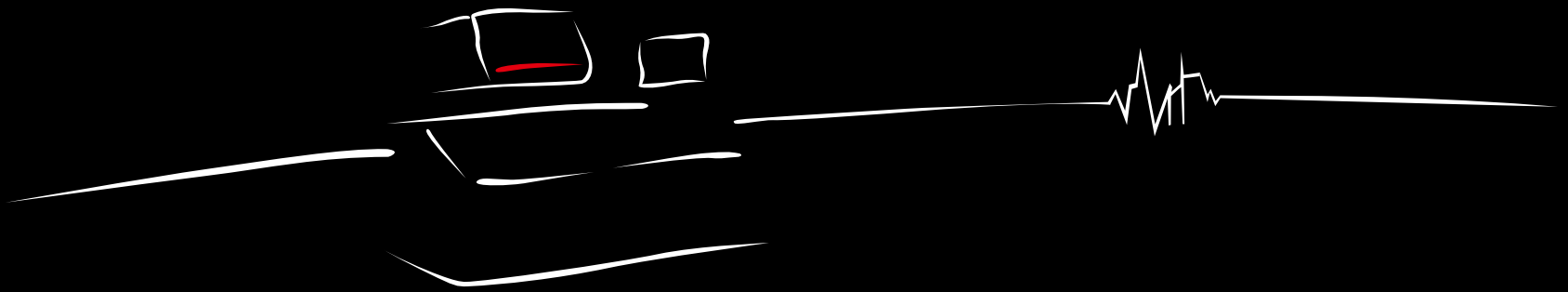
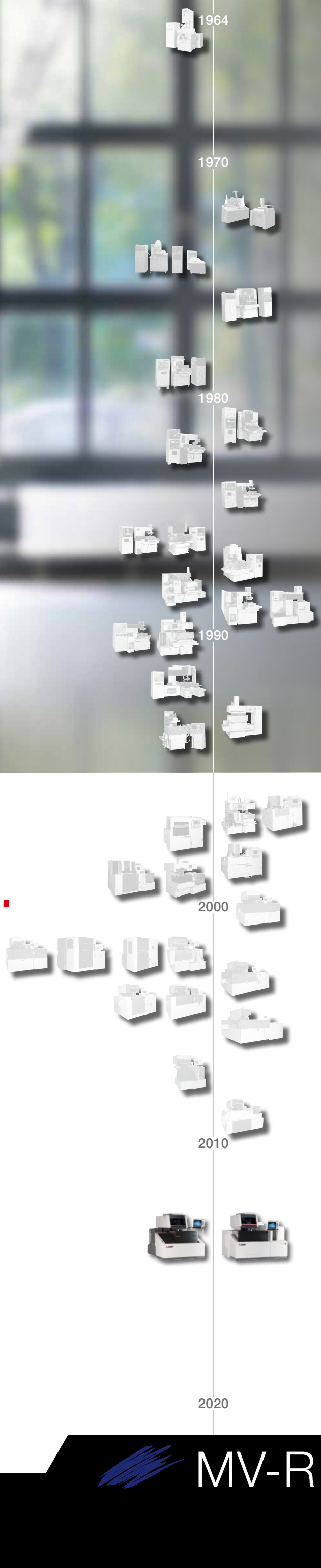
MITSUBISHI ELECTRIC

The Art of Economy



Wire-cut EDM – Power for Precision

MV-R



36 model series since 1964.

An assurance of dependability.

Over

7,000
patent applications per year

63,000
produced wire-cut EDM machines

125,000
employees

90 years
of dependable technology

If you've got grand designs,
you need someone strong you can count on.

Since 1970, a growing number of European companies have therefore been turning to high-performance EDM machines from world market leader Mitsubishi Electric.

Only by producing components in-house is it possible to tailor them perfectly to the intended task. Mitsubishi Electric resorts to its own controls, semiconductors, motors and other items, which are adapted in detail to all requirements. The only thing you notice is that it works – and often for many decades after purchase.

If you want to invest soundly in a durable EDM machine, choose **Mitsubishi Electric**.

MV-R

This way I know I'm in good hands.

ODS
OPTICAL
DRIVE SYSTEM

The speed of light ...
... for communication by fibre optics.
The Tubular Shaft Drive with its highly responsive control fully exploits the benefits of high communication speed. No heat, no maintenance and no contact – just extra precision for good. At Mitsubishi Electric, this is known as “Changes for the Better”.
Continued on page 11

PFC
PRECISE
FINISH CIRCIUT

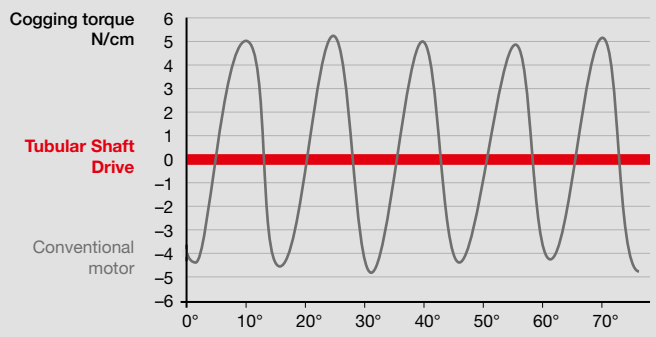
Extra precision and speed thanks to the generator that not only thinks, but also thinks ahead.
If you want to achieve better surface quality with fewer recuts, you need the right blend of mutually adapted technologies. With Precise Finish Cut, you achieve more precise results faster.
Continued on page 13

INTELLIGENT
AT

Wire break point insertion even on thick and interrupted workpieces.
The time-consuming return to the starting point is omitted – and machining continues where it left off, thanks to the highly advanced wire annealing system. Depending on machining conditions, threading can be successfully performed with or without jet stream and even submerged – depending on workpiece thickness.
Continued on page 17

Thrilling technology.

Magnetic levitation in the EDM machine – no friction, no frictional heat and no wear
For rapid and high-precision wire-cutting results, the Tubular Shaft Drive converts almost all the energy into nano-precision axis movement. This is not only good news for your electricity bill and reduces maintenance costs, but also brings you long-term benefits in terms of durability and unwavering precision.



You’re surely familiar with the cogging torque manifested by a conventional electric motor. And it is precisely this cogging torque that is undesirable, as are variations in torque. The Tubular Shaft Drive – for extra precision.

