



*Premium*  
**AQ327L**

Picture shows CE specification

**AQ537L**

High Speed Linear Wire EDM  
With LP Power Supply



**Sodick**

Nano&Solution

# AQ327L/AQ537L



Picture shows non-CE specification

## **Supporting World Leading Manufacturers. The Ultimate In Machining Speed And Accuracy.**

A new world standard in accuracy and ultra high-speed machining has been set

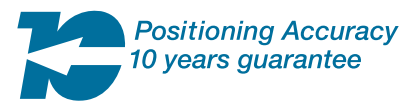
Sodick has combined the latest 3D technology with its expertise and manufacturing experience to create the very best in linear drive performance and technology: the 7 series. Furthermore Sodick's continual pursuit of ergonomics promises customers the ultimate performance in terms of user-friendly, efficient and diverse machining capability.

### **Sodick is the world pioneer of Linear EDM**

Sodick sold over 20,000 linear EDM machine tools. This clearly demonstrates the advantages of linear technology combined with EDM.



## The World's First 10-Year Positioning Accuracy Guarantee



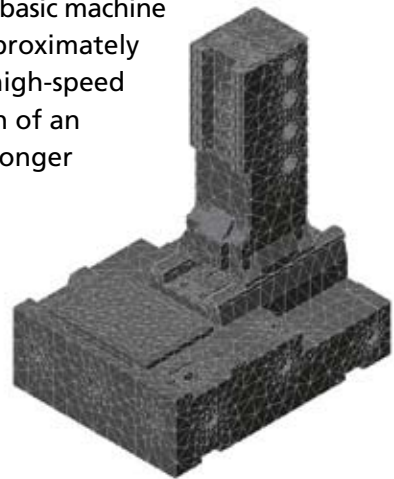
Employing the linear motor drive system, Sodick die-sinker EDMs and wire-cut EDMs have enabled difficult machining operations that were not possible with conventional ball screw-type EDMs.

The linear motor-driven EDMs, eliminate the need for ball screws and allow for non-contact EDMing. Use of the Linear Motor removes the deterioration in machining accuracy caused by worn ball screws throughout the machine life (more than 10 years). Sodick is so confident of the performance and accuracy of their machines over a 10 year period, that they are the only Manufacturer to offer a 10 year positioning accuracy guarantee on all Linear EDM Machines.

## Tech 1

### High Rigidity

Sodick's expertise in EDM innovation using 3D design systems, the latest CAE technologies and numerous simulations have made it possible to create an improved basic machine structure of optimised rib arrangements which increase rigidity by approximately 70%. Deformation is minimised, allowing optimum performance of high-speed and rapid acceleration linear motors. Furthermore the original design of an independent X and Y-axis plus an efficient machine layout lead to a longer stroke, smaller footprint and highly accurate machining capability.



## Tech 2

### "LP Series" The New Power Supply Unit



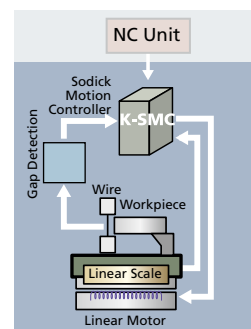
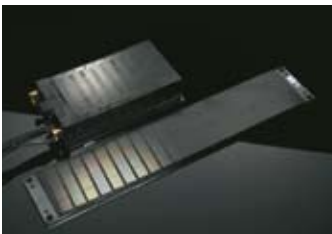
The 7 series features Sodick's latest "LP" power supply unit, capable of high-speed, high precision and high-efficiency machining. An NC control system based on modern control theory used in conjunction with the LP series yields outstanding results. 3D solid models from a CAD system can be transferred directly to the LP 3D controller and converted into an optimised CNC program without any detours, therefore dramatically reducing set-up time.



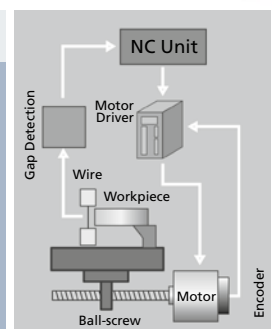
## Tech 3

### Linear Motor Drive

Sodick's linear motor is a direct drive, vibration free device which has unrivalled acceleration and positioning accuracy with no backlash. Its high dynamic responsiveness, stability for precision machining, and performance do not diminish over time and remain maintenance free. The linear motor achieves even better performance thanks to the Motion Controller (K-SMC) which Sodick has perfected over the years.



Sodick Motion Controller



Conventional Ball Screw Drive

## Tech 4

### Ceramic Components

The "7 series" is constructed using ceramic components for the work stand table and critical parts, all of which are built in-house to ensure high precision machining with better electrical insulation, abrasion resistance and rigidity. Ceramics are ideal for high precision machining due to their very low thermal expansion co-efficient (less than one third than that of cast iron), high rigidity and resistance to ageing.





