

Linear Motor Driven High-speed Wire-cut EDM

VL series

VL400Q VL600Q



Sodick's entry level machine, the VL.

Sodick's high precision wire-cut EDM supports extensive applications.

Linear Motor Driven
High-speed Wire-cut EDM

VL400Q

- ▶ 4 axis linear motor drive
- ▶ Ceramics
- ▶ Sodick's Motion Controller
- ▶ Latest NC unit developed in-house



Linear Motor Driven
High-speed Wire-cut EDM

VL600Q

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VL series High-speed Wire-cut EDM

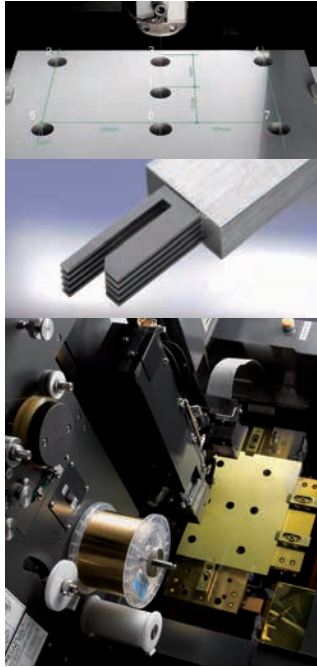
Wire-cut EDM Lineup

Sodick's Wire-cut EDMs support state-of-the-art manufacturing from machining of components to high-precision molds

All models
4 axis XYUV
Linear Motor Drive



- ▶ Realized stable machining with a gantry structure
- ▶ Oil bathed wire-cut EDM excellent in fine precision and high quality



AP250L (oil)

AP450L (oil)

AP650L (oil)

AP

series

High Precision
Wire-cut EDM



- ▶ Integrated advanced technology and ease of use
- ▶ High performance in all machining from first cut to best surface



AL400P

AL400G

ALN400G

ALN400Q

AL600P

AL600G

ALN600G

ALN600Q

AL

series

High-speed &
High Performance
Wire-cut EDM

Abundant ceramic was adopted as the machine structure material based on the 4 axis linear motor drive (XYUV axes).

The automatic wire threading unit equipped with the latest pop-up search, established workability suitable for component machining.

Provides a stable machining performance and highly efficient production with ease of use, in combination with the NC power supply LN2W developed in-house, which demonstrates optimal discharge control in various types of machining.



Demonstrates excellent best surface roughness in the entry level machine

Linear Motor

Sodick's linear motor drive machine achieved total shipments of more than 45,000 machines

XYUV axes

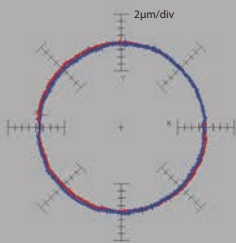
4 Axis Linear Motor Drive

- ▶ XYUV axes are equipped with high speed and high precision linear motors
- ▶ Simple structure with no mechanical contact prevents wear and deterioration
- ▶ Maintenance free and long lasting initial accuracy
- ▶ High accuracy linear guides
- ▶ Backlash-less
- ▶ Linear motor drive system reached more than 45,000 units
- ▶ Sodick's motion controller demonstrates excellent responsiveness
- ▶ Equipped with linear-scale (made by Heidenhain)

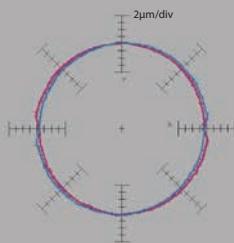
Dynamic accuracy remains the same even after 10 years

Sodick's maintenance free linear motor drive system, maintains the initial accuracy semi-permanently throughout the life of the machine (10 years or more) without deterioration of the machine accuracy caused by the wearing of ball screws, because it uses a non-contact method without ball screws.

Initial Accuracy Results at Introduction



Accuracy Results after 10 Years



No occurrence of backlash

In the "ball screw drive method" used for drive shafts of common machine tools, a slight delay occurs because the clearance that is generated when the driving direction changes to the reverse direction. This is called backlash.

Since Sodick's linear motor drive system uses a non-contact drive with no mechanical contact, backlash does not occur for many years.

Ceramic



Accurate

Maintains high insulatability which accurately transmits fine electric discharge energy between the poles.

Energy saving

Weight saving can be realized by the abundant use of ceramic with low specific weight which is 50% that of cast iron for the moving parts as the machine structural material. Accordingly, load on the motor is reduced, which contributes to energy saving.

Ultra-stable

Extremely low internal stress without water absorpency, maintains a stable condition over a long period of time.
Also provides high rigidity and wear resistance.