NUI
NATURAL USER
INTERFACE

Operation must be simple and assist the user.
The directly retrievable operating instructions, Windows-based user guidance and automatic 3D workpiece position measurement make it easy to relax.
Continued on page 19

LLS
LONG LIFE
SYSTEM

An EDM system must help your company to make money.
The MV-R Series cuts expenditure on electricity, wire and filters considerably – so that you can earn more.
The machine is designed for decades and has extra-low maintenance needs thanks to intelligent technologies.
Continued on page 25

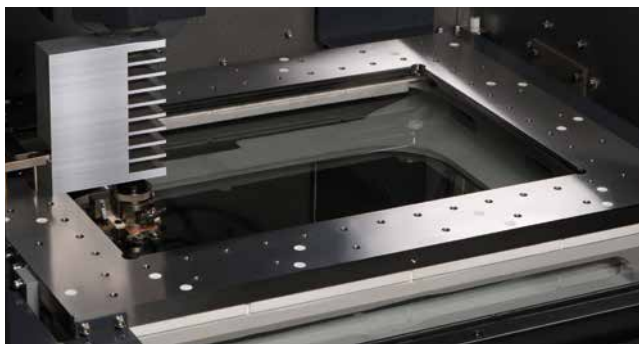
Ingenious drive positioning
If you want extra-smooth axis movements, you have to position the drives right in the centre of the moving weight – so that the superior Tubular Shaft Drive can exploit its full potential. Glass scales right next to the work space are an assurance of maximum precision right from the start.

Tons of solidity
cast in steel.

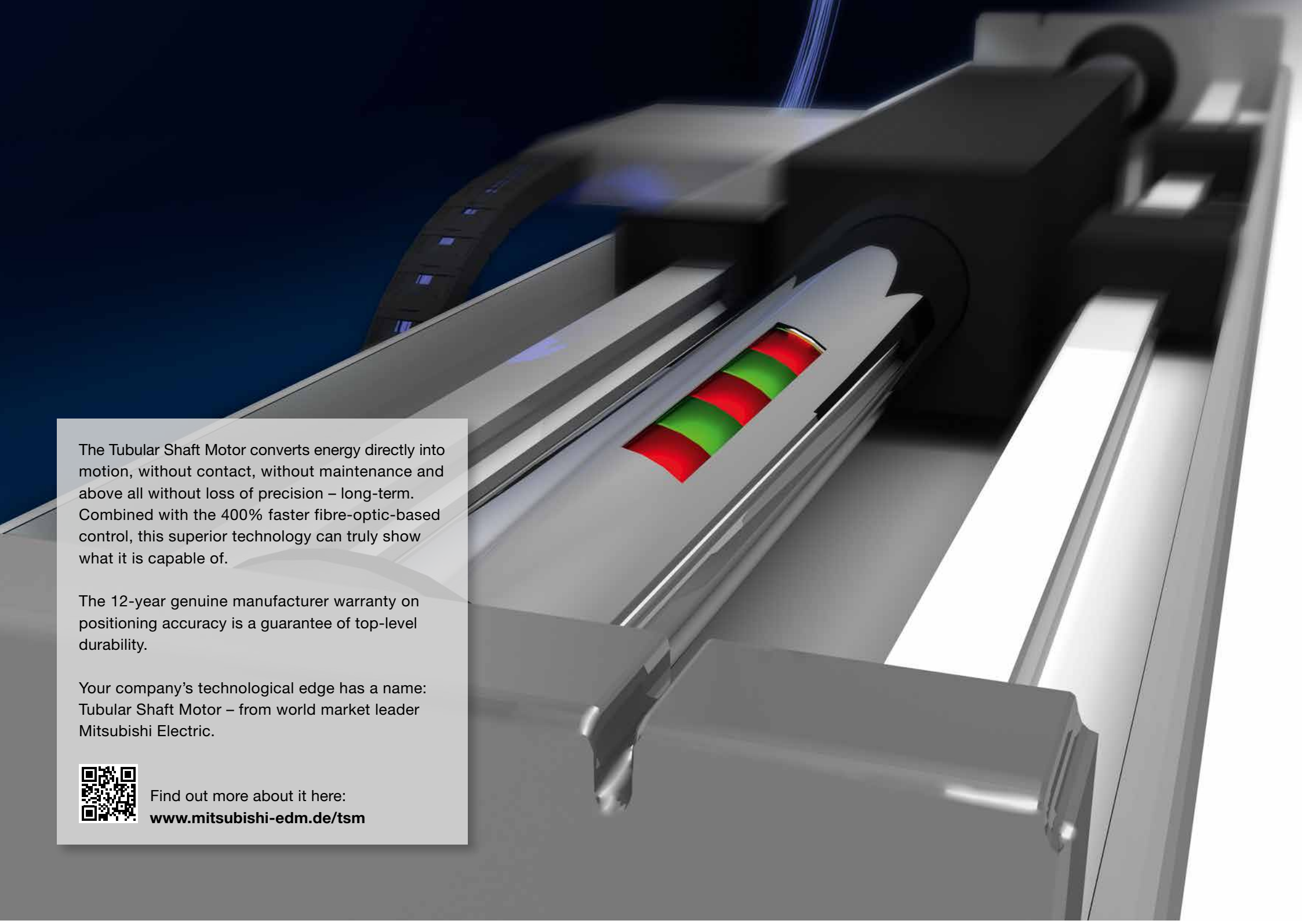
Solid machine body
The specially selected Meehanite casting ensures durability that can be measured in decades and copes with high workpiece weights day after day. The rugged machine bed takes even the severest punishment in its stride – unlike many a less expensive material.

Durable hardened stainless steel table
The four-sided table is insensitive to dielectric and sludge for decades. High-grade stainless steel components and the stainless steel work tank ensure dependability and maintenance-freedom.

The door that simply vanishes ...
... so that you have direct access. This saves time and space and makes workpiece set-up that much easier.



Less elaborate designs may be cheaper at first, but ...



The Tubular Shaft Motor converts energy directly into motion, without contact, without maintenance and above all without loss of precision – long-term. Combined with the 400% faster fibre-optic-based control, this superior technology can truly show what it is capable of.

The 12-year genuine manufacturer warranty on positioning accuracy is a guarantee of top-level durability.

Your company's technological edge has a name: Tubular Shaft Motor – from world market leader Mitsubishi Electric.

Find out more about it here:
www.mitsubishi-edm.de/tsm

12-year warranty
on positioning accuracy.

ODS
OPTICAL
DRIVE SYSTEM

Perfect drive

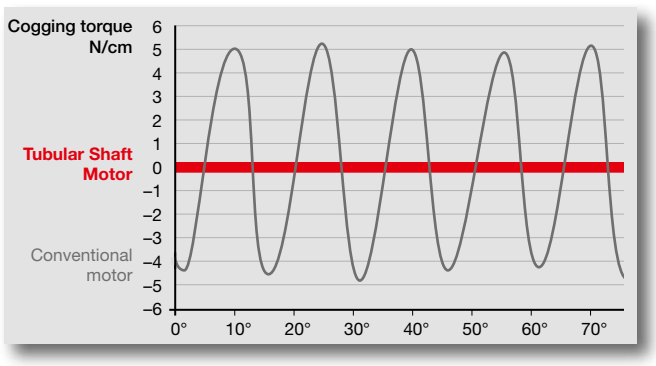
What was it about conventional drive systems that bothered developers at Mitsubishi Electric? The need for lubrication, the friction and frictional heat, power consumption, backlash, the cogging moment and above all the possible wear. Only a non-contact drive overcomes these drawbacks from the outset and is thus an assurance of better results and enhanced dependability over decades.