Lower ecological impact due to energy saving technologies incorporated in all SODICK products.

Sodick's development of core technology has led to world record achievements in high speed precision machining; the "7 series" is the result. Numerous simulations with the latest 3-D designing systems have demonstrated the benefits of Sodick's design, which uses ceramics for the key components of the machine tool. However, Sodick does not lose sight of proven traditional methods, such as the scraping of all mating surfaces, to perfect the high rigidity of the basic machine structure. The power supply controls the machine tool using the latest electric discharge control system, and linear motors are employed on each axis for perfect responsiveness.

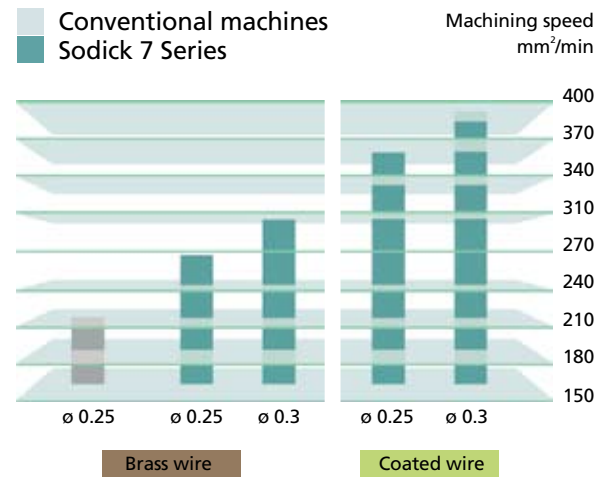
## Core Technology To Achieve The World's Best Quality

## World Record Machining Speed

The 7 series machines are equipped with the "LP33W" power supply unit as standard, capable of higher current peaks. An efficient pulse control provides ultra high-speed machining performance without altering surface finish capability and profile accuracy of the machine. A new special circuit to prevent wire breakage has also been developed.

Sodick achieved the world's fastest machining, using  $\phi 0.2$  mm -  $\phi 0.25$  mm wire. (A machining speed of 360mm<sup>2</sup>/min was recorded using  $\phi 0.25$  mm wire.)

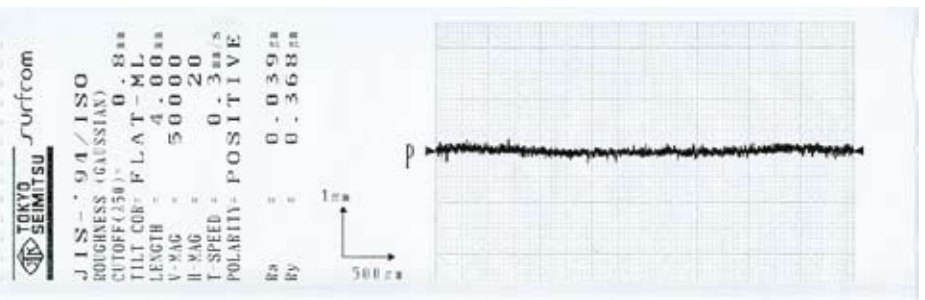
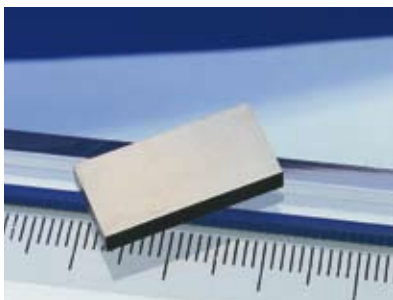
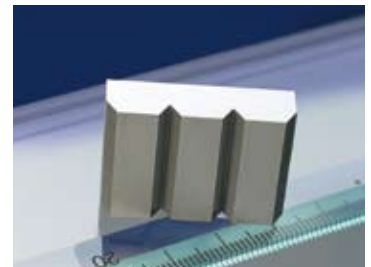
Tech5



## Best Surface Finish Of Less Than 0,1 $\mu$ m Ra

"Super Pika-W" is the super finish circuit which Sodick has introduced. Super Pika technology was created and developed by Sodick to minimise machining energy, resulting in an excellent surface finish which significantly reduces and in some cases eliminates the need for subsequent polishing and other finishing operations.

Tech6



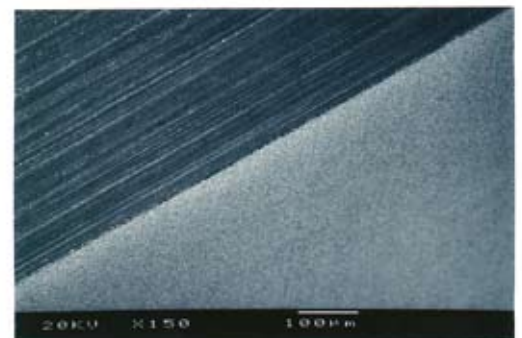
## Electrolysis Free Machining

Sodick created the electrolysis-free circuit to prevent oxidation, deterioration and pitting corrosion of the workpiece. A high frequency bipolar pulse passes between the electrode and workpiece eliminating bias and allowing ultra high speed machining without electrolysis.

