



TÉRMINOS DE REFERENCIA

Pedido de Servicio N° 000120-2023-OCI

1. Denominación de la contratación

Contratación del Servicio de Traducción Certificada de inglés a español.

2. Finalidad pública

El servicio requerido permitirá contar con información necesaria, completa y exacta que contribuya al logro de los objetivos de la Auditoría de Cumplimiento a la "Adquisición de Sistema de Fabricación e Implementación de Circuitos Electrónicos" efectuada por el Órgano de Control Institucional de la Comisión Nacional de Investigación y Desarrollo Aeroespacial - CONIDA.

3. Actividad del POI

Gestión Administrativa.

4. Descripción del servicio

Se requiere el servicio de Traducción Certificada de inglés a español, en las cantidades estimadas y condiciones según se detallan a continuación:

DOCUMENTO / ARCHIVO	Cantidad	IDIOMAS	MODALIDAD
LPKF CONTAC RS	(4 páginas)	De Inglés a Español	Certificada
LPKF PROTOFLOW	(7 páginas)	De Inglés a Español	Certificada
LPKF PROTOMAT D104	(8 páginas)	De Inglés a Español	Certificada
LPKF PROTOPLACE S	(1 página)	De Inglés a Español	Certificada
LPKF PROTOPRINT S	(2 páginas)	De Inglés a Español	Certificada
CERTIFICADOS	(2 páginas)	De Inglés a Español	Certificada
OTROS ADICIONALES	(13 páginas)	De Inglés a Español	Certificada

5. Actividades

- El servicio comprende la traducción de un número determinado de páginas que integran los manuales relacionados al Sistema de Fabricación e Implementación de Circuitos Electrónicos y certificados, que se detallan en el cuadro precedente.
- La traducción requerida debe ser Certificada (traductor reconocido y autorizado por el Colegio de Traductores del Perú).
- La entrega de los documentos a traducir será mediante correo electrónico que el proveedor indique y en formato PDF y el correspondiente acuse de recibo.



- La traducción de los documentos deberá hacerse en papel de tamaño A4, con letra Arial de tamaño 12, espaciado múltiple 1.15.
- La información relacionada con el servicio de traducción no será divulgada a personas distintas a quien solicitó el servicio. El traductor tiene la obligación de mantener la confidencialidad respecto de la información contenida en los documentos traducidos.
- Los documentos y su traducción deberán ser entregados en el Órgano de Control Institucional de la CONIDA, sito en calle Luis Felipe Villarán N° 1069 Urb. Malibú - distrito de San Isidro - provincia y departamento de Lima (4to. Piso), de lunes a jueves de 08:30 a 16:30 horas o el viernes de 08:30 a 14:00 horas.

6. Plan de trabajo

No aplica para la presente contratación.

7. Reglamentos según leyes, reglamentos técnicos, normas meteorológicas y/o sanitarias nacionales, reglamentos y demás normas

No aplica para la presente contratación.

8. Impacto ambiental

No aplica para la presente contratación.

9. Seguros

No aplica para la presente contratación.

10. Prestaciones accesorias a la prestación principal

• **Garantía del servicio**

No aplica para la presente contratación.

• **Mantenimiento preventivo**

No aplica para la presente contratación.

• **Soporte técnico**

No aplica para la presente contratación.

• **Capacitación y/o entrenamiento**

No aplica para la presente contratación.

11. Lugar de prestación del servicio

El servicio se realizará en las instalaciones del contratista.

12. Plazo de ejecución del servicio

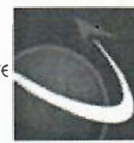
El servicio se ejecutará en el plazo de cinco (5) días calendario, contabilizados desde el día siguiente de notificada la orden de servicio.

13. Entregables

Traducción certificada impresa de los documentos señalados en el cuadro del numeral 4. Descripción del servicio, del presente TDR

14. Requisitos del proveedor

- Autorizado por el Colegio de Traductores del Perú.



- Deberá estar inscrito en el Registro Nacional de Proveedores. En caso de enmarcarse en una contratación menor a una (1) UIT el contratista se encuentra exceptuado de estar inscrito en el RNP, conforme lo establece el art. 10 del Reglamento de la Ley de Contrataciones del Estado. Sin embargo, no deberá encontrarse impedido o suspendido para contratar con el Estado, (Valor 1 UIT = S/ 4,950.00)
- Registro Único de Contribuyentes (RUC).

Requisitos del personal clave para calificación

- **Requisitos**

El proveedor deberá contar con traductores Certificados (traductor reconocido y autorizado por el Colegio de Traductores del Perú) que cuenten con formación académica como licenciados en Traducción o Traducción e Interpretación debidamente acreditado con título profesional.

15. Recursos y facilidades a ser provistos por la Entidad

El Órgano de Control Institucional de la CONIDA, proveerá la información y documentación necesaria para el desarrollo de las actividades.

16. Adelantos

No aplica para la presente contratación.

17. Confidencialidad

La información relacionada con el servicio de traducción no será divulgada a personas distintas a quien solicitó el servicio. El traductor tiene la obligación de mantener la confidencialidad respecto de la información contenida en los documentos traducidos.

18. Propiedad intelectual

No aplica para la presente contratación.

19. Medidas de control durante la ejecución contractual

No aplica para la presente contratación

20. Conformidad de la prestación

La conformidad será otorgada en un plazo de un (1) día calendario de producida la recepción, por el Órgano de Control Institucional.

21. Forma de pago

Lo que determine la indagación de mercado.

22. Penalidades aplicables

22.1 Penalidad por mora

En caso de retraso injustificado del contratista en la ejecución de las prestaciones objeto de la contratación, la Entidad le aplica automáticamente una penalidad por mora por cada día de atraso.

Cálculo de la penalidad diaria:

$$\text{Penalidad diaria} = \frac{0.10 \times \text{monto}}{F \times \text{plazo de vigencia}}$$

Dónde:

Monto: monto del servicio no atendido.



Plazo de vigencia: en días, de acuerdo al plazo ofertado
F = 0.40, para plazos menores o iguales a 60 días calendario.
F = 0.25, para plazos superiores a 60 días calendario.

Cálculo de la penalidad a aplicar:

Penalidad a aplicar = Penalidad diaria x días de retraso

21.2 Consideraciones generales

- El monto máximo de la penalidad por mora no superará el diez por ciento (10%) del monto de la orden de servicios.
- Esta penalidad se deduce de los pagos a cuenta o del pago final.
- Superado el monto máximo de la penalidad, la Entidad puede resolver la contratación.

23. Responsabilidades por vicios ocultos

El contratista es el responsable por los vicios ocultos del servicio-ofertados por un plazo de dos (02) años contados a partir de la conformidad otorgada por la entidad.

24. Anexos

No aplica a la presente contratación.

Atentamente,

Firmado Digitalmente

THALÍA EDITH DOMÍNGUEZ GONZALES

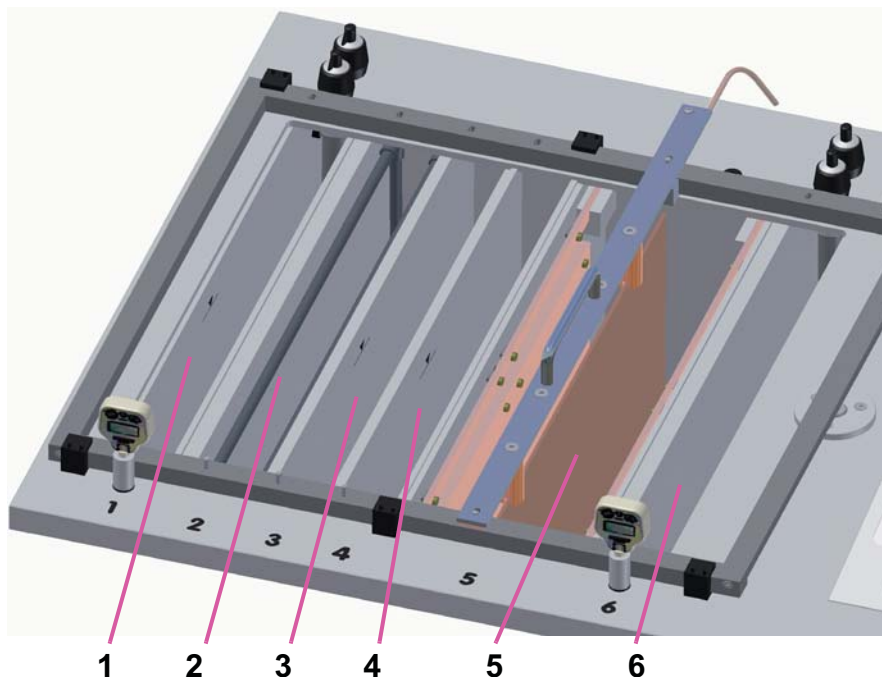
Jefa del Órgano de Control Institucional
AGENCIA ESPACIAL DEL PERÚ – CONIDA



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DOMINGUEZ GONZALES Thalia
Edith FAU 20131371889 soft
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documento
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3.1.2 Description of the individual tanks

Fig. 5: Tank configuration



- | | |
|---------------------|---------------------------------|
| 1 CLEANER 110 | 4 AKTIVATOR 310 |
| 2 Sprinkler rinsing | 5 COPPER PLATER 400 |
| 3 CLEANER 210 | 6 TIN POWDER SOLUTION SENO 3211 |

Tab. 1: Tank specifications

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6
Function	Degreasing	Sprinkler rinsing	Cleaning	Activation	Copper-plating	Tinning
Chemical	CLEANER 110	tap water	CLEANER 210	AKTIVATOR 310	COPPER PLATER 400	Tin powder solution SENO 3211
Dimensions w x l x d	45 x 600 x 350 mm	57 x 570 x 325 mm	45 x 570 x 325 mm	45 x 475 x 330 mm	152 x 570 x 360 mm	45 x 600 x 350 mm
Chemical volume	8.6 l		7.5 l	6.3 l	28.3 l	8.6 l
Heating	yes, 55 °C	no	no (room temperature 18 - 25 °C)			yes, 35 °C
Cover	single	combined		single	combined	

The amount of chemicals supplied in canisters is larger than the tank volume, so ensure that the marked fill level of the tanks is not exceeded when filling. The tanks must not be filled higher than the triangular marks or approx. 5 mm below the copper rails in case of tank 5 (see chapter 5.3.2, "Filling the tanks", on page 36).