Speed of light

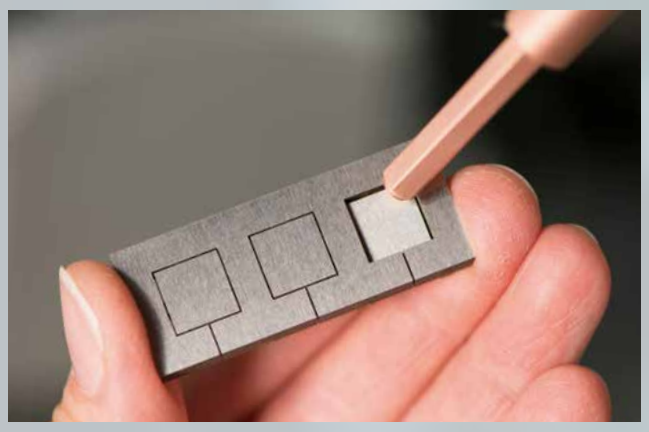
The Mitsubishi Electric polymer optical fibres have decisive advantages – not only over conventional copper cables, but also over glass fibres. Not only their total resistance to water, but also their high transmission rates combined with minimal space requirements and maximum flexibility are essential for truly progressive EDM systems. The only thing that you as a user notice is the longer service life and enhanced precision.

No disruptive cogging torque

You're surely familiar with the cogging torque manifested by a conventional electric motor. It is precisely this cogging torque that is undesirable, as are variations in torque. The Tubular Shaft Motor – the optimal drive for precision applications like electrical discharge machining.



Intercepting the waste – fully automatically
We call it COREHOLD®. During rough machining, a controllable bridge is created to hold the waste material – the waste material cannot fall. This means that many features can be rough-machined and, after removal of the waste material, recut – fully automatically and unmanned, overnight and at weekends. Lower costs, higher profits.



Precision for steps
and around corners.

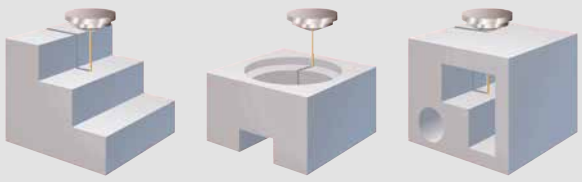
PFC
PRECISE
FINISH CIRCIUT

Results with even greater precision with 3D data
If you can identify obstacles and challenges in advance, you can respond to them in good time. The fully automatic rough machining control (Power Master) identifies cutting conditions in real time. The Power Master 3D additionally analyses the transmitted 3D data and calculates changing cutting conditions in advance, entirely without expert knowledge. Transition lines on stepped workpieces are now a thing of the past.

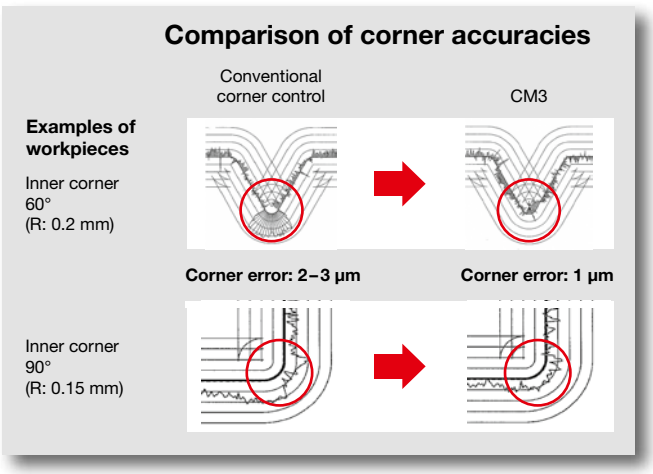
Getting a grip on radii and corners
On small inner and outer corners and complicated geometries, Corner Master 3 comes to your aid. You merely define your priorities, and optimisation is performed accordingly.

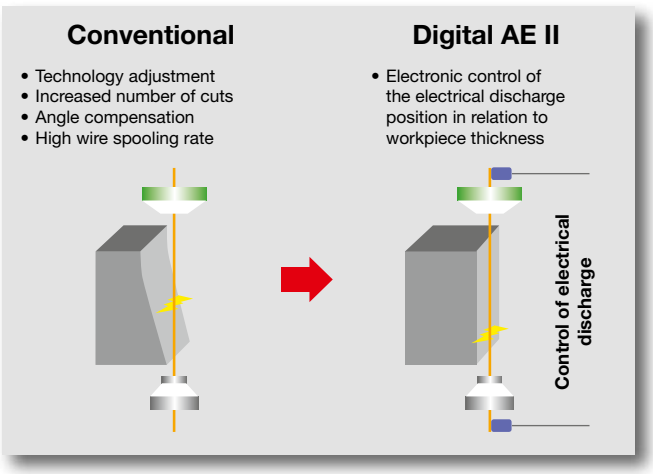
Better straightness and shape accuracy
With precise control of the electrical discharge position, material is only removed where it needs to be. The patented functions of the Digital AE II improve rough and fine machining and fine finishing – in terms of both precision and machining time.

Examples of Power Master machining applications



Comparison of corner accuracies





Lower costs, higher profits.

Twice-as-fast spark detection
The high-speed digital control works up to twice as fast as traditional machines. This prevents wire breakage and increases machining speed noticeably at the same time.

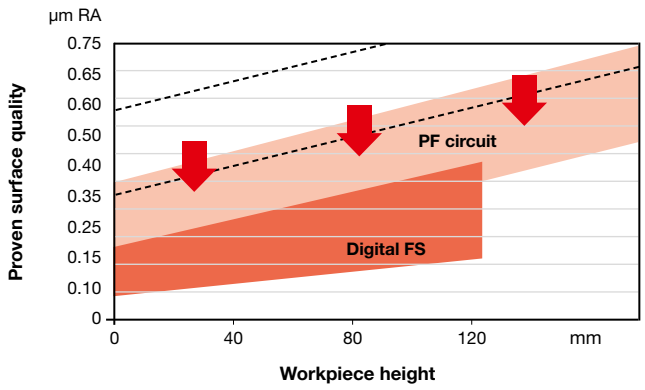
Greater speed and accuracy – and you save more.

PFC
PRECISE
FINISH CIRCIUT

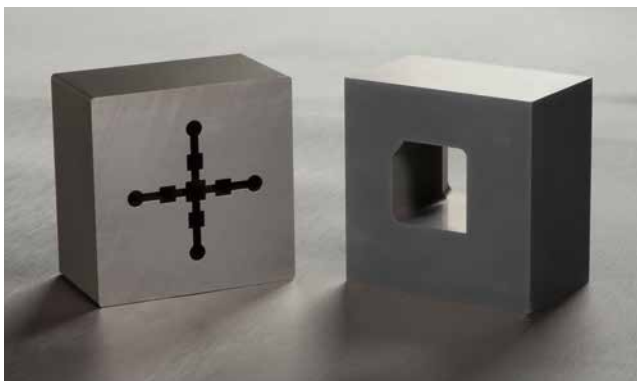
Response time is decisive
An EDM machine that reacts with greater speed and precision achieves better surface quality faster. The new V350 generator has a significantly higher effective clock rate. The voltage is built up faster and with greater precision thanks to reduced capacitance loss. Thanks to faster voltage build-up, spark duration and working voltage can be lowered. All that you will probably notice is higher surface quality and lower power costs.

