时趋势、操作记录等功能；

With functions of wire speed, main motor temperature, dynamic and fixed shaft box temperature, torque, tension detection real-time trend, operation record, etc..

3.3.5 设备具有瞬时断电、电压波动保护功能及断线报警装置。

The equipment has instantaneous power failure, voltage fluctuation protection function and disconnection alarm device.

### 3.4 设备软件设计特点 Equipment software design features

3.4.1 设备所有故障代码显示在触摸屏上；

Display of all fault codes of the equipment on the touch screen.

3.4.2 人机界面设备三级密码（操作工、工程师、厂家），需添加操作记录；

HMI equipment three-level password (operator, engineer, manufacturer), need to add the operation record.

3.4.3 人机界面采用中文；

Chinese language for the human-machine interface.

3.4.4 人机界面上显示所有的电机温度，轴箱温度等；

Display of all motor temperatures, axlebox temperatures, etc. on the HMI.

3.4.5 切割过程中检测存线量小于实际存线量时机台自动反切加提示；

Automatic back-cutting and prompting when the amount of wire in the cutting process is less than the actual amount of wire in the table.

3.4.6 切割程序不能丢失（停电、死机情况下）；

Cutting programs cannot be lost (in case of power failure, deadlines).

3.4.7 中途停机、开机时，初始方向正反切可选；

When stopping and starting the machine in the middle, the initial direction of forward and reverse cutting is optional.

## 4 设备验收要求 Equipment acceptance requirements

4.1 设备验收指标： Equipment acceptance indicators：

项目 Item	验收标准 Acceptance criteria	备注 Remarks
---------	-----------------------------	------------

金刚线切片机 DW Slicer QP850+

装载量 Capable of 40m/s	850mm	
最大线速 Maximum wire speed	40m/s	具备 40m/s 的能力 Capable of 40m/s
金刚线规格 Diamond wire specifications	40~45μm	
工艺线耗 Process line consumption	≤1.8 米/片 (单晶 166mm) ≤1.8 m/sheet (monocrystalline 166mm) ≤2.5 米/片 (单晶 182 mm) ≤2.5 m/sheet (monocrystalline 182 mm) ≤2.8 米/片 (单晶 ≥210mm) ≤2.8 m/slice (single crystal ≥210mm)	
切割时间 Cutting time	≤ 80min (单晶 166 mm) ≤ 80min (single crystal 166 mm) ≤ 95 min (单晶 182 mm) ≤ 80min (single crystal 166 mm) ≤ 120 min (单晶 ≥210mm) ≤ 120 min (single crystal ≥ 210mm)	
断线率 Disconnect ion rate	≤2% (人为因素除外) ≤2% (except for human factors)	断线刀数/切割刀数*100% Number of broken blades/number of cutting blades*100%
TTV	TTV 均值≤10μm, 最大值≤20μm; TTV mean value ≤ 10μm, maximum value ≤ 20μm.	
线痕 Thread marks	≤10μm	
A 品率 A Quality rate	166mm 硅片: A 品率≥96%; 166mm wafers: A rate of ≥ 96%. 182mm 硅片: A 品率≥95%; 182mm wafers: A rate of ≥95%. 210mm 硅片: A 品率≥94%; 210mm wafers: A rate of ≥ 94%.	分选机数据为准, 崩边需二次人工筛选 Sorting machine data shall prevail, chipped edges need secondary manual screening

注: Note:

1.理论片数=有效切割长度/主辊槽距, 成品率=成品片数/理论片数, A 品率=A 级品数/理论片数;

Theoretical piece count = effective cutting length/main roller groove distance, yield = finished piece count/theoretical piece count. A-grade rate = number of A-grade items/theoretical number of pieces.

2.切割有效长度不包含端面和分线网厚片;

Cutting the effective length excluding the end face and the thick piece of the splitting mesh.

3.A 品及成品经自动分选机按甲方标准进行分选确定;

A products and finished products are sorted by automatic sorting machines according to our standards to determine.

4.良品率应将非设备因素除外;

Yield rate shall exclude non-equipment factors.



4.1 验收期：生产 1 个月后将开始调试验收程序，以买方主流产品硅棒规格进行验收，以量产一个月数据作为依据。

Acceptance period: After 1 month of production, we will start the commissioning and acceptance procedure, and the acceptance will be based on the buyer's mainstream product specifications for silicon rods, with one month of mass production data as the basis.