8. Service and repair

8.1 Routine inspection

Tank 5 has to be inspected visually once a week for copper sulphate crystals on the walls and in the corners of the tank.

These crystals have to be put back into the bath.



Chemical bath can be ruined!

No copper sulphate crystals nor residues of the *COPPER PLATER 400* bath may reach the adjacent *AKTIVATOR* bath, the *AKTIVATOR* bath would be ruined. In such a case warranty claims are forfeited.

› Keep the *AKTIVATOR* bath covered.

8.2 Service and repair by user

8.2.1 Unit

The unit itself requires no servicing.

It is essential that the tanks are covered immediately after use in order to prevent contamination of the chemical baths.

Carefully clean the unit regularly (depending on volume of through-plated circuit boards weekly or even daily).



Tip: Never use abrasives to remove chemicals that have dripped on the unit, use a soft cloth instead. Otherwise, the unit's surface gets scratched and removal of chemical stains is made even more difficult.

8.2.2 Chemical Baths



Risk of scrap production!

Replacing or adding chemicals changes their effect.

› If chemical baths have been replaced or *SHINE 400* has been added the unit should be re-initialised with a dummy circuit board.

Bath 1 (Degreasing)

Product: *CLEANER 110*

Keep covered when not in use.

Evaporation losses can be replaced with distilled or de-ionised water if need be.

Replace the degreasing chemical after 3 months or when its colour has significantly changed.

Note: Avoid unnecessary heating as this shortens the service life.

Bath 3 (Cleaning)

Product: *CLEANER 210*

Keep covered when neither tank 2 nor tank 3 is in use.

Evaporation losses can be replaced with distilled or de-ionised water if need be.

Replace the chemical after 3 months or when its colour has significantly changed.

Bath 4 (Activation)

Product: *AKTIVATOR 310*

Keep covered when not in use.

The chemical bath is highly sensitive to contaminants and acid ions and thus requires careful handling.

Traces of *CLEANER 110*, *CLEANER 210*, *COPPER PLATER 400*, tap water, any acidic chemicals, iron particles or similar can shortly lead to malfunction of the chemical bath. In this case it is irrelevant whether it is in use or not. If the unit is not in use the bath should be stirred thoroughly once a week.

Note: After intervals of non-use (more than one day) stir the bath for 2 to 3 minutes with a fibre glass rod or similar. If this has created foam wait until it has subsided before inserting a circuit board.

Replace losses only with *AKTIVATOR 310* (fill up to triangular mark).



Chemical bath can be ruined!

The *AKTIVATOR* bath is highly sensitive.

› **Never add water to the *AKTIVATOR* bath as this prevents the through-plating from working.**

After a year at the latest, the bath has to be replaced.

After replacing the chemical ensure that it is thoroughly stirred.

Bath 5 (Copper-plating)

Product: *COPPER PLATER 400*

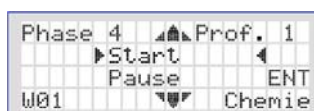
Keep covered when neither tank 5 nor tank 6 is in use and filter (see below) regularly (approx. every 3 weeks).

Note: The service life of the tank's contents is approx. one year. As the service life is influenced by careful operation and air pollution this is only an estimate and can vary.

Filtering bath 5

1. Drain approx. 5 litres from the tank into a clean and dry container (e.g. canister) using the same steps as in "Draining the tanks" on page 66.
 Note: Filtering this partial volume of the bath is sufficient as contaminants accumulate at the bottom of the tank where they are flushed through the drainage tube with this partial volume.
2. Pour the drained volume through a fluted filter (alternatively use several nested paper coffee filters) into another clean and dry container (e.g. a canister).
3. Pour the filtered chemical back into tank 5.
4. Replenish using *COPPER PLATER 400*.
5. Wipe the tank's rim with a cloth that has been moistened with distilled or de-ionised water.

Adding *SHINE 400*



The chemical additive *SHINE 400* is consumed depending on throughput. The unit has an internal counter for the ampere hours used. After 100 ampere hours the warning **W01 CHEMIE** is displayed. Complete the current plating process before adding 5 ml *SHINE 400* to the *COPPER PLATER* bath.

1. Complete the current plating process with all remaining steps.
 2. Afterwards, add 5 ml of *SHINE 400* to tank 5.
 3. Re-initialise the unit with a dummy circuit board (A3 size):
 - Phase 1: 15 minutes
 - Phases 3 and 4 are skipped
 - Phase 5: 90 minutes at 18 A, RPP off
 4. Confirm adding the chemical in the setup menu (see "Setup menu" on page 25).
- [] The chemical *SHINE 400* has been added and the ampere hour counter is reset to 0.

2 Technical data

Electrical data

Data	Value
Power supply	Single phase 220-240 V, 50-60 Hz, 16 A
Max. power consumption	3500 W
Main fuse characteristics	T 16 A, 250 V

Mechanical data

Data	Value
Dimensions (width x height x depth)	647 x 315 x 450 mm (25.5" x 12.4" x 17.7")
Dimensions with open drawer	647 x 315 x 900 mm (25.5" x 12.4" x 35.4")
Weight	22 kg (48.5 lbs)
Required surface space	800 x 550 mm (31.5" x 21.2")
Additional required space for drawer	450 x 450 mm (17.8" x 17.8")

Climatic conditions

Data	Value
Temperature range	15 to 30 °C (59 to 95 °F)
Relative humidity	30 to 80%

Operating specifications

Data	Value
Max. size of PCB	230 x 305 mm (9" x 12")
Max. preheating temperature, time	220 °C, 999 s (396 °F)
Max. reflow temperature, time	320 °C, 600 s (576 °F)
Long thermal treatment temperature, time	220 °C, 64 h (396 °F)
Temperature stabilization time	< 5 min
PCB cooling	Two speed-adjustable bottom-mounted fans

Emissions

Data	Value
Sound pressure level LpA (EN ISO 3744)	< 70 dB (A)
EMC emission class	A

Module for temperature recording (optional)

Data	Value
Supported systems	LPKF ProtoFlow S
Temperature range	-200 °C to +1250 °C (-330 °F to +2280 °F)
Temperature sensors	K-type

3.7 Software

The system can be operated with the software LPKF FlowShow SE.

LPKF FlowShow SE enables temperature logging of the current profile (chart and data), programming of system profiles from the saved database, and upgrading the ProtoFlow firmware.



The LPKF FlowShow SE software is not required for general use of the LPKF ProtoFlow S. LPKF FlowShow SE is a tool for displaying and analyzing temperature measurements and enables more convenient profile programming. Therefore, connection to a PC is not required.

Starting the software

▶ Perform one of the following steps:

- Click on *Start > All Programs > LPKF Laser & Electronics > FlowShow SE* and click on the *FlowShow SE* icon.
- Double-click on the icon on the desktop.

□ The following user interface is displayed:

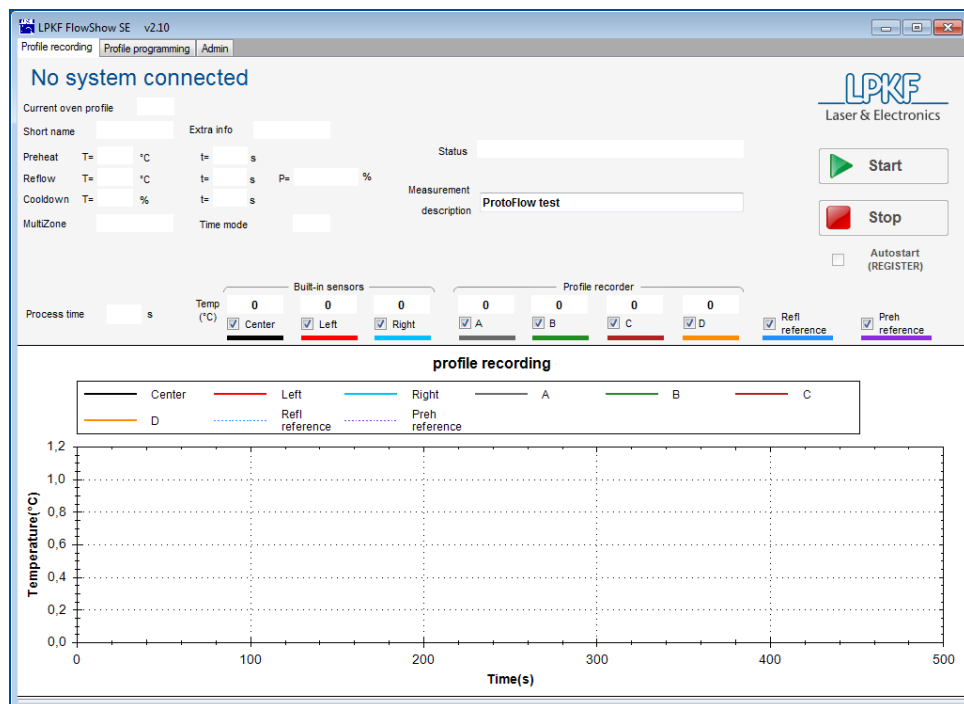


Fig. 10: FlowShow SE user interface

☑ The software SE has been started.

3.8 Optional modules, accessories, extras



Only equipment approved by LPKF can be used for the system. The use of unsuitable equipment could endanger the user!

The system can be equipped with the following accessories:

- Module for temperature recording
- N2 module



For more information contact the LPKF sales department or your local representative.

3.8.1 Module for temperature recording

As an extra option, the module for temperature recording can be integrated with the drawer to measure the temperatures on the PCBs or particular electronic components.

All LPKF ProtoFlow S ovens are prepared for mounting the module for temperature recording. A necessary connector and a cable are installed under the blank cover.

A USB communication port enables data transfer to a PC for analyzing and editing the process data.

3.8.2 Software

The LPKF FlowShow SE software is an excellent accessory that simplifies the handling of ProtoFlow S. The following figure shows the user interface of the LPKF FlowShow SE software.