17% faster multi-pass jobs
4 cuts of Ra 0.28 µm compared to a conventional machine.

0.12 µm surface quality
The proven digital fine finishing generator (D-FS) is also optionally available for the MV-R Series.



New V350 generator
Achieve excellent surface qualities with the V350 generator.



MV-R

Precise Finish Circuit – a boost to productivity.

Vastly superior.

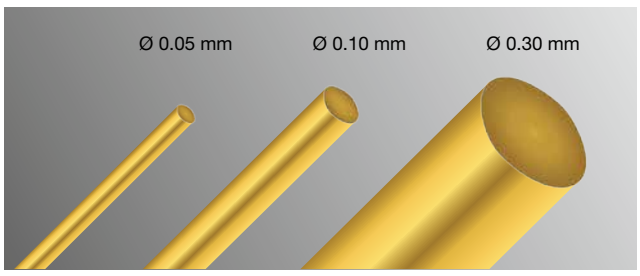
The wire threader for maximum dependability.

INTELLIGENT AT

Automatic wire threading – equipped for any situation
Wire break point insertion, jet stream on or off, even with difficult applications. The innovative flow analysis for the jet stream makes your work easier. The entire process has been improved to permit toleration of an up to 10% rate of spooling-related curl.

Round diamond guide
Maximum precision and durability ensure the best results in the long run – inclusive of maintenance-friendliness due to a small number of parts and simple design.

Flexibility – even when it comes to wire thickness
Intelligent AT is designed for wire thicknesses of 0.10–0.30 mm, i.e. the right range for more than 95% of all applications. But what if you need thinner wire? No problem. Intelligent AT is optionally available for the 0.05–0.30 mm range as well.



Find out more about it here:
www.mitsubishi-edm.de/threader

Good to know that it works – with or without jet stream.

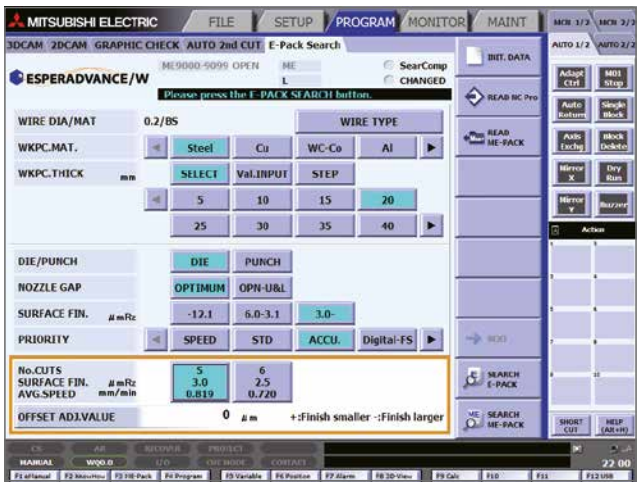
Intuitive operation
and knowledge at a keystroke.

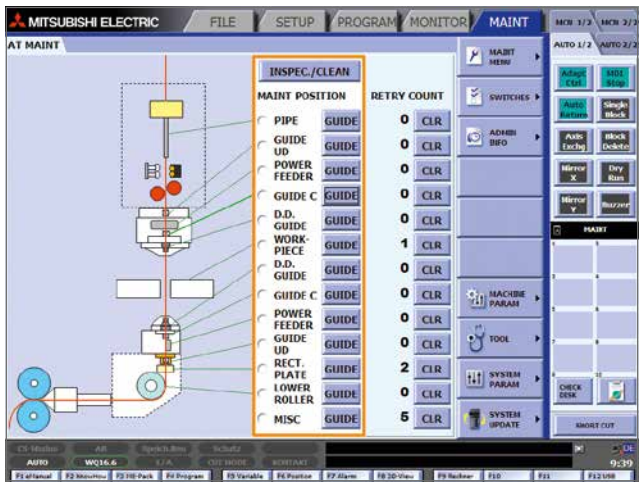
NUI
NATURAL USER INTERFACE

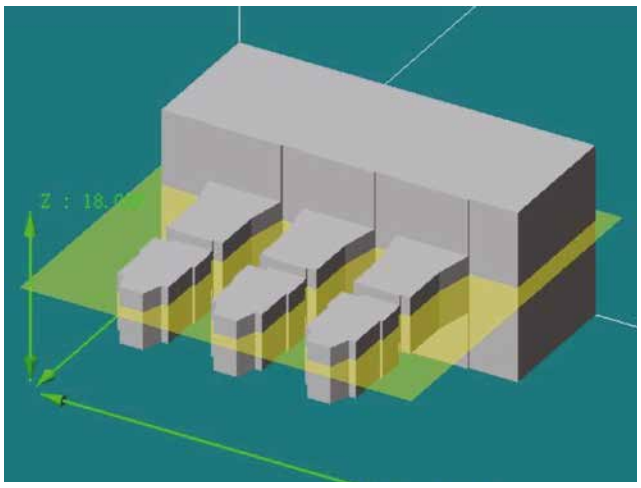
In dialogue with the machine
Produce NC data the easy way. Machining technologies are assigned intuitively and with menu guidance. Optimise the parameters of the machining technologies and store these as an ME-Pack.

Help at a keystroke
The complete machine documents inclusive of maintenance instructions are always available, and the right help is quickly found. Comprehensibility is aided by photos and 3D depiction.

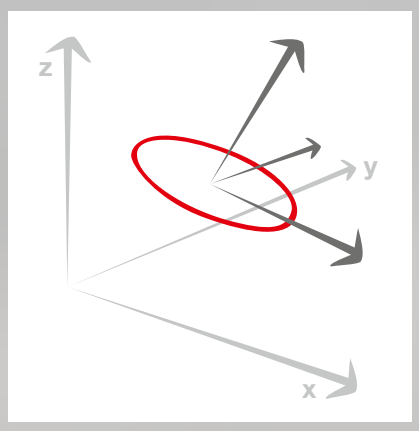
3D data import
Import 3D data in Parasolid® format and create 3D shapes with the integrated 3D CAD/CAM. By using them, you can generate NC data with the associated machining parameters. Even more precise results are achieved with intelligent analysis of the machining conditions by the Power Master 3D that thinks ahead.







Parasolid is a registered trade mark of UGS PLM Solutions Co. Ltd.



If time is of the essence or you want the machines to take some of the work off your shoulders. Set-up often takes too long; from now on, you can save this time. Highly accurate probing cycles measure the workpiece precisely. With the water flow on, off or in the dielectric – whatever you prefer. By means of the cutting wire or with an optional sensing head.

Clamp it and press *Start*!

Intelligent user guidance takes the effort out of work.