Portions equipped with ceramic developed and manufactured in-house used in the VL

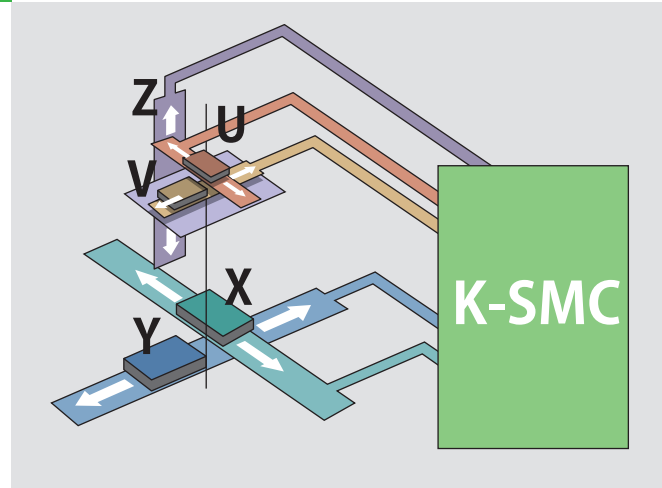
- ▶ Ceramic upper arm
- ▶ Ceramic lower arm
- ▶ Ceramic base for work stand: 4 locations
- ▶ Pulley for wire tension
- ▶ Winding rollers for wire discharge

A high quality machining surface which is an advantage of electric discharge machining can be acquired by the abundant use of ceramic.

Sodick's Motion Controller

K-SMC

- ▶ Accurately controls the high speed and high precision motion of the linear motor (fully closed control)
- ▶ Motion is accurately controlled based on commands from the NC unit, where accurate positioning is controlled at high repeatability

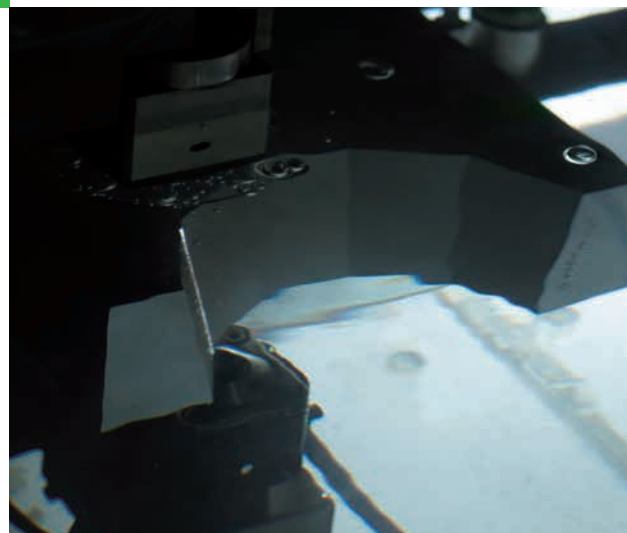


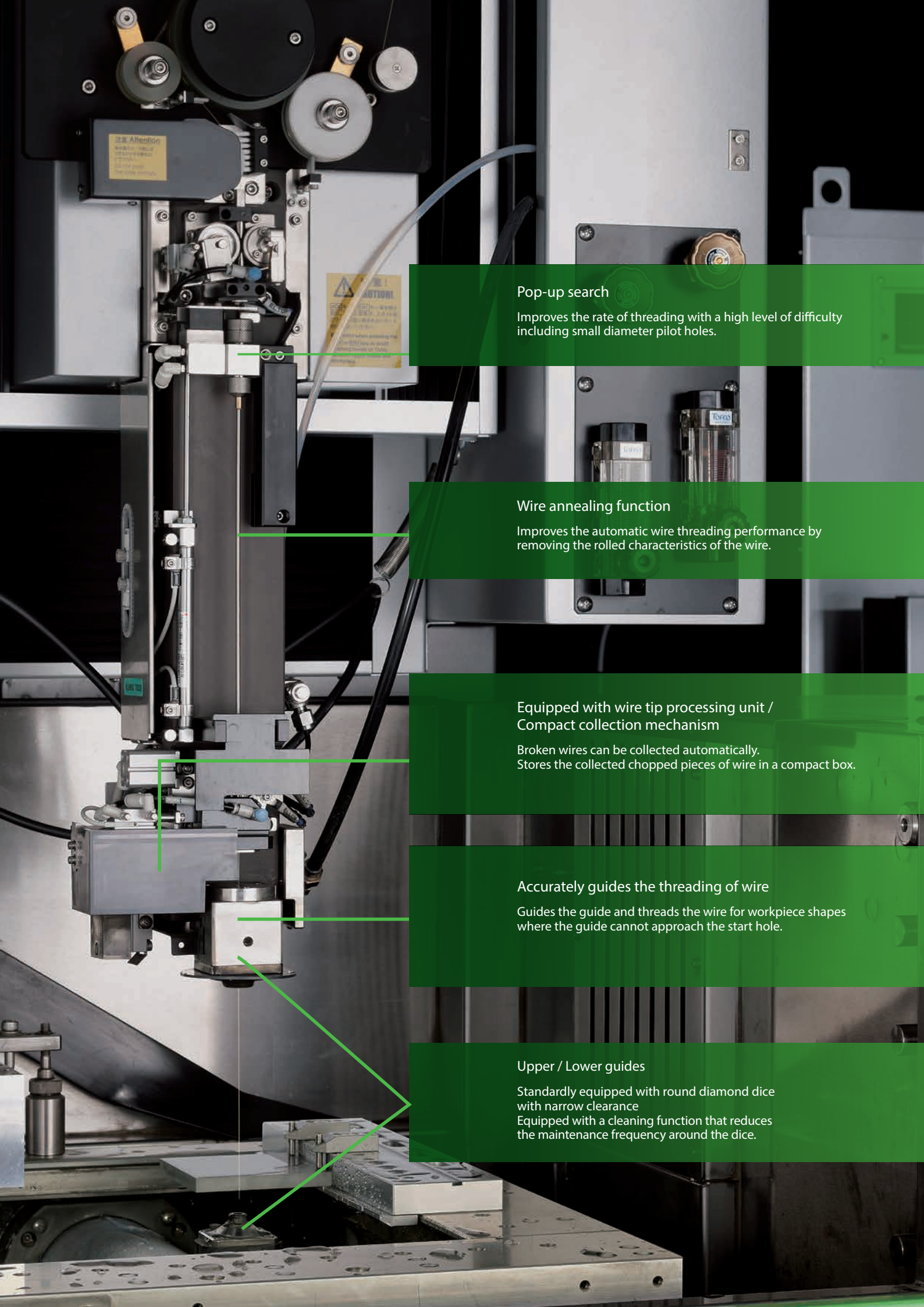
High speed processing of the discharge control and motion control can be realized at the same time, based on accurate information without delays using 1 Gbit/sec high speed communication technology.

