Sodick

Linear Motor Drive High-speed Ultra-precision Die-sinker EDM

AP30L

Sodick's latest technology solves the issues of ultra precision machining

- Overall temperature control
- Linear motor drive
- High precision compact size CFRP spindle
- Numerical control power source device LP4/LP40
- LN Pro ADV

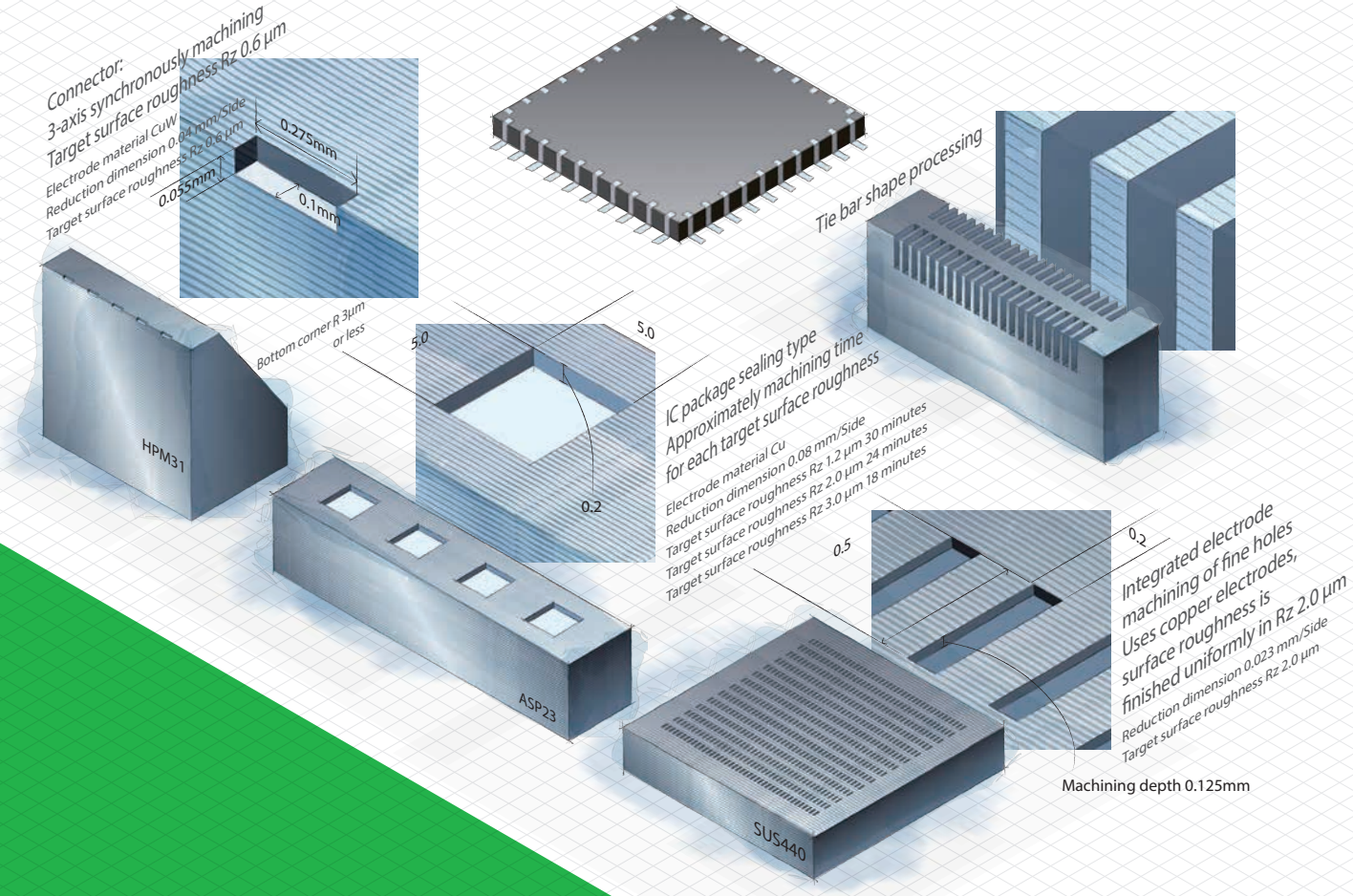
Unexplored world comes into view

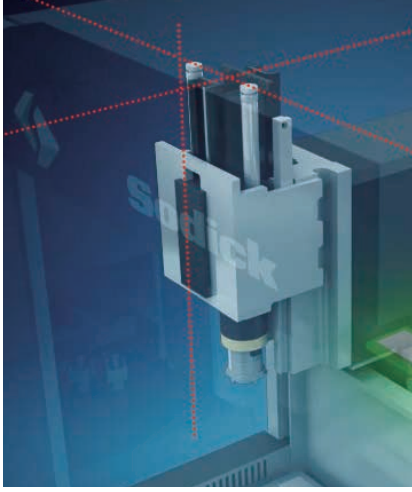
Sodick started with the invention of non-wear electrode circuit, and has created unexplored technology for over 40 years. In the history of ultra precision machining, Sodick has made a number of innovations, and our discharge technology will continue to demonstrate overwhelmingly high performance in the future.

Stabilize and realize high value-added products with leading-edge technique