NUI
NATURAL USER INTERFACE

Fully automatic alignment cycles

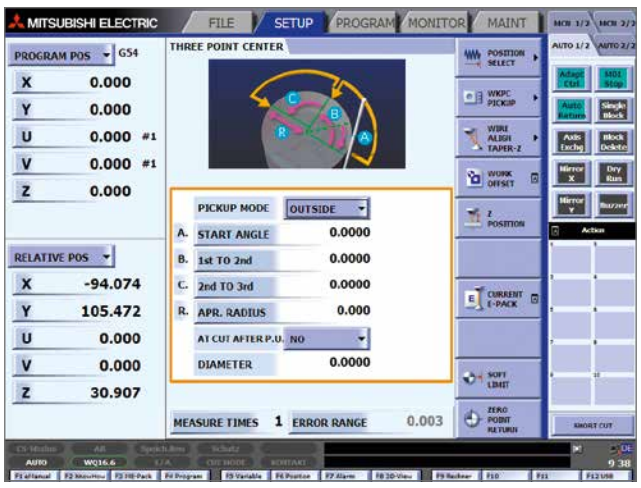
Intelligent user guidance takes you to the finish. The electrical discharge machine takes you quickly to your goal.

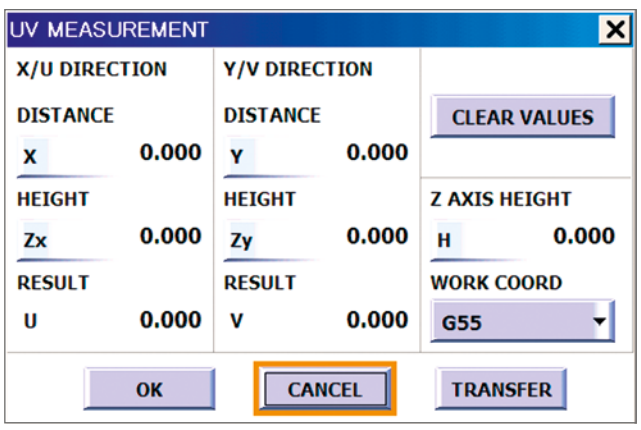
Manual control

Comfortable set-up with the manual control box: standard equipment with Mitsubishi Electric.
All essential control functions at hand – wherever you need them.

3D position measuring – manual or automatic

Both are possible. As a user, you decide whether you do set-up classically by hand or the machine automatically defines the position of your workpiece. Using the cutting wire or pick-up coil – the machine takes care of it for you. It only takes the press of a button.





Remote control with mcAnywhere

Always in charge –
wherever you are.

NUI
NATURAL USER INTERFACE

You can control the machine and keep an eye on processes, wherever you are. Intelligent communication takes the pressure out of work. Ideal combined with automation solutions and high process autonomy with the intelligent AT wire threader.

mcAnywhere Control
Comfortable and reliable remote control for your EDM system – powered by TeamViewer.

mcAnywhere Service
Rapid help from Mitsubishi Electric experts.

mcAnywhere Contact
Any place, any time … always up to date with direct status messages.

Cleaning the tank seal
With the ingenious auto-clean function, your tank seal always stays impeccably clean.
This ensures long-term precision and saves labour for the user.

Tank seal cleaning in
0 seconds

Quick replacement,
long-term savings.

LLS
LONG LIFE SYSTEM

Cutting wire replacement
Simply replace the spool and feed the cutting wire over the feed rollers. Everything ready for work again in 92 seconds.

Spool change in
92 seconds

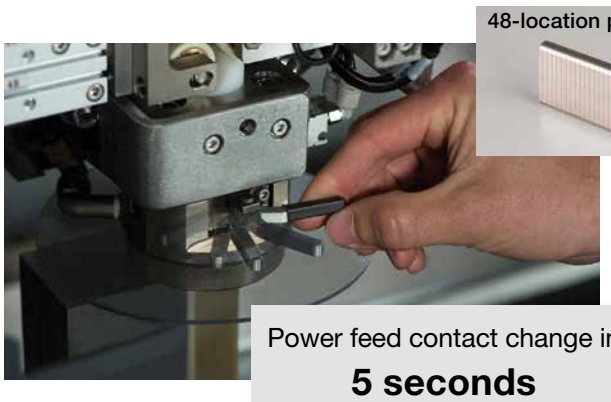
Now watch:
www.mitsubishi-edm.de/spool

Rapid filter change ...
... without tools or wasted time. Two hands, 32 seconds – and the filter is replaced.

Filter change in
32 seconds

Now watch:
www.mitsubishi-edm.de/filters

Changing the power feed contact
Replace the power feed contact with just one hand and a small gauge – at a speed befitting Formula One.



48-location power feed contact

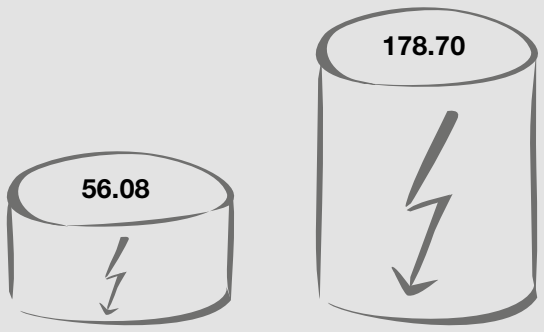
Power feed contact change in
5 seconds

Now watch:
www.mitsubishi-edm.de/power

Sample calculations
Workpiece . . . . . Punch, steel 1.2379 – 100 mm cutting length
Cutting height . . . . . 60 mm
Surface . . . . . Ra 0.28 µm (comparison with Ra 0.35 µm for conventional EDM machine)
Wire electrode . . . . . Brass, 0.20 mm

Higher performance:
Energy costs reduced by up to 69%

Energy consumption in kWh



MV-R Grand Tubular — Conventional EDM machine

Savings of **4,598.25 EUR** per year*

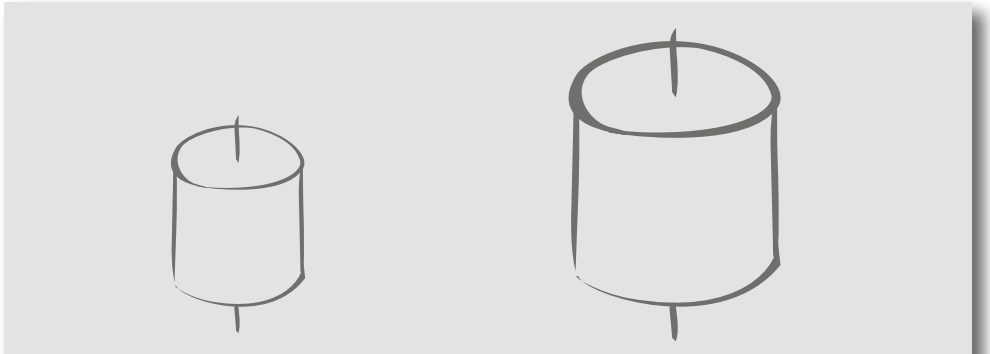
	MV-R Grand Tubular	Conventional EDM machine
Time period (24 h day)		
Productive wire cutting	10 h 32 min	14 h 06 min
Stand-by	1 h	9 h 54 min
Sleep Mode without wire cutting	12 h 28 min	–
Energy consumption in kWh		
Productive energy consumption	51.07	113.36
Energy consumption without wire cutting	2.69	65.34
Deactivating Sleep Mode	2.32	–

** Assuming production of six punches per working day, electricity price 0.15 EUR/kW for 250 working days/year*

Greater precision faster
= lower piece costs.