Tech7

### Effects Of Electrolysis Free Circuit

- **Cemented carbide:** minimises the depletion of cobalt which is the binder of the material and preserves the integrity of the material surface.
- **Ferrous material:** reduces rust and corrosion, prevents discoloration of the workpiece during long machining operations.
- **Titanium alloy:** reduces anodisation and oxidation, therefore preventing discoloration of the workpiece.
- **Aluminum alloy:** prevents corrosion and discoloration of the workpiece caused by machining waste.
- **PCD:** minimises the depletion of the workpiece binder, prevents corrosion and preserves material surface integrity.



## High Precision Stepped Machining

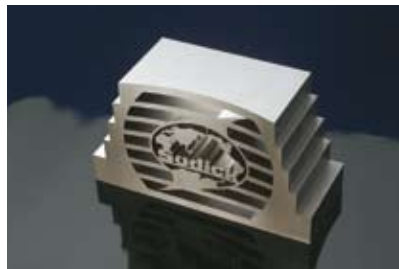
Sodick's "thinking circuit" automatically detects the thickness of the workpiece and calculates the optimum machining settings from rough machining to finishing for every thickness, avoiding wire breakage. Furthermore, parallelism of 1-2  $\mu\text{m}$  can be achieved.



## Stepped And Irregular Form Machining

The "thinking circuit" ensures even more stability, high speed and high precision for the machining of stepped or irregular parts.

- Workpiece material: SKD-11
- $t = 20\text{-}80\text{ mm}$
- Wire diameter:  $\varnothing 0.25\text{ mm}$



# Technology Capable Of Supporting World Leading Manufacturers

## Automatic Wire Threading With "Super Jet AWT"

In Sodick's original automatic wire threading unit (Super Jet AWT) - the pipe guide runs between the upper guide and lower guide and reliably threads the wire.

- AWT automatically prevents any short-circuit after re-threading, ideal for unattended machining
- The wire is cut by a thermal process, which sharpens the cut end of the wire, thus further improving the threading success rate.



## Wire Tension Servo

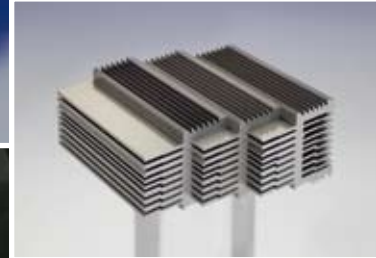
All 7 series machines are equipped as standard with a wire tension servo to continually monitor and regulate wire tension and adjust the servo motor current, which makes stable, high precision machining possible.



# Work Samples

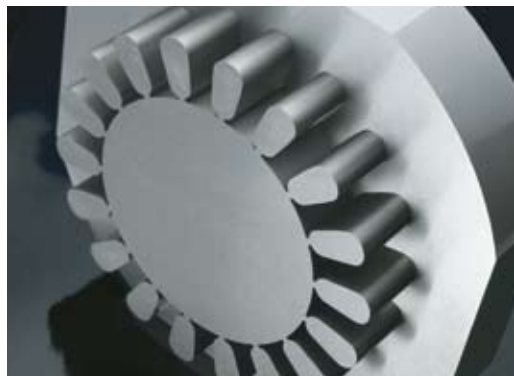
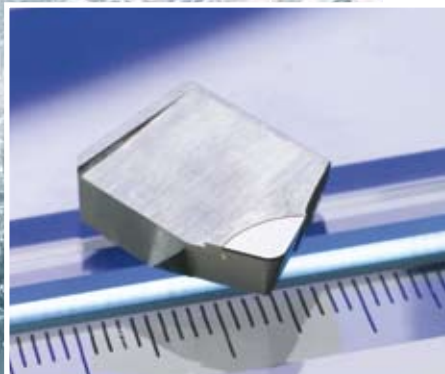
## Interlocking Thick Workpieces

The 7 series can easily produce a high-level interlock.



## Diamond Tool Machining

By installing a high-quality power supply for EDM, surface damage such as chipping and cracking is minimised and the high speed cutting of difficult to machine materials is made possible. Moreover, tools such as cutting tools and router reamers can be produced by using an indexer and rotary axis.



# AQ327L/AQ537L



## High Accuracy Gear Machining

Sodick's new corner control function enables the machining of high precision corners.