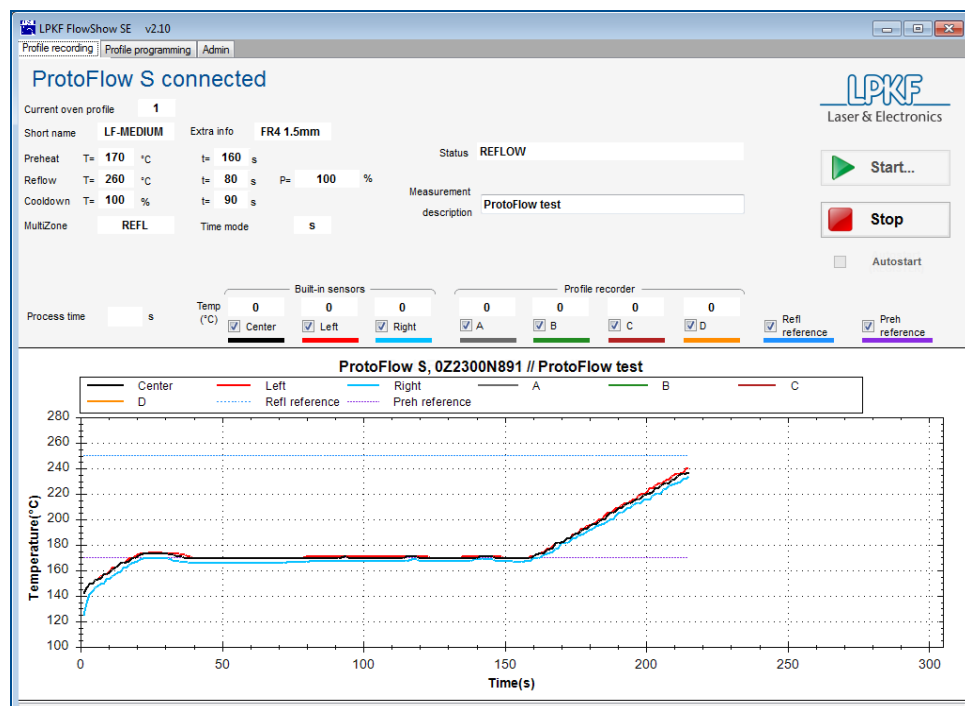


Fig. 11: LPKF FlowShow SE

4.3.2 Disposing of the packaging materials

Dispose of the packaging material according to the current laws and local regulations.



Before you dispose of the original packaging, consider whether it will be required again to transport or store the system.

NOTICE

Environmental hazard by wrong disposal of packaging!

Wrong disposal of packaging material can cause environmental hazards.

- ▶ Dispose of the packaging material environmentally friendly.
- ▶ Observe the local disposal regulations and hire a specialized company for the disposal, if necessary.

The system may only be shipped in the original packaging of LPKF. Contact the LPKF Service if you need the packaging.

4.4 Storage

When putting the system out of operation and into storage over a longer period, ensure that the storage room is clean, almost dust-free, and has a sufficient load-bearing capacity.

▶ Observe the following conditions to store the system:

- Do not store the system outside.
- Store the system dry and dust-free.
- Do not expose to aggressive substances.
- Protect against sunlight.
- Storage temperature: 10 °C to 40 °C; 50 °F to 104 °F
- Relative air-humidity: max 60%, non-condensing.

When storing the system for more than 3 months, use the original packaging and check the general condition of all components and the packaging on a regular basis.

4.5 Unpacking the system

When unpacking the system remove the packaging material, check the contents against the enclosed packing list and check the general state of the equipment. Make sure you remove all packaging, otherwise severe damage could be caused to the system!

NOTICE**Property damage by improper handling!**

Improper handling can cause damage to the system.

- ▶ Handle the system with appropriate care.
- ▶ Make sure you do not tilt, shake or impact the system during transport.

5.2 Requirements of the place of installation



Ensure that the environment in which the equipment is going to be used conforms to that specified in this document. It is particularly important that there is no contact with water in any of its forms. Furthermore, the system may not be operated or stored in humid conditions!

The system is intended for use as a table-top device. The weight of the system is 22 kg (48.5 lbs). Make sure the place of installation has sufficient load-bearing capacity.

5.2.1 Minimum required space

System dimensions

- Width 647 mm (~25.5")
- Depth 450 mm (~17.7")
- Height 315 mm (~12.4")

Minimum required space for installation and maintenance

- Width 800 mm (~31.5")
- Depth 550 mm (~21.7")
- Height 315 mm (~12.4")

The minimum required surface space for the system is 800 x 550 mm/31.5" x 21.7". Leave at least 450 x 450 mm/17.8" x 17.8" free space in front of the system for opening the drawer.

Make sure that the workspace surface is even.

Minimum required space for operation with a computer

In case you intend to connect the system to a computer, sufficient space for the computer must be ensured in addition to the minimum space requirements for the system.

To correctly set up the PC work station, observe and follow the standards, guidelines and recommendations for arranging a computer workplace area.

5.2.2 Climatic conditions

The system can operate in diverse locations and within a wide range of environmental conditions. However, control over temperature, humidity, and airflow is necessary to ensure optimal system performance and reliability.

The following climatic conditions are recommended for operating the system.

Data	Value
Temperature range	22°C ± 2 °C (71.6 °F ± 3.6 °F)
Temporal change	Max. 0.5 °C/h (0.9 °F/h)
Humidity	60% non-condensing

Table 3: Climatic conditions

5.3 Installing the LPKF ProtoFlow S and performing first startup

Check the system for transport damage before the installation is started. The system has to be transported to the desired place of installation. The total weight of the system has to be considered.



Before starting-up the system for the first time, it is necessary to allow the system to acclimatize. Leave the unconnected system in the working area for such a period that the system adjusts to the ambient temperature in the room.

■ Installing the system

1. Place the system on a flat surface at the place of installation.
2. Connect the mains cable to a grounded mains socket.

The system has been installed.

■ Performing the first startup

1. Press the power button to turn on the system.
2. In case data are lost with the first startup of the system (names of the profiles are not readable), reload the factory profiles and settings. Select *SETTINGS > FACTORY PR.*
3. After data reloading, turn the system off and on to accept the settings.
4. Open the drawer for the first time by selecting *OPEN/CLOSE* in the menu or by pressing the up ▲ button in the basic menu.



When the drawer is opened for the first time, it will go out further than usually. The reason for this is its automatic function for drawer alignment. After that, the drawer opens normally.

5. Close the drawer by selecting *OPEN/CLOSE* option in the menu or pressing the up ▲ button.

The first startup has been performed.

7 Maintenance

This chapter contains important information about maintenance of the system.

Proper maintenance and the proper operation of the system are basic requirements for a smooth functioning of the system.

Maintenance should be executed and documented on regular basis. Each maintenance task and each service has to be recorded in a logbook with date, operating hours, as well as the tasks that have been executed.

The system is designed for a service life of 10 years used in one-shift operation (10 hours a day). The specified maintenance intervals are valid for one-shift operation at 5 days a week.

7.1 Safety

Follow the safety instructions below for your own protection and for the protection of other persons in the vicinity during maintenance of the system. Ensure that the described prerequisites for the planned maintenance tasks are fulfilled and observe the special safety notes for every individual task.

⚠ DANGER

Danger to life by electrical shock!
Touching energized components or cables can cause death by electrical shock and/or fire.

- ▶ Turn off the system with the power button before starting any maintenance work.
- ▶ Disconnect the system from the power supply.

NOTICE

Property damage by unauthorized use!
Unauthorized use can cause damage to the system.

- ▶ Maintenance and service tasks have to be performed by qualified personnel.

7.2 Maintenance schedules

The following tables provide an overview of the maintenance tasks that have to be performed by properly trained personnel.

7.2.1 Maintenance schedule for the maintenance personnel of the operator

Component/ Subassembly	Interval	Task to be performed	Note
System	Every week or when required	Cleaning	Refer to page 77
Main fuse	When required	Replacing	Refer to page 77
Firmware update	When required	Updating	Refer to page 67

Table 9: Maintenance schedule for the maintenance personnel of the operator

3 Technical data

The following table contains technical data of the system:

LPKF ProtoMat D104	
Processing area (X / Y)	305 mm x 229 mm (12" x 9")
Processing range (Z)	10 mm (0.4")
Mechanical resolution (X / Y)	0.3 µm
Mechanical resolution (Z)	0.2 µm
Repetition accuracy	1 µm
Movement speed (X/Y)	70 / 70 (100 mm diagonal) (3.9")
Spindle speed	10 000 – 100 000 rpm, software controlled
Tool exchange positions	15
Drilling speed strokes/min	120
Accuracy of the non-contact tool adjustment	+/- 5 µm
Laser class acc. to EN 60825-1:2008	1
Diameter of focused laser beam	0.015 mm
LASER - minimum track width on 18 µm Cu	50 µm
LASER – minimum distance between the tracks on 18 µm Cu	15 µm
Mechanical – minimum track width on 18 µm Cu	100 µm
LASER – minimum distance between the tracks on 18 µm Cu	100 µm
Laser power	100 mW
Laser wavelength	349 nm
Vision system for optical fiducial recognition/width check	Standard equipment
Stack light	Standard equipment
Acoustic hood	Standard equipment
Software CircuitPro PM	Standard equipment
Automated extraction control	Standard equipment (performance level D, acc. to DIN EN ISO 13849)
Vacuum table	Standard equipment
Depth limiter	Air cushion
Interfaces	USB 2.0
Required space (W x D x H incl. opened cover)	660 mm x 870 mm x 700 mm (25.9" x 34.3" x 27.6")
Weight	99 kg (218.3 lbs)

LPKF ProtoMat D104	
Operational data	
Power supply (V, Hz, W)	AC 85 V – 260 V, 50 – 60 Hz, 440 W
Compressed air and compressed-air flow	0.6 MPa / <100 l/min
Ambient temperature	22 °C ± 2 °C
Air humidity	Max. 60% non-condensing
Extraction system LMD 508	
Power supply	230V, 50/60Hz, 1.2kW
Air flow	320m³/h max. vacuum pressure 21.000 Pa
Filter	Activated-carbon filter and HEPA filter
Dimensions	365 mm x 1245 mm x 501 mm (14.4" x 49" x 19.7")
Weight	80 kg (218.3 lbs)
PC requirements	
OS	WindowsXP 32bit and Windows7 32/64bit
Graphics requirements	Min. 1024 x 768 (128MB) Opt. 1680 x 1050 (1GB)
Processor and free space	Min. 2 GHz Single Core, 2 GB RAM Opt. 2.6 GHz Dual Core, 8 GB RAM
Interfaces	2 x USB 2.0



Note

The camera of the system is connected via a USB 2.0 interface. Due to compatibility issues that may arise with Intel Core processors from the 6. generation onwards and USB 2.0 interfaces, the manufacturer recommends **not to use** PCs with Intel Core processors of generation 6 or higher.