Application field representative example Narrow-pitch micro connector/Small IC package

Even faster and easier to use





Overall temperature control

Changes in temperature affect extremely high-precision machining. AP30L collectively manages all the ambient temperature changes and internal heat generation through the overall temperature control.

- Optimum high rigidity mechanical structure by CAE analysis
- Heating source complete separation structure
- Machining-fluid temperature control system
- Integrated with ceramic

Developed to allow circulation of machining fluid and cooling liquid, and overall temperature control.

High precision compact head

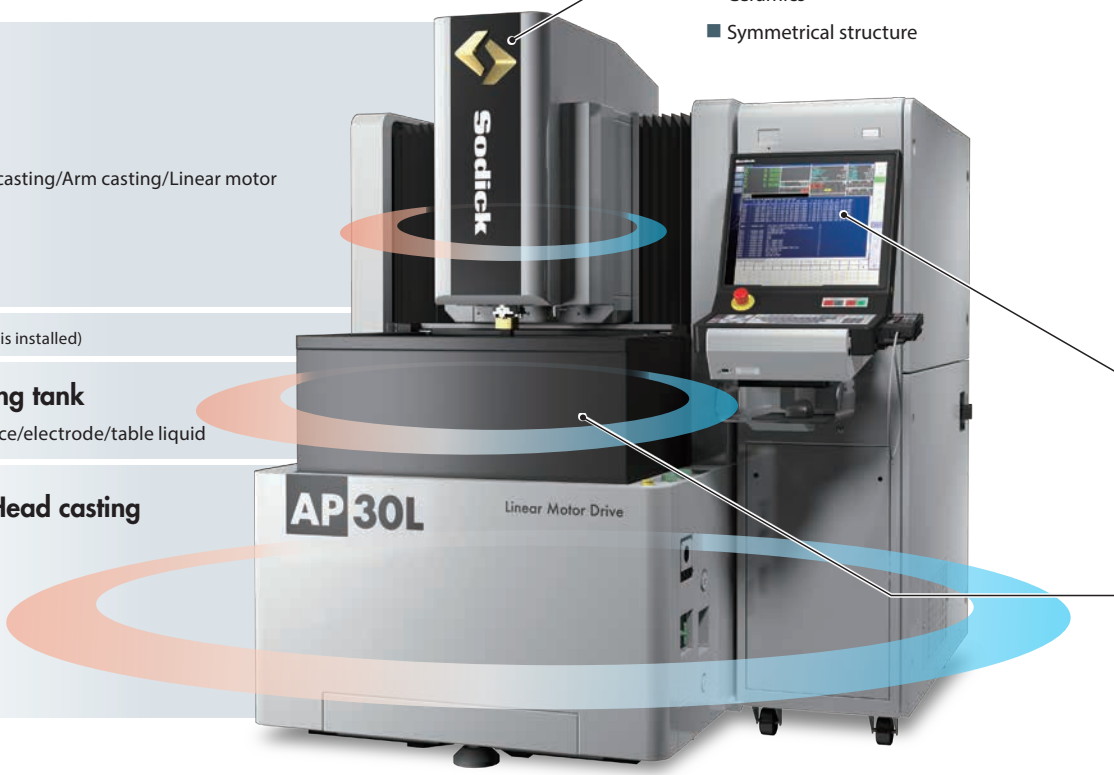
- CFRP slider
- Ceramics
- Symmetrical structure