## Slide Machining Of High Grade Materials

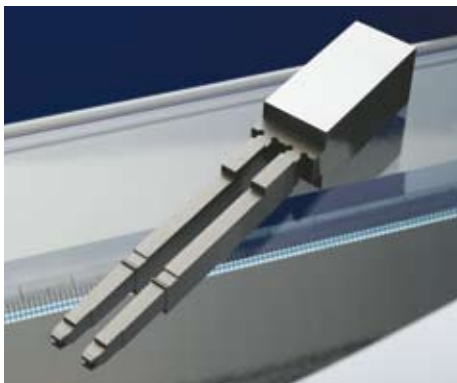
Interlocking workpieces, long workpieces and punches with different top & bottom contours can be machined to an even greater accuracy by using the "Taper Flex" option. This function also significantly increases the scope of potential applications for mould manufacturers.

- Workpiece material: SKD-11,
- $t=120$  mm
- Taper angle: 7 degrees



## Machining Of Connector Core Pin

Shapes with high aspect ratios are usually affected by warping or bending, but digitising the discharge energy solves the problem and allows stable and high accuracy machining.



## Motor Core Machining

Excellent form accuracy can be attained with minimum interlocking clearances, even on oversized workpieces, eg: 100 mm x 100 mm.

Sample of electric car motor core

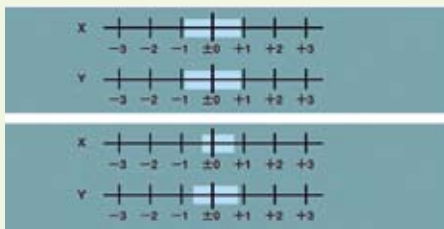
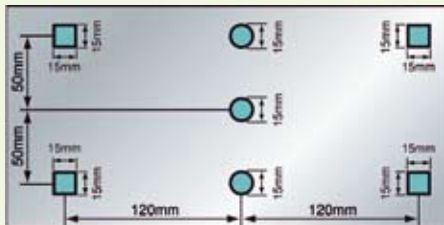
- Workpiece material: SKD-11
- Clearance: 2.5  $\mu$ m
- Punch:  $t=50$  mm, surface roughness 0.15  $\mu$ m Ra
- Die:  $t=30$  mm, surface roughness 0.14  $\mu$ m Ra
- High precision machining for long periods

# Maintains A Continuous High Level Of Precision

A linear motor drive machine retains its precision accuracy and high level capabilities over a long period of time. The rigid design and broad scope of possible applications allow Sodick machines to meet the varying demands of contemporary manufacturing and respond to the customer's needs.

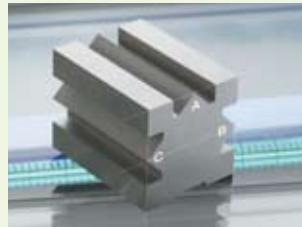


## Pitch And Form Accuracy



- Workpiece material: SKD-11, t=15 mm
- Wire diameter:  $\phi$  0.2 mm

## Improved Corner Accuracy (sharp edge and no rounding of corner)



High accuracy with corner control

- A: Sharp edge R 0.010 mm
- B: Point R 0.010 mm
- C: Point R 0.030 mm

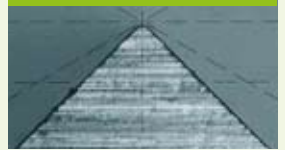
At every machined corner Sodick achieved a very precise corner radius. The error from the target amount was less than 1.0  $\mu$ m at every corner.

- Work piece material: SKD-11
- t = 20 mm
- Wire diameter:  $\phi$  0.2 mm

A: Sharp edge magnified x100



B: Point 10 $\mu$ m magnified x100



C: Point 30 $\mu$ m magnified x100

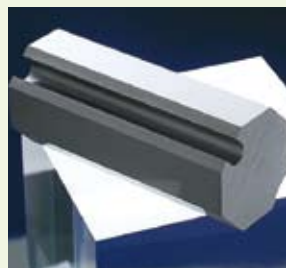


## Circular Accuracy

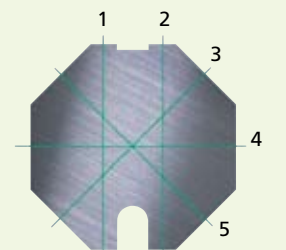


- Workpiece material: SKD-11, t=40 mm
- Wire diameter:  $\phi$  0.2 mm
- Circular accuracy: 0.82 $\mu$ m

## True Direct Precision



- Workpiece material: SKD-11
- t = 50 mm
- Wire diameter:  $\phi$  0.2 mm
- Form accuracy: (distance across flats 20 mm, octagon condition)



|   | Top    | Middle | Bottom |
|---|--------|--------|--------|
| 1 | 20.001 | 19.999 | 20.001 |
| 2 | 20.000 | 20.000 | 20.001 |
| 3 | 20.001 | 19.999 | 20.001 |
| 4 | 20.001 | 20.000 | 20.001 |
| 5 | 20.002 | 20.001 | 20.002 |

The cutting was conducted according to Sodick machining conditions.