- ▶ XYUV 4 axis linear motor drive control
- ▶ Maintains stable high precision machining

Discharge Power Supply Unit

- ▶ This unit is equipped with numerous circuits which optimally control the electric discharge energy.
- ▶ Finish machining circuit demonstrates Rz 2 μ m (cemented carbide material) in 4 cuts
- ▶ Equipped with corner machining control
- ▶ Supports "Rust-less" which suppresses the rust and corrosion on steel and cemented carbide (Optional)
- ▶ Energy saving design minimizes loss of energy





Pop-up search

Improves the rate of threading with a high level of difficulty including small diameter pilot holes.

Wire annealing function

Improves the automatic wire threading performance by removing the rolled characteristics of the wire.

Equipped with wire tip processing unit / Compact collection mechanism

Broken wires can be collected automatically. Stores the collected chopped pieces of wire in a compact box.

Accurately guides the threading of wire

Guides the guide and threads the wire for workpiece shapes where the guide cannot approach the start hole.

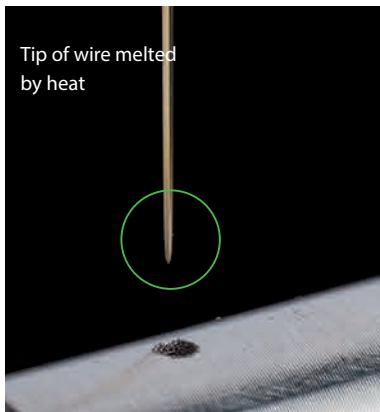
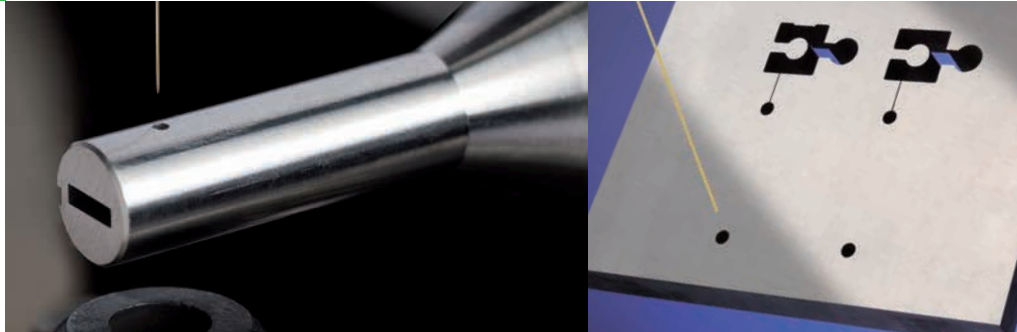
Upper / Lower guides

Standardly equipped with round diamond dice with narrow clearance
Equipped with a cleaning function that reduces the maintenance frequency around the dice.