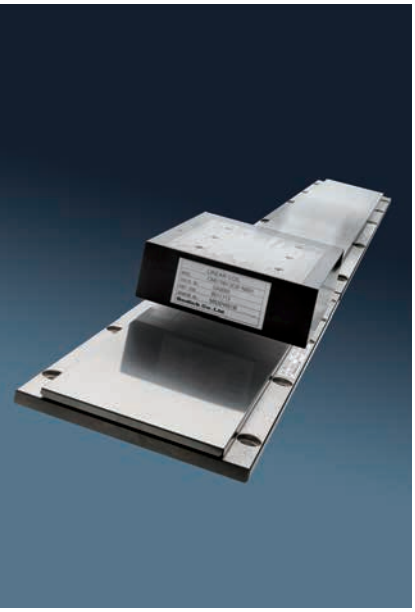
Head structure Head casting/Arm casting/Linear motor

CR axis (when option is installed)

In machining tank
Table/work piece/electrode/table liquid

Head casting





Linear motor drive

Maintains extremely accurate positioning by No ball screw-system for a long period.

Sodick has adopted the linear motor into die-sinker EDM for the first time in the world and has more than 20 years of sales experience. Our linear motor control technology has many excellent features and has received high evaluation from customers all over the world.

- High speed, high response
- Three-axis linear motor drive (XYZ axis)
- Sodick Motion Controller Technology (K-SMC)

Sodick motion controllers

K-SMC

The linear motor drive method is direct drive method that maintains high speed, high acceleration, high precision and high response for a long period. There is no backlash, which is a problem in the conventional ball screw drive method, and it keeps accurate axis movement almost permanently. Therefore, it is "high stability" and "ecology" drive method that does not require periodic replacement like the ball screw drive method. Moreover, the performance of this linear motor demonstrates maximum performance in combination with the motion controller (K-SMC) which Sodick has developed over the years.

High-precision CFRP compact spindle

With unparalleled technology and ultra lightweight, it shows extremely high performance in high speed jump.

- Linear motor drive
- CFRP enhanced slider
- Symmetrical structure
- Lightweight design for moving parts
- Integrated with ceramic

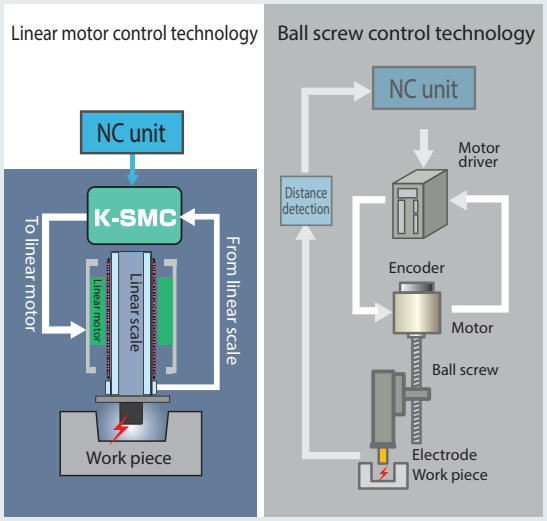
■ High speed turning, high precision indexing CR axis (optional) (Absolute encoder adopted)

The built-in synchronous motor made by Sodick is integrated, has a small size and light-weighted. This new CR axis has a complete cooling structure and improves resistance to changes in environmental temperature.

Touch panel type
19 inch control panel

Fully automatic control
Automatic three sides up and down type machining tank

It is easy to combine with automation equipment such as robots.



CNC power supply LP4/LP40

Improves machining speed in all of rough machining, semi-finishing, finishing

- Maximum machining current 20A (40A: optional)
- 19 inch horizontal CNT
- Utilities
- AIM (AI maintenance function)

■ Arc-less 4 (discharge stabilized machining system)

Discharge state is maintained steadily, further speeding-up is possible. In addition, it realizes suppression of electrode consumption to the utmost limit, achieves a wide variety of processed surface quality ranging from satin finish to mirror finish, improves the performance of electric discharge machining.

■ TMM4 circuit (rough machining)

Improves machining speed of rough machining by short-pulse and high-peak current.

■ TPC4 control (semi-finishing)

Speeds up the semi-finishing machining with narrow gap.