# In Pursuit Of High Capability And Easy Operation

The design of the "7 series" is focused on ergonomics to allow optimum use of machine capabilities. The operator will find the machine easy and simple to work with from preparation to finishing. Sodick machines are also designed to be energy efficient, ensuring cost-effective machining at all times.

## Easy Access For Setup

An automatic 3-sided vertical drop tank has been introduced to increase workspace, which makes access for work preparations easier. The automated fluid level control eliminates the need for manual fluid level adjustment. It is now possible to observe thin workpiece machining by lowering the tank to the intermediate position. This new design is immediately compatible with automation.



## Easier Maintenance

### Three Part Filtration System

An extensive improvement in filtration capability makes high speed and accurate machining easier to achieve. The filters can even be changed during machining. A recyclable Eco Filter is also available.



### Wire Ejection Unit

A low-friction roller and extremely rigid unit have led to improved reliability. Additionally, the roller can be shifted in 5 positions, which significantly reduces the need for replacement.



### Slide-Plate Flushing Function

A seal flushing function has been introduced to support the machine's capability for high precision, stable machining. This also provides for easier maintenance and extends the life of the tank seal.

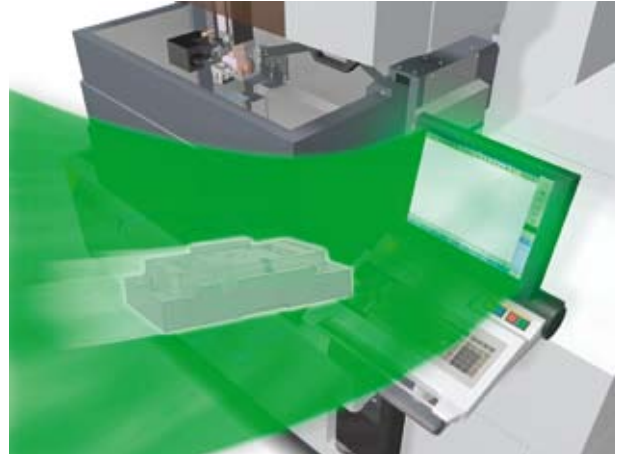


# Sodick's Intelligent Q<sup>3</sup>vic Shapes The Future Of Manufacturing

The use of 3D solid models has now become an essential part of the manufacturing process. The AQ327L/AQ537L range features the first control unit in the world compatible with 3D solid models. These machines provide customers with the manufacturing technologies capable of creating a finished result which is not dependant on the level of skill of the operator; effectively eliminating the need for drawings and reducing human error.

## Intelligent Q<sup>3</sup>vic

The LP power supply comes equipped with "Intelligent Q<sup>3</sup>vic" as standard. This enables the operator to directly import 3D models and to additionally extract every cutting contour to be wire EDM'd within seconds. Even work pieces with a complicated shape and different cutting heights can be programmed using only a single command. After the surfaces to be machined have been recognised an NC programme is generated including all cutting parameters. A full on screen simulation is possible prior to machining.



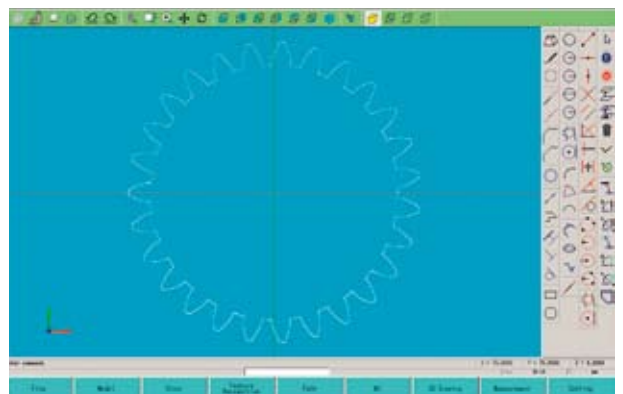
## Intelligent Q<sup>3</sup>vic And Esprit CAM Software Offline

All LP series machines come with "Intelligent Q<sup>3</sup>vic" and "Esprit" on a CD ROM. This package can be run on an external PC, and allows the operator to manipulate 3D Solid Model remote from the machine. Furthermore, any other 2D and 3D formats can be imported allowing full offline programming. When the offline system is networked to the machine, a full simulation can be performed using "Intelligent Q<sup>3</sup>vic".