## 5 设备包装及交货要求 Equipment packaging and delivery requirements

### 5.1 设备包装要求 Equipment packaging requirements

5.1.1 设备应分类装箱，并遵循适于运输，便于现场卸货，安装和查找的原则；The equipment should be sorted into boxes and follow the principles of being suitable for transport, easy to unload, install and find on site.

5.1.2 包装箱外外壁应有明显的文字说明，如设备名称及运输存储安全注意事项等；There should be obvious text descriptions on the outside of the box, such as the name of the equipment and safety precautions for transportation and storage.

5.1.3 所提供的设备及部件应按照国家标准有关包装的技术条件可靠包装，以满足长途运输，吊装和装卸的需要，包装中应采取防止雨淋、腐蚀、振动及碰撞的措施，保证设备在运输过程中不会损坏、变形、受潮及部件丢失。

The provided equipment and components should be reliably packed in accordance with the technical conditions of the national standards on packaging to meet the needs of long-distance transportation, lifting and loading and unloading, and the packaging should take measures to prevent rain forest, corrosion, vibration and collision to ensure that the equipment will not be damaged, deformed, damp and lost in the process of transportation.

### 5.2 设备交货要求 Equipment delivery requirements

5.2.1 供方应将设备送至买方指定收货地址；

The supplier shall deliver the equipment to the buyer's designated delivery address.

5.2.2 供方交货时应提供设备出厂检验报告、合格证明或文件；

The supplier shall provide factory inspection reports, certificates of conformity or documents for the equipment upon delivery.

5.2.3 供方需提供设备使用说明书，设备说明书包括：设备基本参数，设备操作说明，设备操作方法，维修保养部位及保养方法，主要异常及处理方法等。

The supplier needs to provide the equipment instruction manual, which includes: basic parameters of the equipment, equipment operation instructions, equipment operation methods, maintenance parts and maintenance methods, major abnormalities and handling methods, etc.

### 5.3 设备安全要求 Equipment safety requirements

设备安全防护符合国家标准，当人体进入防护区时，运动机构停止动作并报警，通过工程师及以上权限可手动关闭防护功能，以满足观察或实验需求；

Equipment safety protection continued to meet national standards, when the human body enters the protection area, the movement mechanism stops and alarm, through the engineer and above authority can manually close the protection function to meet the observation or experimental needs.

## 6 技术支持和服务要求 Technical support and service requirements

金刚线切片机 DW Slicer QP850+

6.1 质保期 Warranty Period

6.1.1 设备整机质保期 1 年，从验收之日起计算；

1 year warranty for the entire equipment, calculated from the date of acceptance.

6.1.2 验收后，供方需提供合理范围的技术支持及服务；

After acceptance, the supplier is required to provide a reasonable range of technical support and services.

6.2 客服及时性 Customer Service Timeliness

质保期内发生故障，供方需在 4 小时内远程指导解决，若无法远程解决，供方需在 48 小时内达到现场解决；

If a failure occurs during the warranty period, the supplier is required to remotely guide the solution within 4 hours, and if the remote solution is not possible, the supplier is required to reach the site within 48 hours to solve the problem.

6.3 设备使用维护培训 Equipment use and maintenance training

提供设备操作、故障处理、维护保养等培训；

Providing training on equipment operation, troubleshooting, maintenance, etc.

7 设备配置清单 Equipment configuration list

序号 #	名称 Name	型号或规格 Model or specification	数量 Quantity	制造厂商 Manufacturers	备注 Remarks
一、机器设备 Machinery and equipment					
1	主机 Machinery and equipment	QP850+	1台 1 unit		
二、随机附件 Random attachment					
1	机床垫铁 Machine tool pads		8件 8 pieces		
三、其它附件（标配） other accessories (standard)					
1	收线轮 Take-up wheel	QP720-422301	1件 1pc		单台配置 Single unit configuration
2	切割辊 Cutting rollers	QP850+ -661701/702	2副(6件) 2 pairs (6 pieces)		(210&182) 单台配置 Single unit configuration
3	晶托（工件板） Crystal tray (workpiece plate)	QP850+ -652	6件 6 pieces		单台配置 Single unit configuration
4	滤芯 Cartridge	QP720-511703 (100目) (100 mesh)	1个 1pc		单台配置 Single unit configuration
5	压簧 Compression spring	QP720-511701	1个 1pc		单台配置 Single unit configuration
6	碎料盒 Shredder box	QP850+ -561701/702	各1件/台 1 piece each/set		182mm