4.10.2 Accessory kit ProtoMat D104

Accessory kit ProtoMat D104 (order code: 10035172) consisting of:

Table 13:
accessory

Description	Quantity	Order code
Sinter plate	1 pc	10033233
Special adhesive tape 19 mm x 50 m	1 pc	106373
Board cleaning pad	3 pcs	101074
Tool kit - 1/8" (see page 53)	1 pc	129103

Table 14: Tool

Tool name	Length (mm)	Ø (mm)	Quantity	Order code
End Mill RF, custom tool, cylindrical, 1/8"	36	0.15	3 pcs	115832
End Mill RF, custom tool, cylindrical, 1/8"	36	0.25	10 pcs	115833
End Mill RF, custom tool, cylindrical, 1/8"	36	0.40	3 pcs	115834
Micro Cutter, fine line, conical, 1/8"	36	0.1/ 0.15	5 pcs	115836
End Mill long, cylindrical, PCB/aluminum, 1/8"	38	2.00	2 pcs	129102
End Mill, cylindrical, PCB/aluminum, 1/8"	36	1.00	5 pcs	115840
End Mill, cylindrical, PCB/aluminum, 1/8"	36	2.00	2 pcs	129100

Table 15: base material

Material	system dimensions (mm)	Copper (µm)	Quantity	Order code
base material FR4, pre-drilled with registration holes	229 x 305 x 1.5	35/35	5 pcs	116030
base material FR4, pre-drilled with registration holes	229 x 305 x 1.5	18/18	5 pcs	116028
base material FR4, pre-drilled with 3 registration holes	229 x 305 x 1.5	0/18	5 pcs	116027

4.10.3 Tool kit 1/8"

Tool kit consisting of tools with a shank of 3.175 mm (1/8") diameter and spacer rings Order code: 129103

Table 16: Tool kit 1/8"

Tool name	Length (mm)	Ø (mm)	Quantity
UniversalCutter, conical, 1/8"	36	0.20 - 0.50	10
Micro Cutter, conical, 1/8"	36	0.10 - 0.15	2
End Mill, cylindrical, PCB/aluminum, 1/8"	36	0.8	1
End Mill, cylindrical, PCB/aluminum, 1/8"	36	1.00	2
End Mill, cylindrical, PCB/aluminum, 1/8"	36	2.00	2
End Mill long, cylindrical, PCB/aluminum, 1/8"	38	1.00	1
End Mill long, cylindrical, PCB/aluminum, 1/8"	38	2.00	1
Contour Router, special tool, cylindrical, 1/8"	38	1.00	2
Contour Router, special tool, cylindrical, 1/8"	38	2.00	2
Spiral Drill, drill, cylindrical, 1/8"	38	0.40	2
Spiral Drill, drill, cylindrical, 1/8"	38	0.50	2
Spiral Drill, drill, cylindrical, 1/8"	38	0.60	2
Spiral Drill, drill, cylindrical, 1/8"	38	0.70	2
Spiral Drill, drill, cylindrical, 1/8"	38	0.80	2
Spiral Drill, drill, cylindrical, 1/8"	38	0.90	2
Spiral Drill, drill, cylindrical, 1/8"	38	1.00	2
Spiral Drill, drill, cylindrical, 1/8"	38	1.20	1
Spiral Drill, drill, cylindrical, 1/8"	38	1.40	1
Spiral Drill, drill, cylindrical, 1/8"	38	1.50	2
Spiral Drill, drill, cylindrical, 1/8"	38	1.60	1
Spiral Drill, drill, cylindrical, 1/8"	38	1.80	1
Spiral Drill, drill, cylindrical, 1/8"	38	2.00	2
Spiral Drill, drill, cylindrical, 1/8"	38	3.00	2

5.3 Packaging

The package has been packed according to the shipping conditions to be expected.

The packaging is intended to protect the system against transport damage, corrosion, and other types of damage. Thus, do not damage the packaging and only remove it just before installation.

Handling the packaging materials

Dispose of the packaging material according to the current laws and local regulations.



Note

Hazard to the environment due to improper disposal!

Packaging materials are valuable resources and can often be re-used or recycled. Improper disposal of packaging materials can cause hazards to the environment.

- Dispose of the packaging materials in an ecological way.
- Observe the local disposal regulations. If necessary, contract a specialized company for disposal.

5.4 Storage

The system has to be stored in the original packaging and in accordance with the symbols on the packaging.

Shipping packages have to be stored under the following conditions:

- do not store outside
- store dry and dust-free
- do not expose to aggressive substances
- protect against the sun
- storage temperature: $+22\text{ °C} \pm 2\text{ °C}$
- relative air humidity: max. 60 %
- If storing the system for more than 3 months, check the general condition of all parts and the packaging regularly. If required, refresh or renew the preservation.

6.1 Requirements of the place of installation

The system has to be transported to the desired place of installation. Transport the system in the packaging with a hand pallet truck. The total weight of the system has to be considered!

6.1.1 Climatic conditions

The following climate conditions have to be ensured for operating the system.

Table 17: Climatic conditions

Climatic conditions	
ambient temperature	22 °C ± 2 °C
humidity	max. 60% non-condensing

6.1.2 Minimum required space for the system

System dimensions

Length	844 mm
Width	740 mm
Height	621 mm

Minimum required space for system operation and maintenance

Length	1389 mm
Width	740 mm
Height	719 mm



CAUTION

Risk of injury!

The hoses of the extraction system are connected to system. If the hoses are laid inappropriately they pose a tripping hazard.

Lay the hoses and cables so that they pose no tripping hazard.

8 Maintenance

This chapter contains important information about maintenance of the system.

Proper maintenance and the proper operation of the corresponding supply units are basic requirements for a smooth function of the system.

The system is designed for a service life of 10 years for one 10-hour shift per workday. The maintenance intervals are given for one-shift operation and a 5-day workweek.

8.1.3 Personal protective equipment

The following personal protective equipment must be available for the maintenance tasks:

- Respirator mask according to EN 141/143; protection level P2
- latex lab gloves

8.1.4 Personnel

The maintenance tasks may only be performed by the maintenance personnel of the operating company.

8.2 Maintenance schedule

Detailed information on the maintenance steps start on page 156.



Note

LPKF offers maintenance contracts specially tailored for your system. For more information contact the LPKF Service.

Parts of maintenance	Interval	What to do?	Replacement/maintenance
depth limiter	after 125 tool exchanges	cleaning	see chapter 8.3.1 on page 156
compressed-air system	after 250 operating hours or at least every three months	cleaning, replacing	see chapter 8.3.2 on page 161 see chapter 8.3.6 on page 181 see chapter 8.3.7 on page 183 see chapter 8.3.8 on page 185
focusing lens	Every month	cleaning	see chapter 8.3.3 on page 162
drive spindle, linear guides	after 500 operating hours or at least every six months	cleaning, lubricating	see chapter 8.3.4 on page 171
tool clamp	after 125 tool exchanges	cleaning, lubricating	see chapter 8.3.5 on page 176
housing fan	after 250 operating hours or at least every three months	replacing	see chapter 8.3.9 on page 187
clamping sheets	after 1000 operating hours or at least every year	replacing	see chapter 8.3.12 on page 193
extraction system	Refer to the TEKA-LMD 508 manual	cleaning, replacing	Refer to the TEKA-LMD 508 manual

3 BASIC DATA

3.1 Name and address of the manufacturer

Company name: LPKF Laser & Electronics d.o.o.
 Abbreviated name: LPKF d.o.o.
 Address: Polica 33
 SI-4202 Naklo
 Slovenia

Telephone: + 386 (0) 592 08 800
 Fax: + 386 (0) 592 08 820

Internet: www.lpkf.com

E-mail: support@lpkf.si, sales@lpkf.si

Trade-mark: 

3.2 Relevant model

ProtoPlace S

3.3 Intended use

ProtoPlace S is a placer intended for professional use in assembling printed circuit boards with most surface mounted components (SMD) currently available on the market. The device is intended for:

- Placing components
- Dispensing of soldering pastes, glues and washers

3.4 Technical data

Max. size of PCB	297 x 420 mm (11.8" x 15.6")
Min. size of components	0201 chip components
Power supply	220-240 V / 50Hz or 110-120 V / 60 Hz 10 VA
Compressed air supply	0.6 MPa (6 bar), min 10 l/min, dry, non-lubricated
Weight	25 - 35 kg (55.1 - 77.1 lbs) (with additional/optional equipment)
Device dimensions (W x H x D)	760 x 250 x 760 mm (30" x 10" x 30")
Device dimensions with feeders and turntable (W x H x D)	1000 x 500 x 900 mm (39.7" x 19.7" x 35.4")
Vacuum	0 - 0.08 MPa (0 - 0.8 bar)
Pulse/Pause duration	0.1 - 9 s/0.1 - 2 s
Number of dosing points	Up to 300 per minute
Dosing quantity	min. 0.2 mm ³
Turntable position	Backward
Feeders position	Left
Ambient conditions	Temperature: 15-30°C (59-95°F) Relative humidity: 30 - 80 % General level of lightning: 500 lx

3 BASIC DATA

3.1 Name and address of the manufacturer

Company name: LPKF Laser & Elektronika d.o.o.
 Abbreviated name: LPKF d.o.o.
 Address: Polica 33
 SI-4202 Naklo
 Slovenia

Telephone: + 386 (0) 592 08 800
 Fax: + 386 (0) 592 08 820

Internet: www.lpkf.si

E-mail: support@lpkf.si, sales@lpkf.si

Trade-mark: 

3.2 Relevant model

ProtoPrint S

3.3 Intended use

ProtoPrint S is a table top manual stencil printer for professional fine pitch SMT precision prototyping and short run production intended for use in room operation only.