## 2D Form Design

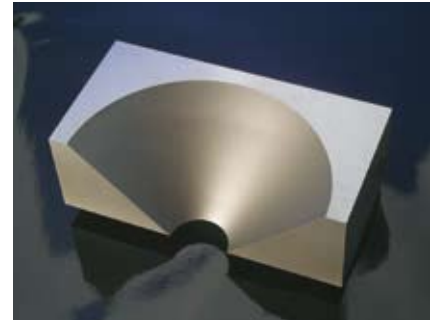
With Intelligent Q<sup>3</sup>vic EDW, it is also possible to design cutting form tools. Varying top & bottom contours, involute gears, coreless forms (pocket machining) and free-form curves can be designed easily. Furthermore it can import data created in DXF format and output machining programmes for wire cut EDM.



# Options

## Wide-Angled Taper Machining

Taper Flex 45 is available as an option for further advanced high angle taper cutting up to 45°. Taper Flex 45 is easy to use and requires no special training. The function consists of three parts, high angle guides, and compensation jig and specialised software.



## Jumbo Feeder

The wire supply device allows up to 30 kg wire bobbin as standard and supports continuous machining.



## L Cut

Part of the ejected wire is chopped into small pieces for easy disposal.



## Automation

AQ327/537L is compatible with Robot automation systems. Left handed CNC specification is also available for multi-automation as factory option.



## WS-4P/5P

Sodick's own Rotary Table developed In-house is available as an additional A or B axis for indexing or simultaneous contouring.

## LP34W

Factory option of power supply "LP34W" is capable of controlling an 8 axis simultaneously.



## Jauch & Schmider Rotary Table

Jauch & Schmider A or B axis as well as A+B axis are available as factory option on AQ327/537L for indexing or simultaneous contouring on both additional axis. (LP34W may be required)



# Specification AQ327L/AQ537L

| Specification Of Machine                   | AQ327L Premium                                                  | AQ537L Premium                                                  |
|--------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|
| Max. workpiece dimensions (W x D x H)      | 570 x 420 x 240 (Flushing) mm<br>570 x 420 x 230 (Submerged) mm | 770 x 520 x 340 (Flushing) mm<br>770 x 520 x 280 (Submerged) mm |
| Max. workpiece weight                      | 500 kg                                                          | 1000 kg                                                         |
| Work tank size (W x D)                     | 850 x 610 mm                                                    | 1050 x 710 mm                                                   |
| X axis travel                              | 370 mm                                                          | 570 mm                                                          |
| Y axis travel                              | 270 mm                                                          | 370 mm                                                          |
| Z axis travel                              | 250 mm                                                          | 350 mm                                                          |
| U axis x V axis travel                     | 120 x120 mm                                                     | 120 x120 mm                                                     |
| Taper angle (workpiece thickness of 100mm) | ±25°                                                            | ±25°                                                            |
| Wire diameter                              | 0.15~0.30 <sup>#1</sup> mm                                      | 0.15~0.30 <sup>#1</sup> mm                                      |
| Wire feed speed (max)                      | 420 mm/sec                                                      | 420 mm/sec                                                      |
| Wire tension                               | 3~23 N                                                          | 3~23 N                                                          |
| Distance from floor to table top           | 995 mm                                                          | 995 mm                                                          |
| Machine tool dimensions (W x D x H)        | 2225 x 2395 x 2220 mm                                           | 2600 x 2740 x 2390 mm                                           |
| Machine installation dimensions            | 3200 x 3200 mm                                                  | 3700 x 3900 mm                                                  |
| Machine tool weight                        | 3950 kg                                                         | 5200 kg                                                         |
| Total power input                          | Normal: 10,5 KVA                                                | Normal: 10,5 KVA                                                |

Due to ongoing research, specifications are subject to change without prior notice

#1 Option: Ø 0.1 mm /

## Premium Features

- LP33W High-speed generator
- Super Pika W fine finishing circuit down to Ra 0.1 µm\*
- Rise and fall work tank