金刚线切片机 DW Slicer QP850+

7	碎料盒 Shredder box	QP850+ -562701/702	各1件/台 1 piece each/set		210mm
8	轻质一体轮 Shredder box	Q720-260301	12个		含机床上6个 Including 6 on the machine
四、维修工具 Maintenance tools					
1	内六角扳手 Hexagonal wrench	1.5-10;S91-1A	1套 1 set		5台配置1套 5 sets of configuration 1 set
2	扳手 Wrenches	8×10;S91-1A	1件 1 piece		
3	扳手 Wrenches	12×13;S91-1A	1件 1 piece		
4	扳手 Wrenches	14×15;S91-1A	1件 1 piece		
5	扳手 Wrenches	16×17;S91-1A	1件 1 piece		
6	扳手 Wrenches	18×19;S91-1A	1件 1 piece		
	扳手 Wrenches	22×24;S91-1A	1件 1 piece		
8	扳手 Wrenches	27×30;S91-1A	1件 1 piece		
9	扳手 Wrenches	46;S91-2A	1件 1 piece		
10	扳手 Wrenches	55;S91-2A	1件		
11	-螺丝刀 -Screwdriver	φ5×150	1件		
12	+螺丝刀 +Screwdriver	φ5×150	1件		

8 设备辅机及配件 Equipment auxiliary machines and accessories

序号 Serial number	名称 Name	型号或规格 Model or specification	数量 Quantity	制造厂商 Manufacturers	备注 Remarks
1	上下料工装小车 Loading and unloading work trolley	0732-0992	1台 1 unit		4台配置1辆 1 main roller replacement car with 2
2	上下辊小车 Upper and lower roller trolley	0732-0993	1台 1 unit		10台配置1辆 10 units configured with 1 vehicle

金刚线切片机 DW Slicer QP850+

3	定支承拆卸工具 Fixed bearing removal tool	QP720-722	1组 1 group		10台配置1组 10 units configured in 1 group
4	动支承拆卸工具 Dynamic bearing removal tool	QP720-721	1组 1 group		10台配置1组 10 units configured in 1 group
5	液压拉马 Hydraulic pulling horse	PHS 150-1000	1组 1 group		10台配置1组 10 units configured in 1 group
6	拉伸器 Tensioner	BLM30	1件 1 piece		
7	主辊吊装带 Tensioner		2根 2 sticks		1台主辊更换车配2根 1 main roller replacement car with 2

9. 易损件 (含耗材) 清单及型号 List and model of wearing parts (including consumables)

序号 Serial number	名称 Name	型号或规格 Model or specification	制造厂商 Manufacturers	备注 Remarks
1	油气润滑用油 Oil for oil and gas lubrication	VG32(DTE轻级涡轮机循环系统油) VG32(DTE light grade turbine circulation system oil)	美孚 Mobil	
2	轻质一体轮 Lightweight one-piece wheel	QP720-260301	阳辰 Yang Chen	
3	润滑脂 Grease	00#	壳牌 Shell	

10. 随机技术资料、工具 . Random technical information, tools

序号 Serial number	随机技术资料内容 Content of random technical data	数量 Content of random technical data
1	纸板和电子版设备使用说明书 (含设备总图、气动原理图、电气原理图、电气接线图等、设备操作流程说明书) Paperboard and electronic versions of equipment manuals (including equipment general diagram, pneumatic schematic diagram, electrical schematic diagram, electrical wiring diagram, etc., equipment operation process instructions)	随设备数量 With the number of equipment
2	备品备件清单及易耗品清单 Spare parts list and consumables list	1份 1 copy
3	装箱说明 (对箱内包装内容说明, 箱内非连接的零部件要做标示, 装箱说明中明细与标示要统一)	1份 1 copy

金刚线切片机 DW Slicer QP850+

	Packing instructions (description of the contents of the box, the box of non-connected parts to be marked, packing) (Box description of the details and labeling to be unified)	
--	---	--