3.4 Technical data

Frame size	Width up to 430 mm (16.9") Length adjustable from 420 to 520 mm (16.5" to 20.5") Height adjustable from 20 to 40 mm (0.8" to 1.6")
PCB thickness	Up to 5 mm (0.2"), optionally more
Max printing area	300 x 300 mm (11.8" x 11.8")
Print stroke	Manual
Print table adjustment	X and Y axis: +/- 10 mm (0.4" / 400 mils) Rotation: +/- 5°
Accuracy (machine)	+/- 0.025 mm (+/- 1 mil)
Double sided printing	Max. height of components is 15 mm (0.6")
Device dimensions (W x H x D)	850 x 180 x 530 mm (33.4" x 7.1" x 20.9")
Weight	30 kg (60 lbs)

Configurations (additional to ProtoPrint S specifications)

ProtoPrint S System
 ZeiFlex QR 362x480
 Print area approx. 260 x 330 mm
 (10.2" x 13")
 /
 Hand squeegee, rubber, 260 mm

ProtoPrint S RP
 ZeiFlex QR 266x380
 Print area approx. 164 x 230 mm
 (6.5" x 9.1")
 Adapter for universal frames
 Hand squeegee, metal, 180 mm

8 MAINTENANCE

8.1 Cleaning

The surface of the printer can be easily cleaned with a soft cloth, soaked in a mild detergent solution.

The stencil must be cleaned after each use on both sides.

Pastes must be cleaned in accordance with manufacturer instructions for each individual substance.



Most soldering pastes and glues can be cleaned using isopropyl alcohol.



Caution!
Follow the manufacturers' instructions for each individual substance!

8.2 Maintenance

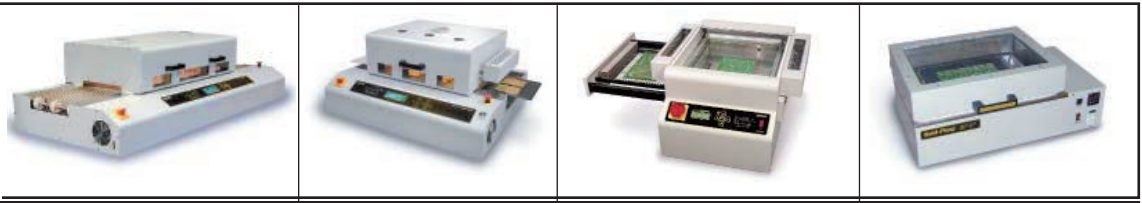
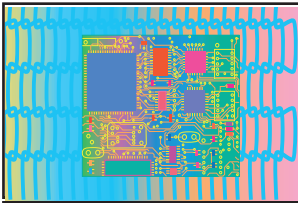
For best performance of the printer it is recommended to clean it after every use.

After some time, grease on extensively used guides will run out. This will happen also when using cleaning solutions on guides.

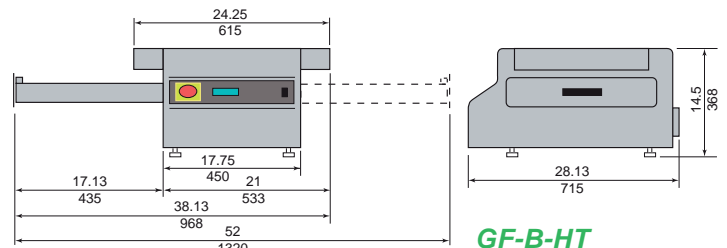
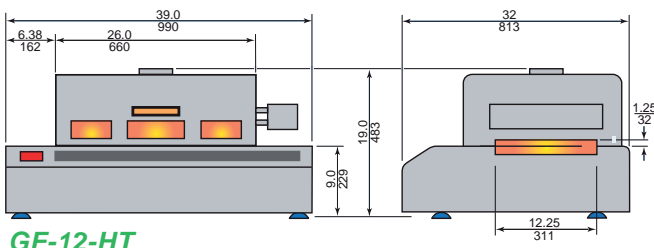
In order to maintain smooth operation it is necessary to grease the main guides with a thin layer of Lithium grease every six months.

Also grease guides after cleaning them with cleaning solutions.





Conveyor and Batch Reflow Ovens



Model:	GF-120-HT	GF-12-HT	GF-B-HT	GF-C ² -HT
Heating zones	3 top, 3 bottom	3 top, 3 bottom	1	1
Cyclonics™ (forced air)	3	3	1	1
Conveyor extensions	NA	yes	Dual board shuttle	NA
Electrical power	220 VAC, 50/60 Hz 1Ø (3Ø option), 50A 8.7 Kw	220 VAC, 50/60 Hz 1Ø (3Ø option) 5.5 Kw	15A @220 VAC, 50/60 Hz 1Ø, 2.7 Kw	110 VAC, 50/60 Hz, 20A 220VAC, 50/60 Hz, 10A 1.8 Kw
Max board width	12" (305mm)	12" (305mm)	12" x 12" (305 x305mm)	12" x 12" (305 x 305mm)
Max board height	1.375" (35mm)	1.375" (35mm)	1.250" (32mm)	3" (76mm)
Cooling station(s)	1	1	2	NA
Max temperature: Lead free compatible	752°F (400°C)	662°F (350°C)	600°F (315°C)	600°F (315°C)
Venting	(2) 4" flanges 100 CFM ea. max.	4" flange 100 CFM max.	4" flange with integral fan	NA
Heating technology	Forced air Horizontal Convection™	Forced air Horizontal Convection™	Forced air convection	Forced air convection
Heat tunnel length	41" (1042mm)	26" (660mm)	NA	NA
Nitrogen option	Yes	Yes	Yes	Yes
Stand option	Yes	Yes	Yes	no
PC interface option	Yes	Yes	no	no
Overall dimensions	73" x 34" x 19"H 1854 x 864 x 483 mm	39" x 32" x 19" H 990 x 813 x 483 mm	38.13" x 28.13" x 14.5" H 968 x 715 x 368 mm	29.12" x 16.5" x 12" H 740 x 420 x 305 mm
Approximate weight	325 lbs (148 kg)	220 lbs (98 kg)	102 lbs (46 kg)	56 lbs (25 kg)



FEATURES AND SPECIFICATIONS

	 manual	 manual	 manual	 semi-automatic	 automatic
Model:	SPR-10	SPR-20	SPR-25	SPR-40	SPR-45
Linear squeegee guide	no	no	yes	yes	automatic
Adjustable power sweep squeegee for single or dual passes	no	no	manual	yes	
Dual squeegee adjustable angle of attack	no manual	no manual	yes yes	yes no	yes no
Adjustable dual squeegee pressure/speed	manual	manual	manual	pneumatic/manual	pneumatic/ pneumatic
Automatic power frame lift	no	no	manual	manual	yes
X & Y adjustment	± 0.500" (12.7mm)	± 0.500" (12.7mm)	± 0.500" (12.7mm)	± 0.500" (12.7mm)	± 0.500" (12.7mm)
Z axis adjustment	0 to 3/4" (19mm) (4 point leveling)	0 to 3/4" (19mm) (4 point leveling)	0 to 5/8" (16mm) single knob, self leveling	0 to 5/8" (16mm) single knob, self leveling	0 to 5/8" (16mm) single knob, self leveling
Theta adjustment	(manual alignment)	Single knob with true Ø, ± 3° range	Counter rotating dual knobs, ± 5° range	Counter rotating dual knobs, ± 5° range	Counter rotating dual knobs, ± 5° range
Adjusts to various size frames	yes	yes	Frame holder accepts any size stencil frame up to 23" x 23"	Frame holder accepts any size stencil frame up to 23" x 23"	Frame holder accepts any size stencil frame up to 23" x 23"
Clear Lexan® fixture for initial registration	no	yes (for Y and Ø)	yes (for X, Y and Ø)	yes (for X, Y and Ø)	yes (for X, Y and Ø)
Unique "foil-frame" option	yes, models FF-10/20	yes, models FF-10/20	yes, model FF-25	yes, models FF-40/45	yes, models FF-40/45
Nesting kit option for double sided PCBs	yes	yes	yes	yes	yes
Vacuum hold-down option	no	no	yes	yes	yes
Metal squeegee option	yes	yes	yes	yes	yes
Maximum print area	12" x 15" 305 x 380mm	12" x 15" 305 x 380mm	16" x 18" 406 x 457mm	16" x 18" 406 x 457mm	16" x 18" 406 x 457mm
Outside frame dimensions	20" x 17" 508 x 432mm	20" x 17" 508 x 432mm	23" x 23" 584 x 584mm	23" x 23" 584 x 584mm	23" x 23" 584 x 584mm
Approximate weight	35 lbs (13.6 kg)	50 lbs (22.7 kg)	117 lbs (53.1 kg)	150 lbs (68 kg)	160 lbs (73 kg)
Power*	NA	NA	NA	NA	110* VAC, 50/60 Hz, 2 A
Air pressure	NA	NA	NA	80 psi (5 bar)	80 psi (5 bar)
Weight with stand option	NA	NA	164 lbs (74.3 kg)	197 lbs (89.4 kg)	207 lbs (93.9 kg)
Overall dimensions	17.5"W x 27"L x 11"H 445 x 686 x 280mm	21"W x 28"L x 11"H 533 x 711 x 280mm	28"W x 33"L x 14"H 711 x 838 x 355mm	28.5"W x 33"L x 14"H 724 x 838 x 355mm	30"W x 35"L x 16"H 762 x 900 x 406mm
Height with stand option	NA	NA	45" (1143mm)	47" (1194mm)	47" (1194mm)