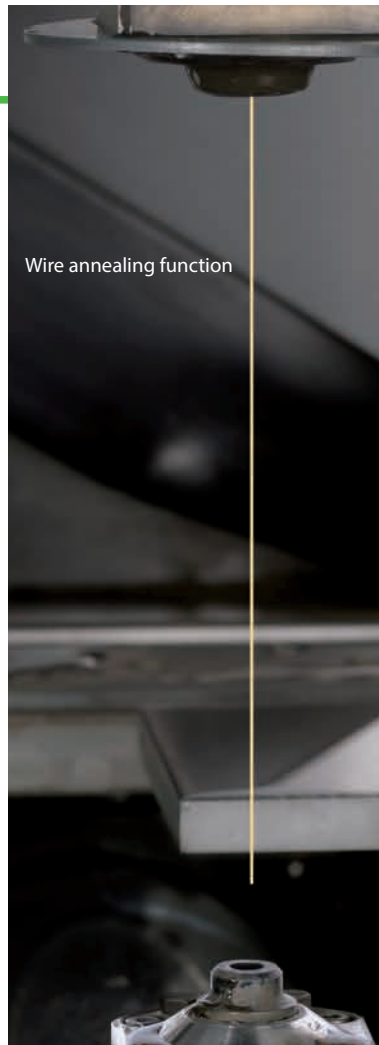
AWT

Automatic WireThreading Unit

- ▶ Wire is automatically threaded into the next start hole
- ▶ Supports unattended machining operation and automation
- ▶ Improves automatic wire threading performance regardless of being in the air or submerged



Tip of wire melted by heat



Wire annealing function

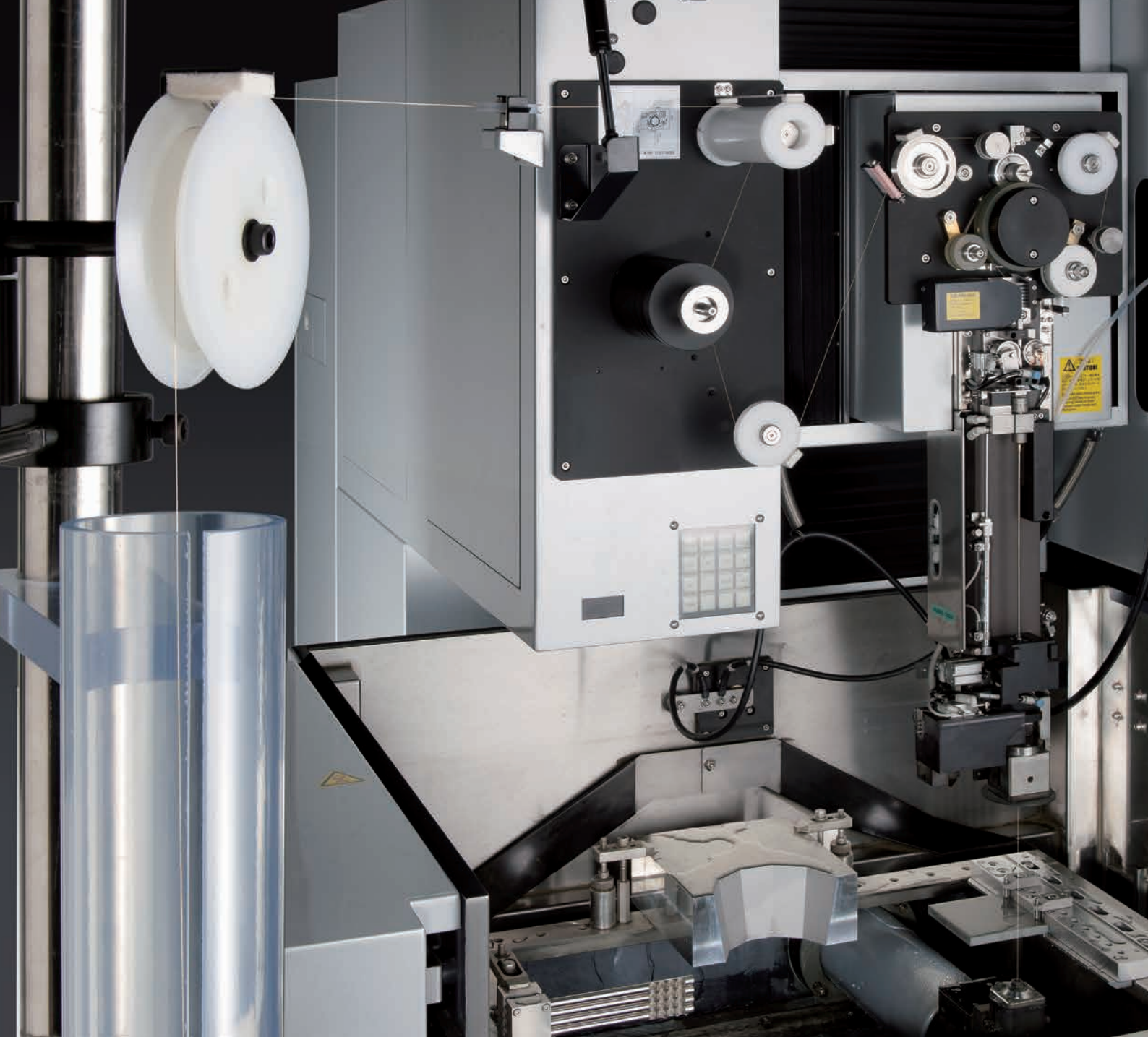
- ▶ Excellent straightness improves the automatic wire threading performance of very thick workpieces
- ▶ Improves the automatic wire threading performance even in workpiece shapes where the guide cannot approach the pilot hole
- ▶ Wire straightness function by annealing