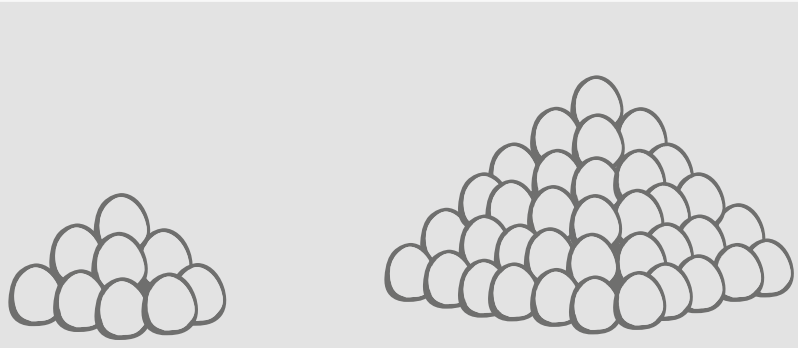
LLS LONG LIFE SYSTEM

Reduce filter costs by up to 45%



MV-R Grand Tubular — Conventional EDM machine

Reducing cost of ion exchange resin



MV-R Grand Tubular — Conventional EDM machine

Calculate the difference online at:
www.edm-calculator.com

Producing more, less expensively.

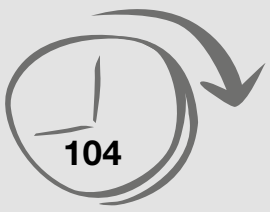
How it's done.

LLS LONG LIFE SYSTEM

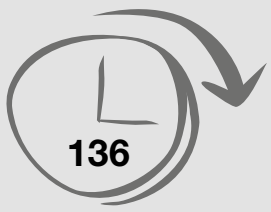
30.76% more productive capacity

Better result:
Wire consumption reduced by up to **46%**

Cutting time in min



MV-R Grand Tubular



Conventional EDM machine

	1	2	3	4	Total
Cutting time in minutes					
MV-R Grand Tubular, Ra 0.28 µm	45	20	16	23	104
Conventional EDM machine, Ra 0.35 µm	80	20	20	16	136

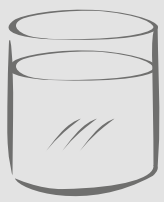
32 minutes faster

Wire consumption in m

1,086

MV-R Grand Tubular

1,923



Conventional EDM machine

3,300 EUR
Saved per year*

	1	2	3	4	Total
Wire consumption in metres					
MV-R Grand Tubular, Ra 0.28 µm	406	272	167	241	1086
Conventional EDM machine, Ra 0.35 µm	1090	303	303	227	1923

Savings: 837 metres per workpiece

** Assuming production of six punches per working day, brass bare wire price 9.60 EUR/kg for 250 working days/year*

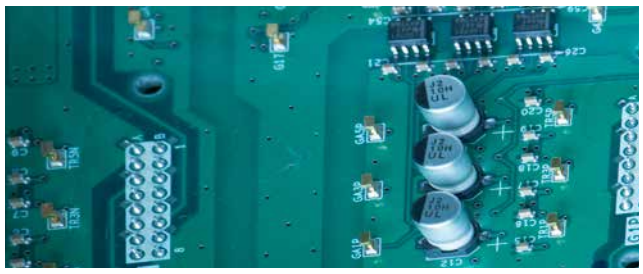
Customised extension.

The intelligent solution.

3D probing

Mounted on the machine head, activated on command. The intelligent solution.

Digital FS



Top-flight technology – the finest surface finish up to 0.1 µm Ra

Angle Master Advance II

Special wire guide and sequential calculation of the wire set-up point for precision angles.

Tool package

Complete kit for the machining of rotationally symmetrical tools with PCD or CBN cutting edges.

20 kg wire station

Accommodates large wire spools with ease.

Warning lamp

Machine status is visible from a distance.

ERGO-LUX (machine lights)

Working conditions that are kind to your eyes – for the sake of users and for the benefit of machining results.

From grinding wheels up to high-precision cones: a future-proof machine that you can upgrade at any time.

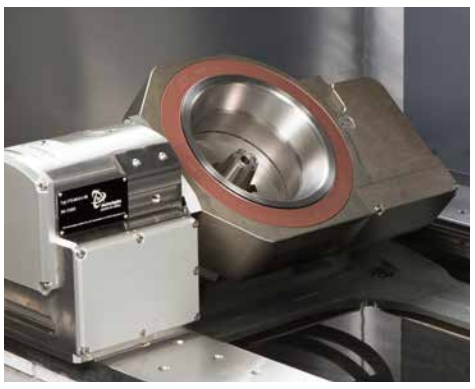
A turn for the better.

Extend your machine’s functions.

B-axis

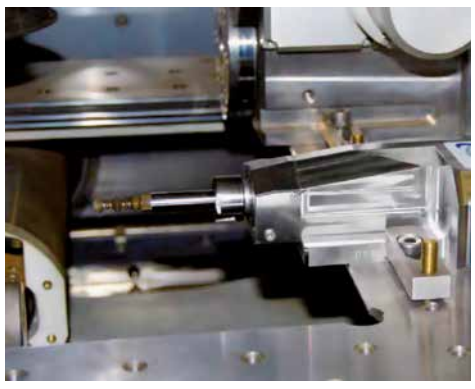
A servo-controlled B-axis fully integrated in the machine controls permits wire cutting on a rotating carried workpiece. Separation and multi-sided machining can be performed in a single clamping as well as simultaneously.

Rotational/swivel axis



Machining cones to the highest standards of precision: the rotational/swivel axis integrated in the machine controls. Multi-axis machining to the centre of the workpiece and multi-sided machining in a single clamping, plus the realisation of high-precision conical polygons.

Mini-rotational axis



Rotating spindle fully integrated in the machine control with positioning for the most minute high-precision components, e.g. the manufacture of ejector pins with a diameter of ≥ 0.05 mm, the realisation of conical threads in medical technology, erosive grinding, turning and simultaneous machining.

Rotational machining

Can be used for reliable indexing and simultaneous machining as well as high-speed rotation (EDM grinding): the servo-controlled rotational machining fully integrated in the machine controls. Discover new production scope!

Extra axes: Expand your possibilities – boost your earnings.

Everything from a single source if desired.

Mitsubishi Electric EDM systems
Mitsubishi Electric robots
Mitsubishi Electric software
Mitsubishi Electric controls

→ Complete systems responsibility

Just press Start – and off you go.

Automation has to be flexible.

Reconciling different brands.