■ BSN4 circuit (finish)

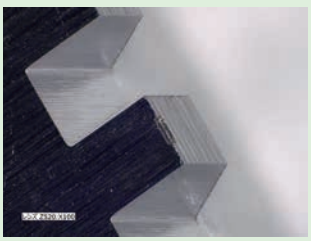
Speeds up in finishing area and equalizes the surface quality.

x 2000

BSN4 circuit

Electrode material	Cu
Machining material	Steel
Electrode shape	□4mm
Surface roughness	Ra 0.13 µm Rz 0.67µm

Sample



Material	S-STAR
Machining shape	0.3×0.1 mm
Machining depth	0.05 mm
Corner R	3µm
Surface roughness	Rz 0.34µm
Electrode	CuW
Electrode reduction dimension	0.03 mm/side
Machining liquid	OIL Vitol-2
BSN4 circuit use	30% higher machining speed

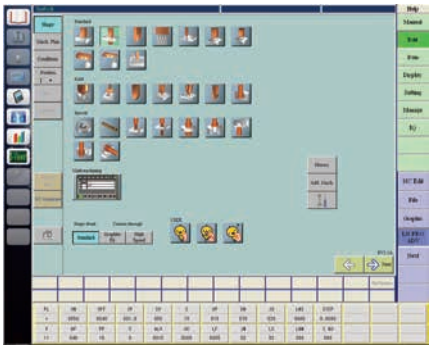
LN Pro ADV

Supports optimal machining parameters thanks to Sodick's Electrical Discharge Machining (EDM) knowhow

It is possible to select various machining conditions corresponding to all forms of machining with a simple 4-step operation (select shapes, machining plans, specific conditions and positions) to obtain the best performance in accordance with the use purposes. Supports optimal machining parameters by integrating AI into a new circuit system, new control system.

AI's reasoning
Embed knowhow about machining into AI

Sodick's
over-40-year knowhow
about Electrical Discharge Machining



Control panel

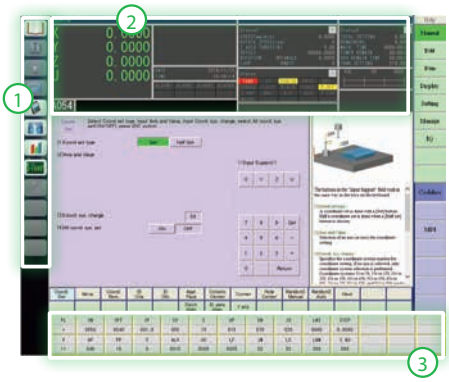
Upgraded to enhance "user-friendliness"

The 19-inch horizontal control panel offers better visibility with improved functionality; keyboard, remote control, safety stop button equipped to fit the use purpose, helping the operations to be performed quickly and easily. Utilities and machining conditions are always displayed on the screen, and one-touch operations can be performed on the touch panel.

1 Utilities
- User Guide
- Calculator
- Temperature graph
- AIM (AI Maintenance)
- Mode list
- S-Viewer

2 Expand Status/VF button/ ALARM
The size of the display coordinate values have been increased.

3 Always show machining conditions



Optional ultra-precision equipment, maximum labor savings

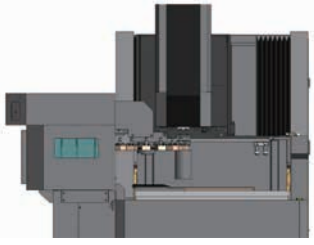
AP30L Full-cover (Option)

It is possible to regulate the air of the main engine and ATC correctly. It is possible to reduce laborers in the super precision machining by minimizing the impacts of the environmental temperature changes.

Full-cover (Option)
- Cover
- Precise air conditioner
- Mist collector

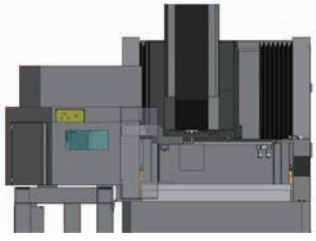
*Picture is a built-in ATC-16S (option)

A labor-saving system can be built thanks to ATC (automatic electrode exchanger: option).
A separate design with the main unit minimizes vibration when moving the electrode.



ATC-16S

Number of electrodes	16
Total electrode weight	24 kg
Maximum size of electrode	φ100 mm Length 200 mm
Maximum weight of electrode	4 kg



ATC-32E

Number of electrodes	32
Total electrode weight	100 kg
Maximum size of electrode	φ160 mm Length 200 mm
Maximum weight of electrode	5 kg

Specifications

Machine tool

Work table dimensions (W x D)	500 x 350 mm (ceramic)			
Work tank inner dimensions (W x D x H)	710 x 540 x 330 mm			
Work tank fluid level (from table top)	130 to 260 mm			
Work tank capacity	120 liter			
X axis travel	300 mm			
Y axis travel	250 mm			
Z axis travel	200 mm			
Clamp chuck	Automatic	EROWA EROWA 3R 3R	COMBI ITS COMBI MACRO	ER-020025 ER-007521 3R-460.86-2 3R-600.86-30
Max. weight of workpiece	5 kg			
Max. suspended weight	200 kg			
Distance between electrode and table top*1	EROWA chuck 3R chuck		185 to 385 mm 168 to 368 mm	
Distance from floor to table top	780 mm			
Machine dimensions (W x D x H)	1140 x 1680 x 1950 mm (Power supply, pump and cooler unit not included)			
Machine tool weight	3410 kg (Power supply, pump and cooler unit included)			
Air pressure	0.65 MPa*2			
Air flow	100 NL/min			
Total power input	3 phase 50/60 Hz 7.0 kVA (including machining fluid cooling unit)			