Round dice

Power Feed Contact





Machine in photo is equipped with the jumbo feeder (Optional).

Wire Tension Servo

Wire Tension Servo Function

- ▶ Adjusts wire tension (wire tension condition) in real time
- ▶ Suppresses tension fluctuation in rough machining with large current
- ▶ Suppresses tension fluctuation in machining of very thick workpieces



Optimal tension demonstrates high accuracy

Wire maintenance

- ▶ Removes impurities from the wire electrode
- ▶ Felt rollers which ensure stability of traveling wire
- ▶ Equipped with wire slip out prevention parts

Wire collection unit

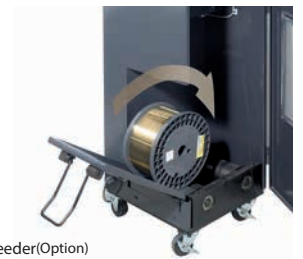
- ▶ Collects wire in the bucket mounted on the back side of machine
- ▶ Large diameter rollers made of wear resistant material adopted on the wire discharge unit demonstrate excellent durability



Genuine wire made by Sodick

Use Sodick's genuine consumable supplies for high precision machining, increased machining speeds and high quality machining.

- Tsubame Wire Plus
- 20 kg specification wire



Jumbo feeder(Option)

Slide plate cleaning

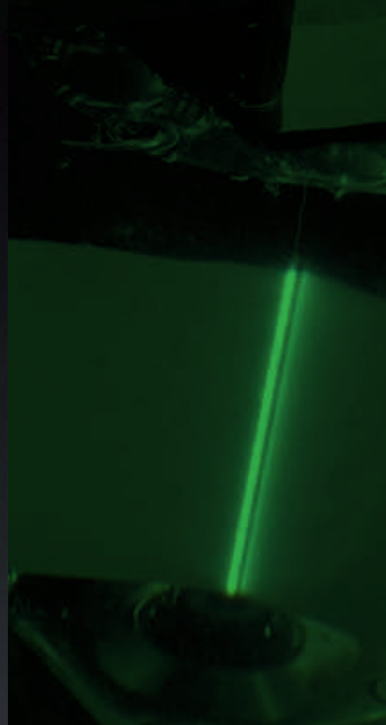
- ▶ Prevents adhesion of sludge on slide plate
- ▶ Maintains stable high precision machining
- ▶ Contributes to reduction of maintenance time



Double filter

- ▶ Filters which filter the machining fluid and collect sludge
- ▶ Maintains stable machining performance by implementing maintenance according to the machining time
- ▶ Easy replacement contributes to reduction of maintenance time





Samples

150 - mm thick varying top and bottom shapes machining

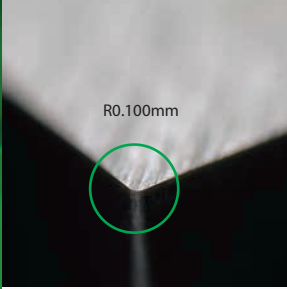
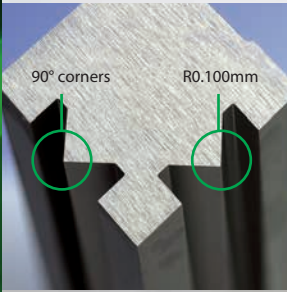
Machining material ■ SKD11

Thickness ■ 150 mm

Surface roughness ■ Ra 0.49 μ m (Rz 3.7 μ m)

Wire diameter ■ \varnothing 0.25 mm





Very thick corner shape machining

- Machining material ■ SKD11
- Thickness ■ 100 mm
- Surface roughness ■ Ra 0.38 μ m (Rz 2.8 μ m)
- Wire diameter ■ ϕ 0.25 mm