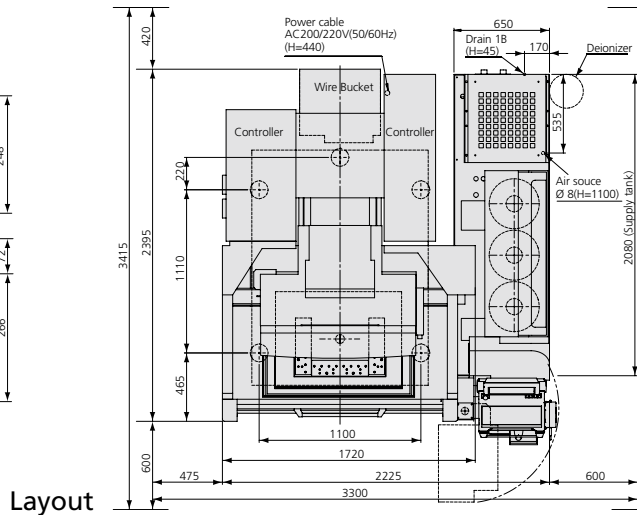
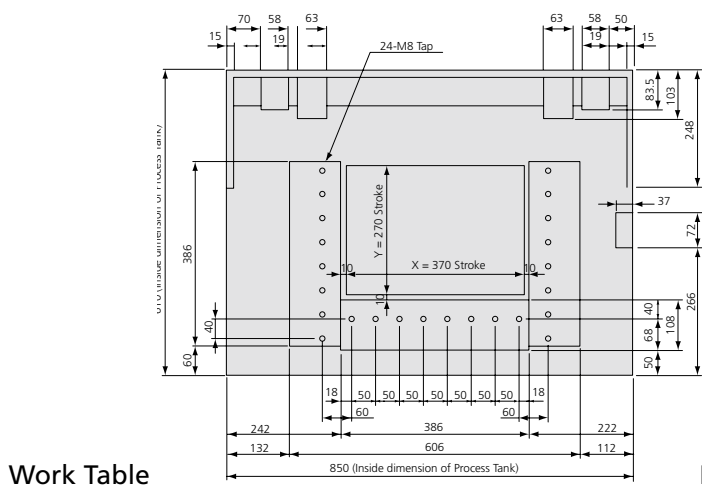
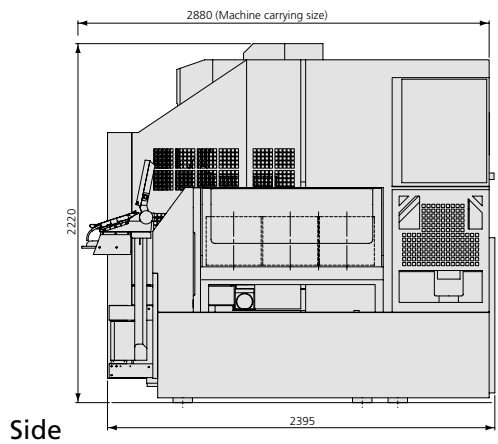
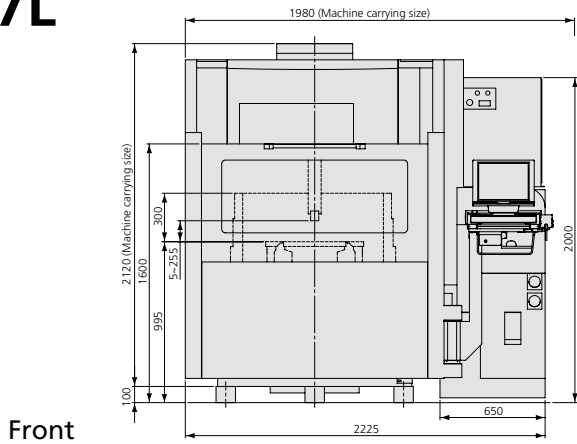
\* Conditions vary according to material and thickness. Please consult your sales representative for further details.

| Dielectric Tank              | AQ327L Premium                                               | AQ537L Premium                                               |
|------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|
| External dimensions (W x D)  | 650 x 2080 mm                                                | 725 x 2550 mm                                                |
| Weight (empty)               | 400 kg                                                       | 600 kg                                                       |
| Capacity                     | 600 lit                                                      | 800 lit                                                      |
| Dielectric filtration system | Replaceable paper filter<br>(internal pressure 3-shell type) | Replaceable paper filter<br>(internal pressure 3-shell type) |
| Deionizer                    | Ion exchange resin (18-lit container)                        | Ion exchange resin (18-lit container)                        |
| Chiller                      | Std                                                          | Std                                                          |