*220/240 VAC available



T-Tech, Inc.
510 Guthridge Ct.
Norcross, GA. USA 30092

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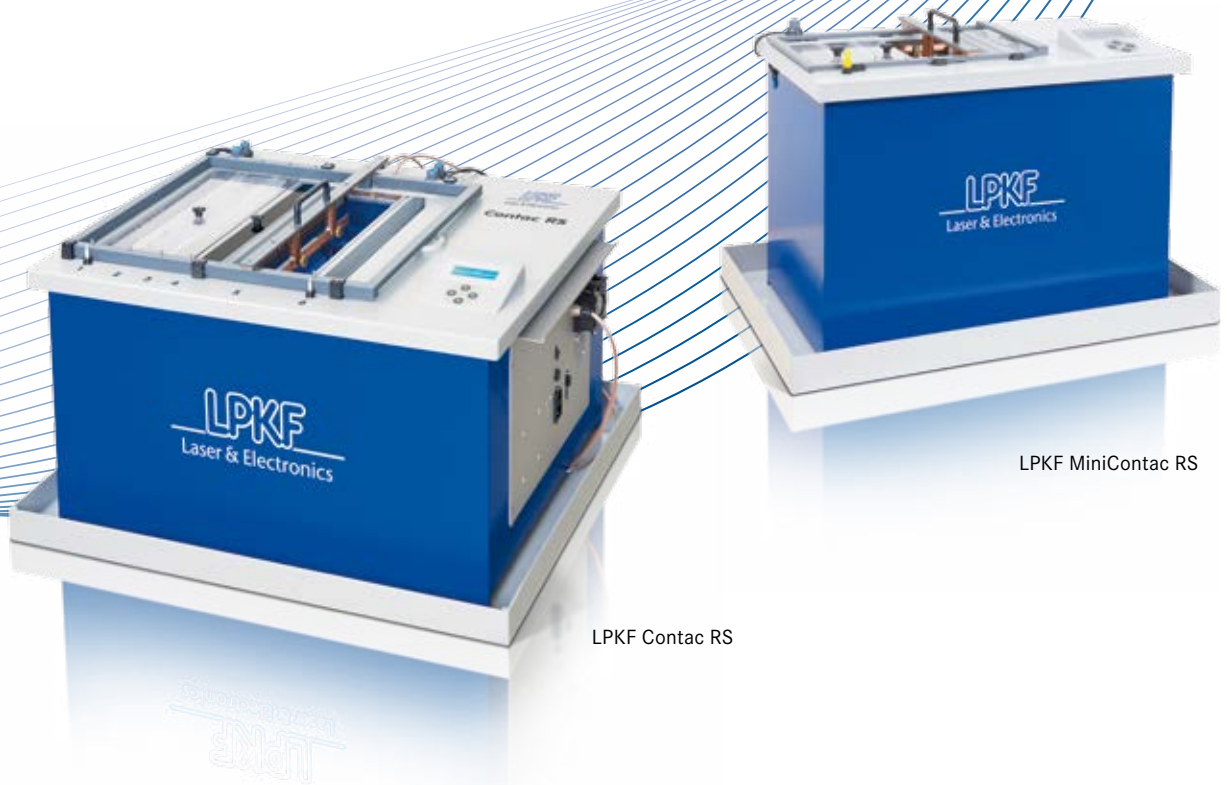
Website
<http://www.t-tech.com>

Features	QCJ5-60	QCJ5-100
RPM - Software Controlled	0-60,000	0-100,000
3 Phase Spindle Power	300 Watts	300 Watts
Smallest Drill Size	.15mm (0.006")	0.1mm (0.004")
Smallest Mill Size	.15mm (0.006")	0.1mm (0.004")
Milling Speed	3,800mm/min (150"/min)	3,800mm/min (150"/min)
Traverse Speed	3,800mm/min (150"/min)	3,800mm/min (150"/min)
Drilling Speed	180 Holes/min	180 Holes/min
Routing Speed	3,800mm/min (150"/min)	4,500mm/min (180"/min)
Material Size	35cm x 40cm (14"x16")	35cm x 40cm (14"x16")
Work Area	25x33x6 cm (10x13x3.5")	25x33x6 cm (10x13x3.5")
Resolution	0.0012mm (0.0005")	0.006mm (0.00025")
Repeatability	0.008mm (0.00036")	0.004mm (0.00018")
Stroke Z-Axis	76mm (3.5")	76mm (3.5")
Machine Voltage	80-245 Volts 50/60Hz	80-245 Volts 50/60Hz
Machine Dimensions	66x66x50cm (26x26x20")	66x66x50cm (26x26x20")
Machine Weight	45 kg (99 lbs)	49 kg (108 lbs)
Automatic Tool Change	12, 24, or 32 Tools	12, 24, or 32 Tools
Axis Motion Control	X,Y, and Z Axis Control	X,Y, and Z Axis Control
Automatic Depth Control	Standard	Standard
Front Panel Controls	Standard	Standard
Pressure Foot System	Pre-Touch	Pre-Touch
Vacuum Table	4 Zone Selectable	4 Zone Selectable
Sound Enclosure	Integrated	Integrated
Mac Requirements	Intel Processor OSX 10.5 or Newer	Intel Processor OSX 10.5 or Newer
Windows Requirements	1.5Ghz Processor 1GB RAM Windows XP, Windows 7	1.5Ghz Processor 1GB RAM Windows XP, Windows 7

LPKF Contac RS / LPKF MiniContac RS

Electroplating of Through-Holes

Product:	LPKF Contac RS	LPKF MiniContac RS
Part no.:	120742	119987
Ordering info:	See front sleeve	



LPKF Contac RS

LPKF MiniContac RS

The LPKF Contac RS and the LPKF MiniContac RS are electroplating systems for professional through-hole platings in PCB prototypes and small batches. The compact desktop design allows it to also be used in labs with limited space. The optional LPKF Reverse Pulse Plating function and formaldehyde-free black-hole technology employed in both systems ensure consistent metallization of through-holes, even with small hole diameters.

The LPKF Contac RS can handle PCBs up to 460 mm x 330 mm (18" x 13"). The system is also equipped for chemical tin-coating. A spray basin with external water supply assists in the PCB cleaning process.

The LPKF MiniContac RS can handle PCBs up to 230 mm x 330 mm (9" x 13"). The system does not require external connections.

- High-quality through-hole plating in your own lab
- Even copper deposit through reverse pulse plating (RPP)
- No special chemical knowledge required
- Chemical tinning with LPKF Contac RS
- Through-hole plating even with small diameters of > 0.2 mm (8 mil)
- Ideal for through-hole plating multilayer-PCBs

Easy to operate

The microprocessor-controlled systems feature easy menu-guided operation. An acoustic signal indicates that the process is complete.

Simple process

The through-hole plating process starts by cleaning and degreasing the PCB in two baths. This is followed by activation and copper buildup in additional baths. After the final cleaning the PCB is ready for further processing.

The LPKF MiniContac RS only needs four baths. The LPKF Contac RS also features a spray basin and a bath for chemical tin-plating. All baths are easy to change. No special chemical knowledge is required.

Chemical tin-plating

The LPKF Contac RS features a bath for chemical tin-plating. Tin-plating protects the through-plated PCB from oxidation and is the ideal primer for the soldering process.

Advantages of Reverse Pulse Plating

Both systems offer a process for consistently coating the annular rings with brief current reversals. Please refer to page 109 for additional information.

Optimized copper build-up

In the course of product maintenance, the anode plates were optimized. The aim is an even more homogeneous build-up of the copper layers. Systems that have already been delivered can be inexpensively retrofitted.

Consumable	Part no.	Description
Electroplating chemicals – MiniContac RS	119986	Covers the complete fill of electroplating chemicals for MiniContac RS. Includes 6 l Cleaner 110, 5 l Cleaner 210, 4 l Activator 310, 16 l Copper Plater 400 and 0.25 l Shine 400.
Electroplating chemicals – Contac RS	120743	Covers the annual supply of electroplating chemicals for Contac RS. Includes 30 l Cleaner 110, 30 l Cleaner 210, 10 l Activator 310, 35 l Copper Plater 400, 0.5 l Shine 400.
Anode plates	10032691	The anode plates were optimized. The goal was to achieve an even more homogeneous copper layer structure.

All materials can be ordered separately. Please contact your local LPKF representative.

Technical Specifications	LPKF Contac RS	LPKF MiniContac RS
Part no.	120742	119987
Activator	Carbon	Carbon
Max. material size	460 mm x 330 mm (18.1" x 13")	230 mm x 330 mm (9" x 13")
Max. layout size	430 mm x 290 mm (16.9" x 11.4")	200 mm x 290 mm (7.8 x 11.4)
Hole diameter	> 0.2 mm (> 8 mil)	> 0.2 mm (> 8 mil)
Number of through-plated holes	No limit	No limit
Max. number of layers	8	8
Max. contact resistance	< 10 mΩ	< 10 mΩ
Environmental compatibility	Good	Good
Processing reliability	Very good	Very good
Processing time	Approx. 90 – 120 min	Approx. 90 – 120 min
Base material types	FR4, RO3000®, RO4000®, TMM® *	FR4, RO3000®, RO4000®, TMM® *
Power supply	115/230 V, 50–60 Hz, max. 1.5 kW	115/230 V, 50–60 Hz, 0.6 kW
Ambient temperature	18–25 °C (64–77 °F)	18–25 °C (64–77 °F)
Dimensions (W x H x D)	900 mm x 540 mm x 800 mm (35.4" x 21.2" x 31.5")	750 mm x 525 mm x 500 mm (29.5" x 20.4" x 19.7")
Chemical tinning	Yes	No
Reverse Pulse Plating	Yes	Yes
Weight	85 kg (187.4 lbs) unfilled; 150 kg (330.7 lbs) filled	42 kg (92.5 lbs) unfilled; 71 kg (156.5 lbs) filled

* Additional materials available upon request.

Technical specifications subject to change.

10 List of spare parts

Filter element	Article no.
Prefilter mat "M5" (10 pieces / 268 x 268 x 20 mm)	10033
Particle filter "H13" (305x305x150)	10031
Activated carbon cassette, 3,5 kg activated carbon (305 x 305 x 100)	97054

11 Technical data

Supply voltage	V	230
Frequency	Hz	50
Type of current	Ph	1
engine power	kW	1,2
Air flow volume max.	m ³ /h	320
Negative pressure max.	Pa	15000
Protection class		IP54
ISO class		F
Extraction performance	%	>99
Width	mm	365
Depth	mm	496
Height	mm	737
Weight	kg	45
Sound pressure level	dB(A)	65
Allowed ambient temperature	°C	+5 to +35
Allowed max. humidity	%	70

14 Maintenance intervals

14.1 Usage-related maintenance

The described maintenances become necessary through the demands of the system operations. The maintenance intervals are recommendations. Depending on the application (multi-shift operation, dust generation, ...) it may make sense for the operator to change the intervals of maintenance, replacing and cleaning.

Maintenance work must always be documented by means of a protocol.

The approach of the maintenance measures is described in chapter "Maintenance".

Maintenance work	Chapter	Maintenance interval	
		recommended by TEKA	determined by the operator
Replacing the particle filter	7.3	The saturation of the particle filter is automatically monitored by the filter unit and thus is not subject to a maintenance interval. The filter unit triggers an alarm when a replacement of the particle filter is necessary.	
Replacing the activated carbon cassette (or check the degree of pollution)	7.4	when odours occur / when replacing the main filter	
Replacing the prefilter mat (or check the degree of pollution)	7.2	monthly	

14.2 General maintenance

The described maintenances are independent from the demands of the system operations.

The operator is obliged to carry out repeated inspections and functional tests according to national regulations. If not otherwise covered by national regulations, the described maintenance intervals must be respected.