Optimum solutions – customised, configured or standardised

The handling systems and robots from different manufacturers can often be seamlessly integrated. Renowned for their dependability and productivity, the EDM machines of the MV-R Series from Mitsubishi Electric are automation-ready. We'd be happy to show you examples that have proven effective in practice and help you to cut costs and boost your productive capacity.

Handling equipment from different manufacturers – welcome and easily integrated.

Flexible solution: Articulated-arm robot up to 15 kg of Mitsubishi Electric quality.

MasterCell: The slim and easy-to-use management software for automation solutions.

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The success factor in a wide range of fields.

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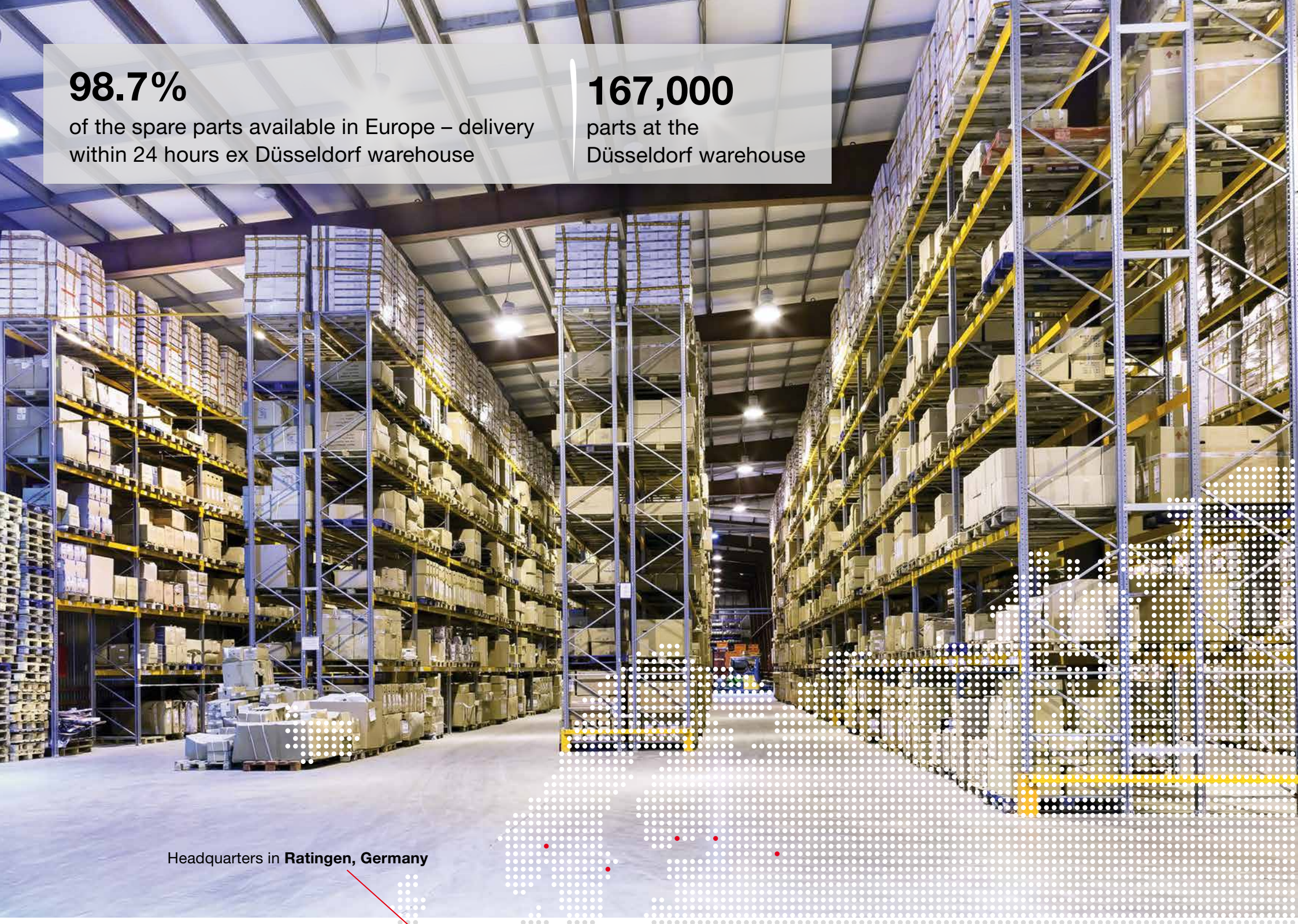


Headquarters in **Ratingen, Germany**

Service.
Always there.

Training
Users acquire skills at the machine and at specially equipped PC workstations. This way they benefit most from the direct transfer of know-how.

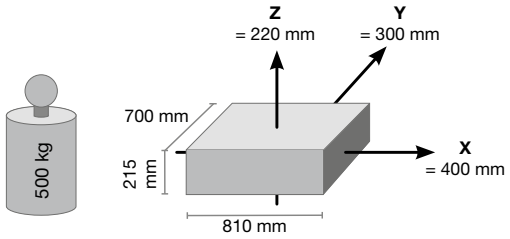
You don't like call centres and queuing systems? We don't either. With every Mitsubishi Electric EDM system you buy excellent service as part of the package.
With 167,000 parts in stock in Ratingen near Düsseldorf, you have a swift and reliable source of parts – on request by express in less than 24 hours. Service is performed by our own highly skilled service technicians so that production is kept dependably up and running.

Users are assisted over the phone and benefit from the expertise and wealth of experience of Mitsubishi Electric specialists.

Service hotline: +49 (0) 1801 486-600
Application support: +49 (0) 1801 486-700
Monday to Friday: 7.30 am to 8 pm
Saturday: 9 am to 4 pm

We're there to help you.

MV1200R
GRAND TUBULAR



Machine body weight. . . . . .2700 kg
Generator weight . . . . . .240 kg
Machine height . . . . . .2015 mm
Required minimum dimensions
for doorways (WxH) in mm . . . . . 1910 x 2015
Travel (U/V) in mm . . . . . 120 x 120