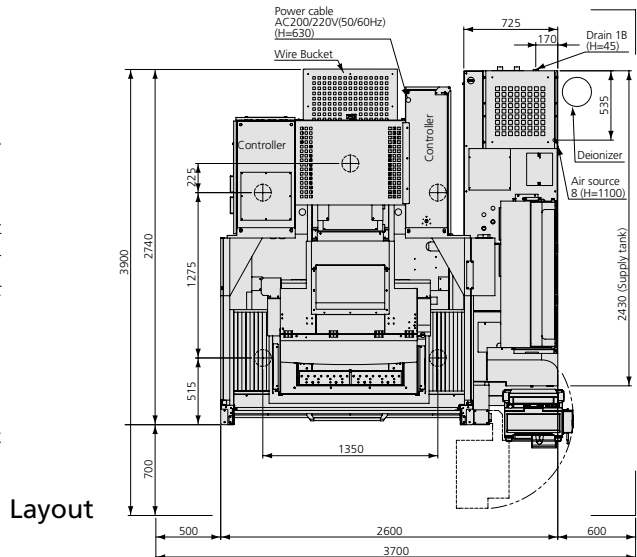
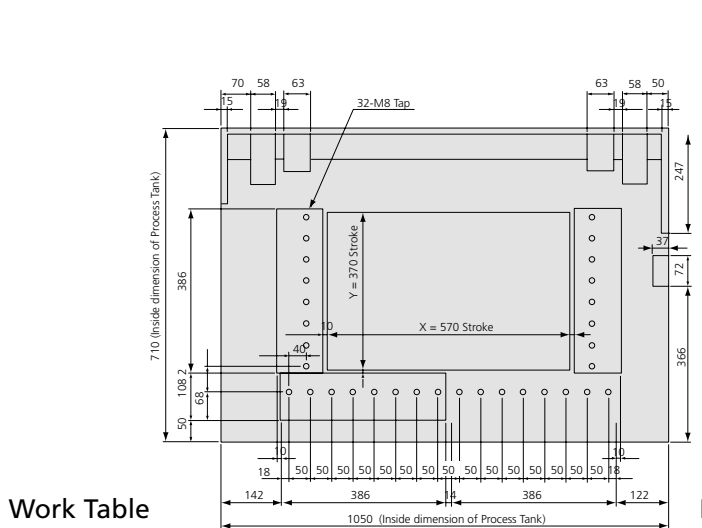
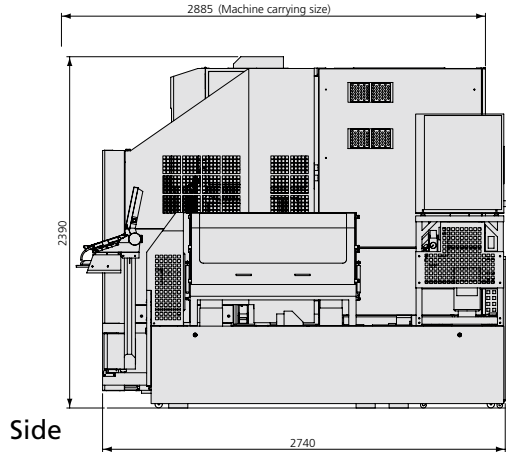
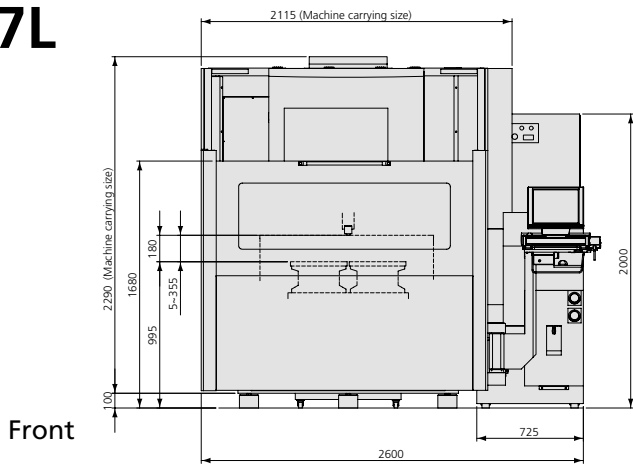
| CNC Power Supply LP33W/34W     |                                         |
|--------------------------------|-----------------------------------------|
| Max. machining current         | 60A                                     |
| Power requirement              | 200/220V 50/60Hz                        |
| CNC unit                       | Multi-task OS, Sodick Motion Controller |
| User memory capacity           | Edit: 100,000 blocks / saving: 30MB     |
| Memory device                  | CF Card, External Memory                |
| Input format                   | USB part, LAN, Touch Screen, Keyboard   |
| Display type                   | 15.1" TFT-LCD Touch Screen (XGA)        |
| Character set                  | Alphanumeric and symbols                |
| Simultaneously controlled axes | Max. 4 axes (LP34W: Max. 8 axes)        |
| Min. input command             | 0.1µm                                   |
| Min. drive unit                | 0.1µm                                   |
| Drive mechanism                | Linear motor                            |

| Standard Features                    |                                      |
|--------------------------------------|--------------------------------------|
| Taper cut unit                       | Tension servo                        |
| Corner control                       | FTII (Fine pick-up function)         |
| Energy saving circuit                | High speed electrolysis free circuit |
| Dielectric cooling unit              | Automatic voltage regulator          |
| High speed wire threading unit (AWT) | Wire tip disposal unit               |
| Air Filter                           | Z-axis automatic fluid level control |
| Paper filter (3)                     | Tool kit                             |
| Ion-exchange unit (18 lit)           | APW (automatic power recovery)       |
| LAN connection                       | Work light                           |
| USB port                             | Linear scale (X. Y. U. V axis)       |

# AQ327L



# AQ537L



# Sodick

*create your future*

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