Maintenance work must always be documented by means of a protocol.

Maintenance work	Chapter	Maintenance interval
Visual inspection of the device	14.2.1	weekly
Functional test of the device	14.2.2	monthly
Electrical test of the electrical lines and earthing connections	14.2.3	annually

Easy to operate

The microprocessor-controlled systems feature easy menu-guided operation. An acoustic signal indicates that the process is complete.

Simple process

The through-hole plating process starts by cleaning and degreasing the PCB in two baths. This is followed by activation and copper buildup in additional baths. After the final cleaning the PCB is ready for further processing.

The LPKF MiniContac RS only needs four baths. The LPKF Contac RS also features a spray basin and a bath for chemical tin-plating. All baths are easy to change. No special chemical knowledge is required.

Chemical tin-plating

The LPKF Contac RS features a bath for chemical tin-plating. Tin-plating protects the through-plated PCB from oxidation and is the ideal primer for the soldering process.

Advantages of Reverse Pulse Plating

Both systems offer a process for consistently coating the annular rings with brief current reversals. Please refer to page 109 for additional information.

Optimized copper build-up

In the course of product maintenance, the anode plates were optimized. The aim is an even more homogeneous build-up of the copper layers. Systems that have already been delivered can be inexpensively retrofitted.

Consumable	Part no.	Description
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Electroplating chemicals – Contac RS	120743	Covers the annual supply of electroplating chemicals for Contac RS. Includes 30 l Cleaner 110, 30 l Cleaner 210, 10 l Activator 310, 35 l Copper Plater 400, 0.5 l Shine 400.
Anode plates	10032691	The anode plates were optimized. The goal was to achieve an even more homogeneous copper layer structure.

All materials can be ordered separately. Please contact your local LPKF representative.

Technical Specifications	LPKF Contac RS	LPKF MiniContac RS
Part no.	120742	119987
Activator	Carbon	Carbon
Max. material size	460 mm x 330 mm (18.1" x 13")	230 mm x 330 mm (9" x 13")
Max. layout size	430 mm x 290 mm (16.9" x 11.4")	200 mm x 290 mm (7.8 x 11.4)
Hole diameter	> 0.2 mm (> 8 mil)	> 0.2 mm (> 8 mil)
Number of through-plated holes	No limit	No limit
Max. number of layers	8	8
Max. contact resistance	< 10 mΩ	< 10 mΩ
Environmental compatibility	Good	Good
Processing reliability	Very good	Very good
Processing time	Approx. 90 – 120 min	Approx. 90 – 120 min
Base material types	FR4, RO3000®, RO4000®, TMM® *	FR4, RO3000®, RO4000®, TMM® *
Power supply	115/230 V, 50–60 Hz, max. 1.5 kW	115/230 V, 50–60 Hz, 0.6 kW
Ambient temperature	18–25 °C (64–77 °F)	18–25 °C (64–77 °F)
Dimensions (W x H x D)	900 mm x 540 mm x 800 mm (35.4" x 21.2" x 31.5")	750 mm x 525 mm x 500 mm (29.5" x 20.4" x 19.7")
Chemical tinning	Yes	No
Reverse Pulse Plating	Yes	Yes
Weight	85 kg (187.4 lbs) unfilled; 150 kg (330.7 lbs) filled	42 kg (92.5 lbs) unfilled; 71 kg (156.5 lbs) filled

* Additional materials available upon request.

Technical specifications subject to change.

LPKF Circuit Board Plotter Comparison

Performance and features

Feature	ProtoMat S103	S63	S43	E33	D104	X60
Max. material size and layout area (X/Y)	3-Phase SM	3-Phase SM	3-Phase SM	2-Phase SM	3-Phase SM	3-Phase SM
mm	229 x 305	229 x 305	229 x 305	229 x 305	229 x 305	650 x 530
inch	9 x 12	9 x 12	9 x 12	9 x 12	9 x 12	25.6 x 20.8
Mechanical resolution (X/Y)						
µm	0.5	0.5	0.5	0.8	0.3	1
mil	0.02	0.02	0.02	0.04	0.01	0.04
Travel speed (X/Y)						
(mm/s)	150	150	150	60	100	100
Repeatability						
mm	±0.001	±0.001	±0.001	±0.005	±0.001	±0.001
mil	±0.04	±0.04	±0.04	±0.2	±0.04	±0.04
Precision of front-to-back alignment						
mm	±0.02	±0.02	±0.02	±0.02	X	±0.02
mil	±0.8	±0.8	±0.8	±0.8	X	±0.8
Max. material size and layout area (Z)	Stepper motor	Stepper motor	Stepper motor	Stepper motor	Stepper motor	Pneumatic
mm	22	35	27	10	10	14
inch	0.9	1.4	1	0.4	0.39	0.55
Mechanical resolution (Z)						
µm	0.2	0.2	0.4	0.85	0.2	X
mil	0.008	0.008	0.016	0.033	0.008	X
Travel speed (Z)						
(mm/s)	25	25	25	20	25	X
Spindle speed						
(x1 000 rpm)	100	60	40	33	100	60
Drilling speed strokes/min	120	120	100	100	120	120
Temperature sensor	•	•	•	X	•	X
Dispenser	•	•	Optional	X	X	X
Software LPKF CircuitPro	Full	Full	Lite	Lite	Full	Full
Automatic tool change	15	15	Optional	X	15	X
Vacuum table	•	Optional	Optional	X	•	X
Optical fiducial recognition	•	•	Optional	X	•	Optional
Brush head	X	X	X	X	X	Optional
Acoustic cabinet	•	•	•	X	•	X
Automatic milling width adjustment	•	•	Optional	X	•	X
Working depth limiter	Pneumatic	Mechanical	Mechanical	Mechanical	Pneumatic	Pneumatic
StatusLight	Optional	Optional	Optional	X	•	X
Ports	USB	USB	USB	USB	USB	RS-232
Footprint (W x D)						
mm	670 x 840	670 x 840	670 x 840	370 x 450	660 x 870	750 x 900
inch	26.4 x 33	26.4 x 33	26.4 x 33	14.6 x 17.7	26 x 34.3	29.5 x 35.4
Weight						
kg	60	58	55	15	99	69
lbs	132	127	121	33	218.3	151.8
Compressed air supply required?	For operation	For dispensing	With upgrade to S63 or S103	Not required	For operation	For operation
bar	6	4			6	6
psi	87	58			87	87
l/min	100	5			100	100
cfm	3.5	1.76			3.5	3.5
Upgrade (see also page 119)	X	S63→S103	S43→S63 S43→S103	X	X	X

• = Standard X = Not available Optional = Optionally available for upgrade/accessories


All specifications are subject to technical modifications.

Starter sets (for initial ProtoMat set-up)

LPKF starter sets include an extensive assortment of work materials, tools, and other accessories needed for quick set-up. We offer customized starter sets for each circuit board plotter.

LPKF ProtoMat S103

Part no.	Contents
122159	For use with vacuum table: 2 x Sinter backing plate white 315 mm x 239 mm x 5 mm (12.4" x 9.4" x 0.2")
Also included:	10 x Base material FR4, 229 mm x 305 mm (9" x 12"), 0/35 µm (predrilled) 5 x Base material FR4, 229 mm x 305 mm (9" x 12"), 35/35 µm (predrilled) 5 x Base material FR4, 229 mm x 305 mm (9" x 12"), 18/18 µm (predrilled) 5 x Micro cutter with 1/8" distance ring, 36 mm (1.4"), d = 0.1–0.15 mm (4–6 mil) 3 x End mill (RF) with 1/8" distance ring, 36 mm (1.4"), d = 0.15 mm (6 mil) 10 x End mill (RF) with 1/8" distance ring, 36 mm (1.4"), d = 0.25 mm (10 mil) 3 x End mill (RF) with 1/8" distance ring, 36 mm (1.4"), d = 0.40 mm (16 mil) 5 x End mill with 1/8" distance ring, 36 mm (1.4"), d = 1.00 (39 mil) 2 x End mill with 1/8" distance ring, 36 mm (1.4"), d = 2.00 (79 mil) 2 x End mill with 1/8" distance ring, 38 mm (1.5"), d = 2.00 (79 mil) 1 x Custom adhesive tape, 3 x board cleaning pad 1 x Tool set with 1/8" shaft and distance rings (Part no. 129103, see page 26 for contents)



LPKF ProtoMat S63

Part no.	Contents
115791	For use without vacuum table: 10 x Drill underlay material 229 x 305 mm (9" x 12"), d = 2 mm (0.08") (predrilled)
122157	For use with vacuum table: 2 x Sinter backing plate white 315 mm x 239 mm x 5 mm (12.4" x 9.4" x 0.2")
Also included in both sets:	10 x Base material FR4, 229 mm x 305 mm (9" x 12"), 0/35 µm (predrilled) 5 x Base material FR4, 229 mm x 305 mm (9" x 12"), 35/35 µm (predrilled) 5 x Base material FR4, 229 mm x 305 mm (9" x 12"), 18/18 µm (predrilled) 5 x Micro cutter with 1/8" distance ring, 36 mm (1.4"), d = 0.1–0.15 mm (4–6 mil) 5 x End mill (RF) with 1/8" distance ring, 36 mm (1.4"), d = 0.25 mm (10 mil) 1 x Custom adhesive tape, 3 x circuit board cleaning pad 1 x Tool set with 1/8" shaft and distance rings (Part no. 129103, see page 26 for contents)

LPKF ProtoMat S43

Part no.	Contents
117717	For use without vacuum table: 10 x Drill underlay material 229 x 305 mm (9" x 12"), d = 2 mm (0.08") (predrilled)
122158	For use with vacuum table: 2 x Sinter backing plate white 315 mm x 239 mm x 5 mm (12.4" x 9.4" x 0.2")
Also included in both sets:	10 x Base material FR4, 229 mm x 305 mm (9" x 12"), 0/35 µm (predrilled) 5 x Base material FR4, 229 mm x 305 mm (9" x 12"), 35/35 µm (predrilled) 1 x Custom-designed adhesive tape, 3 x board cleaning pad 1 x Tool set with 1/8" shaft and distance rings (Part no. 129103, see page 26 for contents)

LPKF ProtoMat D104

Part no.	Contents
10035172	For use with vacuum table: 1 x Sinter backing plate white 315 mm x 239 mm x 5 mm (12.4" x 9.4" x 0.2")
Also included:	5 x Base material FR4, 229 mm x 305 mm (9" x 12"), 18/18 µm (predrilled) 5 x Base material FR4, 229 mm x 305 mm (9" x 12"), 35/35 µm (predrilled) 5 x Micro cutter with 1/8" distance ring, 36 mm (1.4"), d = 0.1–0.15 mm (4–6 mil) 3 x End mill (RF) with 1/8" distance ring, 36 mm (1.4"), d = 0.15 mm (6 mil) 10 x End mill (RF) with 1/8" distance ring, 36 mm (1.4"), d = 0.25 mm (10 mil) 3 x End mill (RF) with 1/8" distance ring, 36 mm (1.4"), d = 0.40 mm (16 mil) 5 x End mill with 1/8" distance ring, 36 mm (1.4"), d = 1.00 (39 mil) 2 x End mill with 1/8" distance ring, 36 mm (1.4"), d = 2.00 (79 mil) 2 x End mill with 1/8" distance ring, 38 mm (1.5"), d = 2.00 (79 mil) 1 x Custom adhesive tape, 3 x board cleaning pad 1 x Tool set with 1/8" shaft and distance rings (Part no. 129103, see page 26 for contents)

LPKF ProtoMat X60: Upon request

Please note: tool set contents may vary by country. Please contact your local distributor for details (see page 134). All specifications are subject to technical modifications.