Varying top and bottom shapes twist taper machining

- Machining material ■ SKD11
- Thickness ■ 70 mm
- Surface roughness ■ Ra 0.31 μ m (Rz 2.5 μ m)
- Wire diameter ■ ϕ 0.20 mm



NC Power Supply Unit

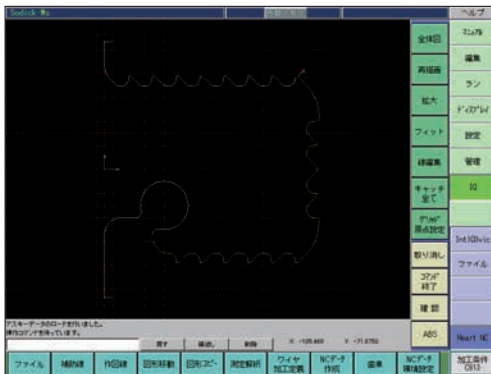


Heart NC

- ▶ 2D automatic programming support function which enables creation of machining shapes
- ▶ Programs, such as varying top and bottom shapes, involute gears, coreless shapes, and free form curves can be created
- ▶ Data can be read in DXF format
- ▶ Reads data created by other CAD/CAM in DXF format, and outputs a machining program

Drawing menu

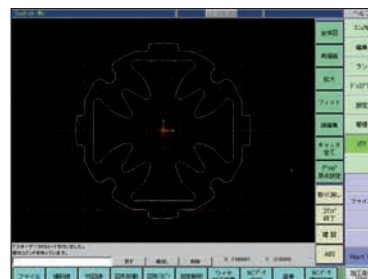
Overdraw	2-Pt Ln	X-Axis Paral Ln	Die
Points	Y-Axis Paral Ln	Perp Ln	Punch
Ln Segmt	Paral Ln	Ang-Div Ln	Open
Circles	Incl Ln	Perp Bisec Ln	T/B Diff
Arcs	1-Circ Tan	2-Circ Tan	Define CoreClip
Fillet	Symm Ln	Bisec Ln	Delete CoreClip
Bevel	3-Pt Circ	2-Pt + R Circ	Part Taper
Offset	Fixed R + C Circ	C + R Circ	Spec T/B R
Div EI	1-EI Tan Pt + R Circ	1-EI Tan C Circ	Del Spec R
Join EI	2-EI Tan R Circ	3-EI Tan Circ	Edit Path
Ellipse	Concen Circ	Extend Auxiliary Line	Del Path
Spline	Second Lines	Drawing Lines	Move Shape



Heart NC



Reads



Punch & die machining



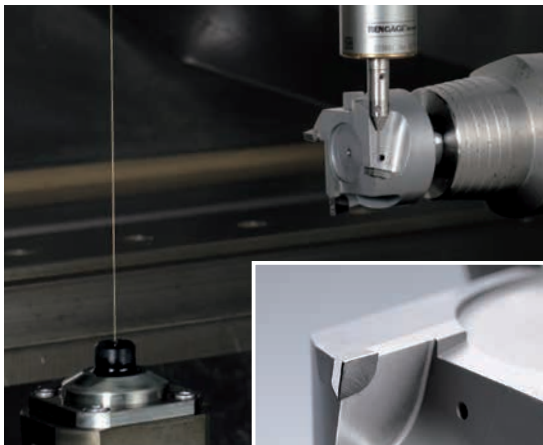


WS-4P/WS-5P (Optional)

- ▶ Installed in the machining tank, and added W-axis
- ▶ Rotary table which enables multi-axis indexing and synchronous machining
- ▶ NC power supply unit LN20W (Optional) is required (Water immersion compatible)

WS-4P table diameter: 102 mm
 Max load weight: 10 kg when used horizontally,
 5 kg when used vertically

WS-5P table diameter: 156 mm
 Max load weight: 40 kg when used horizontally,
 20 kg when used vertically

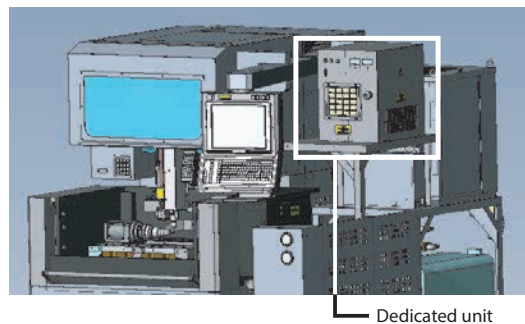


PCD Tool Package (Optional)

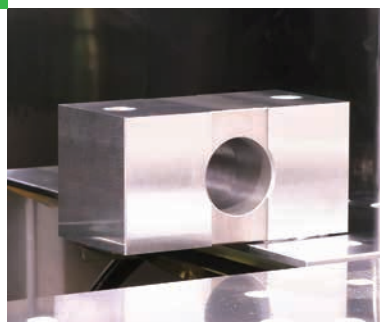
[Package contents]

The package includes measuring equipment, rotary unit, tool clamp unit, dedicated software, and a unit (WTPC) only for the power supply of the selected EDM machine.