* 1 Sub-sera surface plates (Option) EROWA: 135 to 335 mm 3R: 118 to 318mm
* 2 If not satisfying the set the air pressure, install the pressure booster (optional).

Dielectric tank

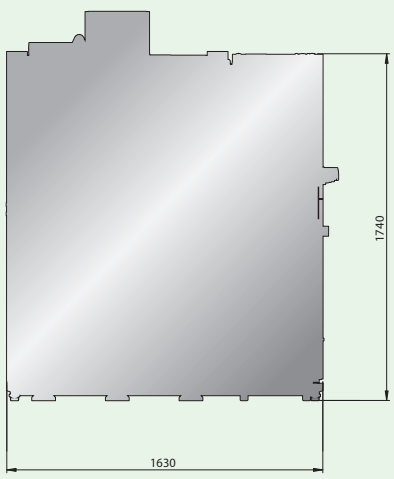
Dielectric machining fluid	oil
Tank capacity	195 liter
Filteration method	Replaceable paper filter

CNC power supply LP4/LP40

Max. machining current		20A (40A: option)
Electric discharge power supply		TMM4 power supply for optimum pulse control [Arc-less 4, TPC 4, BSN 4], other circuits [SVC circuit]
Power requirements		200/220 V 50/60 Hz
NC Unit		Multitask OS, K - SMC-LINK method (M4 - LINK)
User memory capacity		Editing : 100,000 blocks Saving : 30 MB
Memory device		SSD card, external memory
Input format		External memory, Multi touch panel, Keyboard, LAN
Display type		19-inch TFT-LCD
Character set		Alphanumeric and symbols
Keyboard		Standard 101 keyboard, function key
Remote controller		Jog, OFF, ACK, ENT, HALT, Clamp / unclamp etc.
Positioning command		Incremental and absolute
Max. input command		±999999.999/±99999.9999/ ±9999.99999 (switchable)
Machining conditions storage capacity		1000 conditions (C000 to C999)
Offset setting storage capacity		1000 conditions (H000 to H999)
Program sequence number assignment		N000000000 to N999999999
Number of subprogram nesting operations		50
Number of Q command nesting operations		7
Number of coordinates		60
Simultaneous control axes		Max 4 axes (LP40: Max 6 / 8 axis)
Min. input command		0.1µm
Min. drive unit		0.1µm
AJC speed	X.Y axis Z axis	Max 10 m/min Max 36 m/min
Max. feed rate	X.Y.Z axis	3 m/min
Position detection mechanism		Full - closed loop (linear scale)
Drive mechanism		Linear motor
Compensations		Pitch error correction, Plane pitch error correction, Torque correction for each axis
Editing		Editing during machining Multi-editing of two files on one screen
Graphics		XY/ YZ/ ZX plane, graphics drawing during machining, background graphics drawing LORAN shape drawings, discharge graphs, etc.

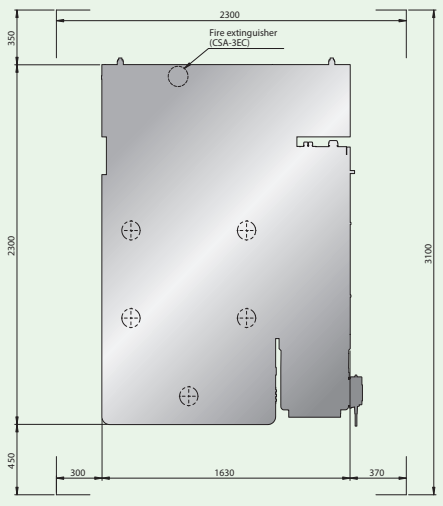
Dimension

Unit: mm



Layout

Unit: mm



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Sodick Co., Ltd.

3-12-1, Nakamachidai, Tsuzuki-ku, Yokohama, Kanagawa
224-8522 Japan
TEL: 81-45-942-3111 FAX: 81-45-943-7880

https://www.sodick.co.jp/en/

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