Selecting the Mechanical Systems for PCB Structuring

LPKF offers a complete line for manufacturing fully equipped PCBs. The first step is structuring the PCB tracks. Depending on the application requirements there are generally two processes: mechanical or laser-based.

LPKF circuit board plotters

A spectrum of mechanical PCB structuring covers the LPKF ProtoMat series circuit board plotters. LPKF circuit board plotters differ in the size of work space, spindle speed and features. They can be categorized by the maximum PCB size:

- S series up to 229 mm x 305 mm (9" x 12")
- X 60 up to 650 mm x 530 mm (25.6" x 20.8")
- E 33 up to 229 mm x 305 mm (9" x 12")
- D104 up to 229 mm x 305 mm (9" x 12")

The spindles on the LPKF circuit board plotters S63, S103, D104 and X60 with maximum speeds of 60 000 or 100 000 rpm respectively can easily produce structures down to a size of 100 µm and drill holes smaller than 0.4 mm. Another unique feature is the Z-drive, which allows the setting of limits on the spatial processing of components such as mounts or housing components.



Milling and drilling single- and double-sided PCBs

The main application of the LPKF circuit board plotters is the production of sophisticated PCB prototypes. They mill PCB tracks and gaps to 100 µm (4 mil) and drill holes to 200 µm (8 mil). Prototypes are produced right from the original CAD data, including precise geometries for BGAs, fine-pitch SMT, RF and other applications.



Milling and drilling RF and microwave substrates

RF and microwave prototypes use special substrates such as ceramic-filled (RO4000®) substrates, and require extremely precise structuring. LPKF circuit board plotters with high-speed spindles produce just these fine structures with high accuracy. Custom hard metal tools produce straight edges and reduce the substrate penetrating depth.



Milling and drilling multilayers with up to 8 layers

LPKF circuit board plotters are key components in manufacturing multilayer prototypes. Prototypes with up to eight layers can quickly and easily be produced using an LPKF ProtoMat in connection with a through-hole plating system such as the Contac RS and a multilayer press such as the MultiPress S. The use of a fiducial camera is recommended for accurate positioning when producing multilayers.



Flexible and rigid-flex circuit milling

Some ProtoMats feature a vacuum table which ensures the PCB materials are firmly secured to the work surface. A high spindle speed helps to safely structure and separate these delicate boards.

Application	ProtoMat					
	S103	S63	S43	E33	D104	X60
Milling and drilling single- and double-sided PCBs	•	•	•	•	•	•
Milling/drilling RF & microwave substrates	•	•	–	–	•	•
Milling/drilling multilayers with up to 8 layers	•	•	•	–	•	•
Contour routing of PCBs	•	•	•	•	•	•
Milling flexible, rigid-flex PCBs	•	–	–	–	•	•
Engraving front panels/labels	•	•	•	•	•	•
Machining cut outs in front panels	•	•	–	–	•	•
Milling / Laser structuring* of SMT soldering paste stencils	•	•	•	–	•	–
Housing production	•	•	–	–	–	–
Wave solder pallets	•	•	–	–	–	–
Reworking PCBs	•	•	–	–	•	•
Test adapter drilling	•	•	–	–	•	–
Inspection templates	•	•	–	–	•	•
Depanelization of populated boards	•	•	–	–	–	•
Ultrafine conductor structuring < 200 µm pitch	–	–	–	–	•	–
Metal layers on ceramics	–	–	–	–	•	–
Reworking of RF structures	–	–	–	–	•	–

* Only applies to the ProtoMat D104

LPKF ProtoMat D104

Fine Pitch and Highest Precision

Product: LPKF ProtoMat D104

Part no.: 10030011

Ordering info: See front sleeve

Applications

- 1 2 Milling/drilling 1- & 2-sided PCBs
- Mill/drill RF & microwave substrates
- Multilayer PCBs up to 8 layers
- Contour routing of circuit boards
- Laser structuring of ultra-fine conductor areas
- Flexible and rigid-flex circuit milling
- abc Front panels/sign engraving
- Machining cut-outs in front panels
- Structuring ceramic materials
- SMD stencil cutting
- Wave solder pallets
- Depanelizing, reworking PCBs
- Test adapter drilling
- Inspection templates



Integrated UV laser for ultrafine conductor structuring

The LPKF ProtoMat D104 is an advanced PCB milling system improving upon the proven LPKF ProtoMat design, with a maximum spindle speed of 100 000 rpm, 15 position automatic tool exchange with light sensor used to set the depth of cut for each tool. True Fiducial Alignment is also included and a repeat accuracy of 1 μm is provided with this machine. As a new addition, the D104 includes an integrated UV laser which can produce circuit track widths and spaces of just 50 μm /15 μm without mechanically stressing the material.

The highly developed LPKF CircuitPro software decides when the precise laser or the faster mechanical tools are used. The laser can also simulate conventional contours to ensure an ideal geometry of conductive traces, e. g., for RF circuits.

- Fully automated operation
- Highest available speed (100 000 rpm), highest mechanical resolution (0.3 μm) and repeatability (\pm 0.001 mm)
- 15 tools and UV laser
- Automatic tool changer
- Contactless tool setting (depth/milling width)
- Non-contact working depth limiter
- Integrated measuring camera/vision system
- Optical fiducial recognition
- Built-in vacuum table
- UV laser tool for highly precise structuring

Tool set with 1/8" shaft and distance rings

For all LPKF ProtoMat models. Includes tools with pressed-on distance rings.

Part no.	Contents
129103	<p>10x Universal cutter 1/8", 36 mm (1.4"), 0.2–0.5 mm (8–20 mil)</p> <p>2x Micro cutter 1/8", 36 mm (1.4"), 0.10–0.15 mm (4–6 mil)</p> <p>1x End mill 1/8", 36 mm (1.4"), d = 0.8 mm (31 mil)</p> <p>2x End mill 1/8", 36 mm (1.4"), d = 1.00 mm (39 mil)</p> <p>2x End mill 1/8", 36 mm (1.4"), d = 2.00 (79 mil)</p> <p>1x End mill long 1/8", 38 mm (1.5"), d = 1.00 mm (39 mil)</p> <p>1x End mill long 1/8", 38 mm (1.5"), d = 2.00 (79 mil)</p> <p>2x Contour router 1/8", 38 mm (1.5"), d = 1.00 (39 mil)</p> <p>2x Contour router 1/8", 38 mm (1.5"), d = 2.00 (79 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 0.40 (16 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 0.50 (20 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 0.60 (24 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 0.70 (28 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 0.80 (31 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 0.90 (35 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 1.00 (39 mil)</p> <p>1x Spiral drill 1/8", 38 mm (1.5"), d = 1.20 (47 mil)</p> <p>1x Spiral drill 1/8", 38 mm (1.5"), d = 1.40 (55 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 1.50 (59 mil)</p> <p>1x Spiral drill 1/8", 38 mm (1.5"), d = 1.60 (63 mil)</p> <p>1x Spiral drill 1/8", 38 mm (1.5"), d = 1.80 (71 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 2.00 (79 mil)</p> <p>2x Spiral drill 1/8", 38 mm (1.5"), d = 3.00 (118 mil)</p>



RF and microwave tool set with distance rings

Part no.	Contents
116394	<p>Tools with distance rings:</p> <p>5x End mill (RF) 1/8", 36 mm, d = 0.25 mm (10 mil)</p> <p>3x End mill (RF) 1/8", 36 mm, d = 0.40 mm (16 mil)</p> <p>3x End mill (RF) 1/8", 36 mm, d = 0.15 mm (6 mil)</p> <p>5x End mill 1/8", 36 mm, d = 1.00 mm (39 mil)</p> <p>2x End mill 1/8", 36 mm, d = 2.00 mm (79 mil)</p> <p>2x End mill 1/8", 38 mm, d = 2.00 mm (79 mil)</p>

i Please note:

LPKF recommends using only original LPKF tools and assumes no warranty for machine or secondary failures resulting from the use of non-LPKF tools. All specifications are subject to technical modifications.

To whom it may concern

LPKF Laser & Electronics AG confirm that the company

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Los Zungaros No. 543 - Chorrillos
Lima
PERU

is an official distributor in Peru. MBC offers technical support, training and sales / marketing activities for the LPKF Rapid PCB Prototyping product line.

LPKF Laser & Electronics AG



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IBAN: DE31 2505 0180 2035 9024 73 BIC: SPKH DE 2H XXX
IBAN: DE39 2506 0180 0000 0360 12 BIC: HALL DE 2H XXX

UST-ID-Nr. DE196620328

00087

Training Certificate


Hereby we confirm

Mr. Ronny Michael Huerta Firma


a 45 hours training in Design and Implementation of Printed Circuit Boards in:
Multilayer 02, 04 and 08 layers with the following LPKF equipment:

- LPKF ProtoMat D104
- LPKF ProtoPrint S
- LPKF ProtoPlace S
- LPKF ProtoFlow S
- LPKF Contac RS

Date: February 2016



Britta Schulz,
Senior Vice President Rapid Prototyping



Sascha Eickmann,
Manager Support & Service Rapid Prototyping