* Contact a sales representative for the PCD tool package.

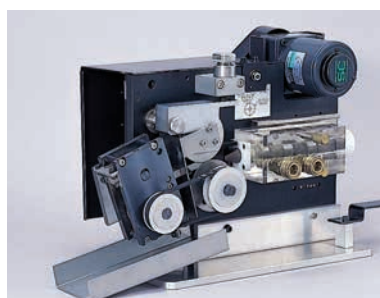


Optional



AVC (Optional)

The vertical alignment of a wire can be performed automatically using a dedicated tool.



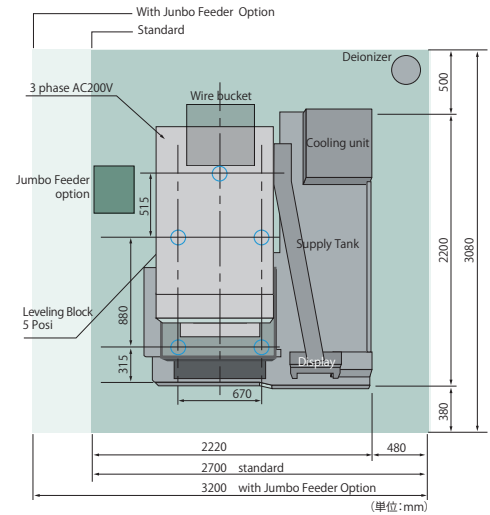
L-cut (Optional)

- ▶ Cuts used wire into small pieces at the discharge portion.
- ▶ Supports $\phi 0.1$ mm to 0.3 mm



Linear Motor Driven High-speed Wire-cut EDM

VL400Q



Specifications

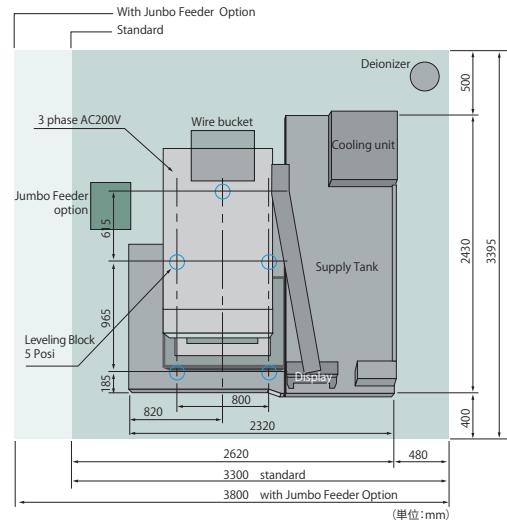
Machine	VL400Q	VL600Q
Machining tank inner dimensions (W x D)	860×690 mm	1040×780 mm
X axis stroke	400 mm	600 mm
Y axis stroke	300 mm	400 mm
Z axis stroke	220 mm	270 mm
U x V axis stroke	80×80 mm	80×80 mm
Max. taper angle	± 15° (Thickness: 120 mm)	± 15° (Thickness: 120 mm)
Max. workpiece size (W x D x H)	830×610×215 (Flush machining) mm 830×610×200 (Immersion machining) mm	990×670×265 (Flush machining) mm 990×670×250 (Immersion machining) mm
Max. weight of workpiece	500 (Flush machining) kg 350 (Immersion machining) kg	850 (Flush machining) kg 700 (Immersion machining) kg
Wire diameter	ø 0.1 - ø 0.3 mm	ø 0.1 - ø 0.3 mm
Wire tension	3 - 23 N	3 - 23 N
Wire feed rate	Max. 420 mm/sec	Max. 420 mm/sec
Distance from floor to table upper surface	900 mm	930 mm
Machine dimensions (W x D x H)	2020×2310×1990 mm	2620×2605×2080 mm
Machine installation dimensions (W x D)	2700×3080 mm	3300×3395 mm
Machine weight (Power supply included)	2700 kg	3040 kg
Air supply	0.5MPa 30NL/min	0.5MPa 30NL/min
Total electric capacity	3-phase 50/60 Hz 11 kVA	3-phase 50/60 Hz 11 kVA
Service Tank	VL400Q	VL600Q
External dimensions (W x D x H)	755×2200×1800 mm	960×2430×1810 mm
Service tank capacity	590 Liter	890 Liter
Weight (dry)	380 kg	420 kg
Machining fluid filtration method	Paper filter replacement type (2 cylinder inner pressure type)	Paper filter replacement type (2 cylinder inner pressure type)
Demineralizer	Ion exchange resin (18 L specification)	Ion exchange resin (18 L specification)
Options available	VL400Q	VL600Q
Name		
XYUV 4-axis linear motor	Standard	Standard
Sodick's motion-controller (K-SMC)	Standard	Standard
Ceramic	Standard	Standard
SJ-AWT Type-2B (φ0.1 to φ0.3 mm)	Standard	Standard
Retry unit (φ0.1 to φ0.3 mm)	Standard	Standard
Pop-up search	Standard	Standard
Taper Flex Neo	Optional	Optional
AVC	Optional	Optional
Wire Tension Servo Function	Standard	Standard
NC power supply LN20 W'	Optional	Optional
Air filter	Standard	Standard
Jumbo feeder 50 kg (Left side)	Optional	Optional
L-Cut (φ0.15 - φ0.3 mm)	Optional	Optional
W-axis (WS-4P)	Optional	Optional
W-axis (WS-5P)	Optional	Optional
Tooling system SWS	Optional	Optional
Z-axis synchronized fluid level control	Standard	Standard
Water gun	Optional	Optional
High column	×	Optional
Rust-less (ANCS)	Optional	Optional
Remote controller	Standard	Standard
Mouse	Standard	Standard
Touch panel	Optional	Optional
LAN	Optional	Optional
RS-232C	Optional	Optional
Time counter	Optional	Optional
Signal tower	Optional	Optional
UPS	Optional	Optional
Transformer	Optional	Optional
Light	Optional	Optional
Anti-virus function	Standard	Standard

Note: Please contact Sodick's Sales Department responsible for your area.



Linear Motor Driven High-speed Wire-cut EDM

VL600Q



NC Power Supply Unit

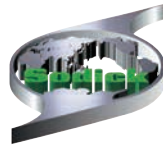
LN2W / LN20W

Max. machining current	32 A
Power supply input specification	AC200V 50/60 Hz
NC unit	Multi-tasking OS, K-SMC-LINK method
User memory capacity	Editing space: 100,000 blocks, Saving space: 30 M bytes
Memory device	CF card, external memory
Input method	External memory, touch panel, keyboard
Display method	15 inch TFT-LCD
Printable character	Kanji (JIS Level 1 Kanji characters), alphabet, numerical characters, etc.
Keyboard	Standard 101 keyboard, function key
Position command method	Incremental / absolute in combination
Input range	± 99999.9999 (metric), ± 9999.99999 (inch)
Electric discharge machining condition registration function	1,000 conditions can be registered (C000 to C999)
Offset function	1,000 conditions can be registered (H000 to H999)
Program sequence number specification	Setting from N000000000 to N999999999
Coordinate value	60
Number of simultaneously controlled axes	4 axes max (LN20W (Optional): 8 axes max)
Min. command unit	0.1 μm
Min. drive unit	0.1 μm (X, Y, U, V axes)
Max. feed speed	X, Y-axis: Max. 3 m/min, Z-axis: 2 m/min
Position detection method	Full closed loop (Linear scale)
Drive system	Linear motor (X, Y, U, V axes)
Various compensation	Pitch error compensation, plane pitch error compensation, torque compensation
Graphics function	Editing during machining, multi-editing of two files on one scre XY, YZ, ZX plane, graphics drawing during machining, background graphics drawing

Installation notes	Select the machine installation location paying attention to the following items:
Installation environment	
Required space	Space indicated in the layout plan *
Installation floor	Location that can withstand the machine weight. Otherwise, foundation work is required. Location not affected by vibration or impact Vibration level 0.1 m/s ² (0.01G) and amplitude up to 1 μm recommended as reference values
Atmosphere	Dust-free location
Temperature and humidity	Location with little variation in temperature Recommendation: Approx. 20 ±1°C Location where the machine is not exposed to direct sunlight, air from an air conditioner, or heat exhausted from other equipment
Measures for radio wave interference	There are cases where a shielded room or similar is required.
Ancillary work	
■ Electrical work	
Power supply input specification	3 phases, 200 VAC ±10%, 50/60 Hz
Input line	3-phase input and grounding: 14 mm ² × 4 cores
Electrical leakage breaker	Breaking current: 75A * Applicable to inverter circuit, sensitive leakage current: 100 mA to 200 mA
Installation work	Independent C-type grounding work (grounding resistance 10Ω or less). Common grounding is acceptable only when there is little noise influx. In such a case, connect the grounding cable to the grounding electrode independently.
■ Pneumatic power source	
Supply pressure	0.5 MPa or more
Supply flow rate	30 L/min (ANR) or more (air compressor output of 0.75 kW or more recommended)
Air connection port	Hose of φ8 to φ10 mm (ID) and hose band (with φ8 high-coupler)

* Please note that these items may be different depending on the additional specifications or options included.

VL400Q VL600Q



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