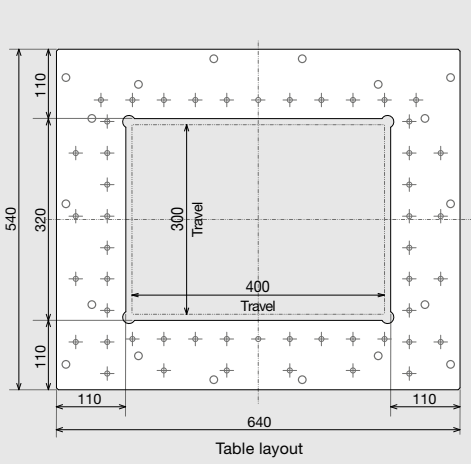
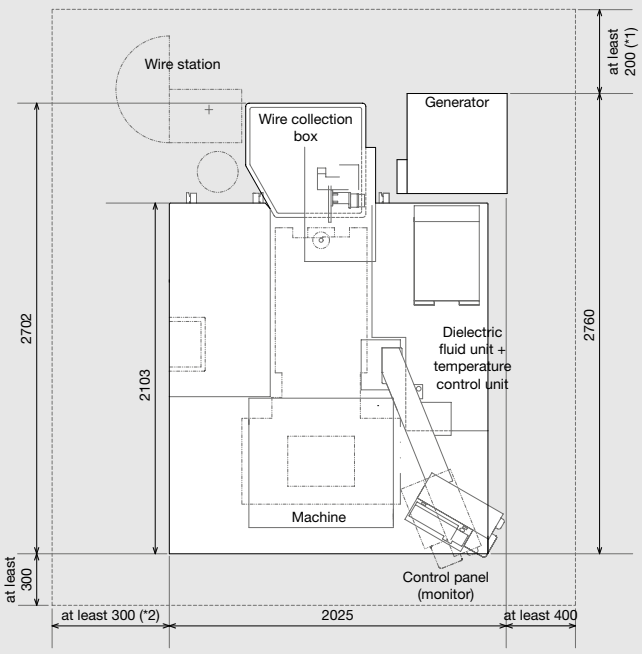
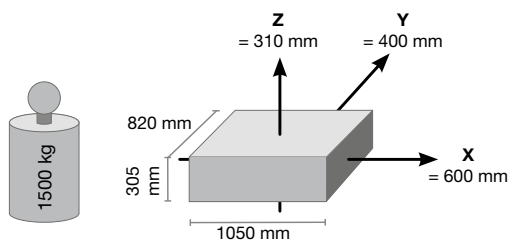


Table layout



*1 at least 500 and 2 at least 700 when the 20 kg wire spool unit is mounted

MV2400R
GRAND TUBULAR



Machine body weight . . . . . 3500 kg
Generator weight . . . . . .240 kg
Machine height . . . . . 2150 mm
Required minimum dimensions
for doorways (WxH) in mm . . . . . .2022 x 2150
Travel (U/V) in mm . . . . . 150 x 150

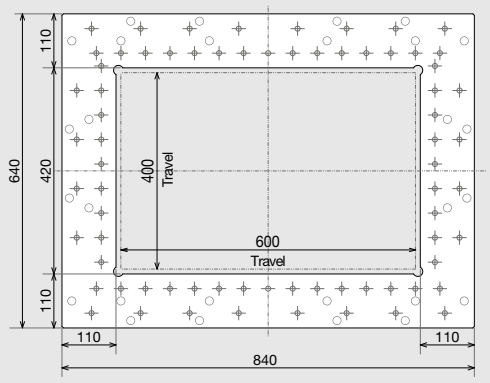
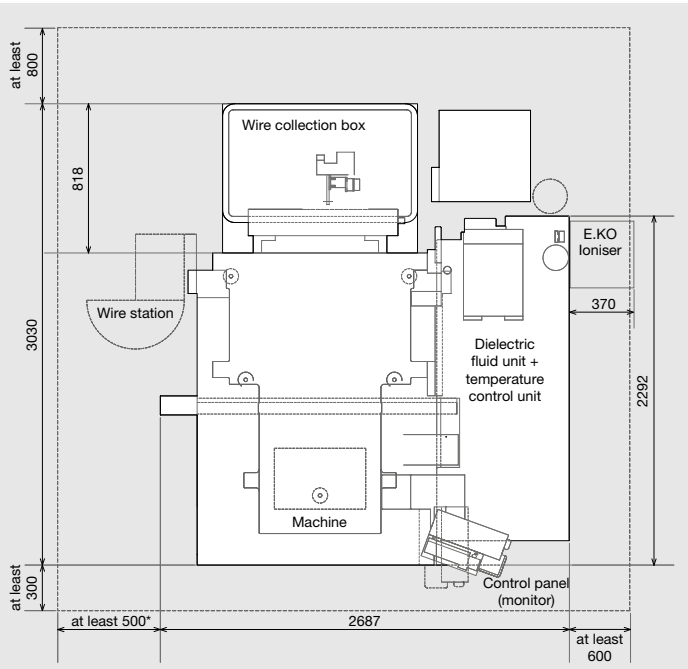


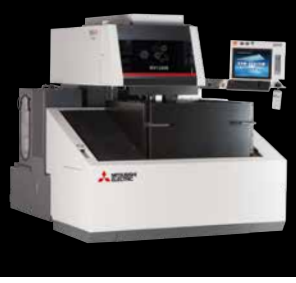
Table layout



* at least 700 when the 20 kg wire spool unit is mounted

Key data at a glance.

Technical data



		MV1200R	MV2400R	MV2400R Column Up
Machine	Travel (X/Y/Z) in mm	400 / 300 / 220	600 / 400 / 310	600 / 400 / 425
	Travel (U/V) in mm	120 / 120	150 / 150	150 / 150
	Taper angle (workpiece height) in °/mm	15 / 200 30 / 87	15 / 260 30 / 110	15 / 260 30 / 110
	Max. workpiece dimensions (W x D x H) in mm	810 x 700 x 215	1050 x 820 x 305	1050 x 820 x 420
	Max. workpiece weight in kg	500	1500	1500
	Table dimensions (W x D) in mm	640 x 540	840 x 640	840 x 640
	Table layout	Hardened 4-side table		
	Possible wire diameters in mm	0.1–0.3		
	Wire spool capacity in kg	10		
	Automatic wire threader/Wire chopper	Yes		
	Overall dimensions (W x D x H) in mm	2025 x 2760 x 2015	2687 x 3030 x 2150	2837 x 3452 x 2380
	Machine weight in kg	2700	3500	3650
	Mains voltage	3-phase 400 V/AC ± 10%, 50/60 Hz, 20 kVA		
Filter system	Tank capacity in l	550	860	980
	Filter particle size in µm/Filter elements	3/2		
	Temperature control	Dielectric cooling unit		
	Weight (dry) in kg	Included in machine weight	350	390
Generator	Power supply unit	Regenerative transistor pulse type		
	Cooling method	Fully sealed/indirect air cooling		
	Max. output current in A	50		
	Dimensions (W x D x H) in mm	600 x 650 x 1765		
	Weight in kg	240		
Control	Input method	Keyboard, USB flash drive, Ethernet		
	TFT colour monitor/Control system	15" touchscreen/CNC, closed circuit		
	Min. command step (X/Y/Z/U/V) in µm	0.1		
	Min. axis resolution in µm	0.05		

		MV1200R	MV2400R	MV2400R Column Up
Equipment	Optical drive system with linear scales (X/Y/U/V)	Yes		
	Digital AE II generator	Yes		
	Manual vertical front door	Yes	–	–
	Automatic vertical front door	–	Yes	Yes
	Digital fine finishing generator (< Ra 0.12 µ)	Optional (not retrofittable)	Optional (not retrofittable)	–
	Corehold Technology	Optional		
	Thin Wire Device 0.05/0.07 mm	Optional (not retrofittable)	Optional (not retrofittable)	–
	Wire station 20 kg	Optional		
	4-filter system	–	Optional	Optional
	Ethernet/DNC/FTP/Anti-virus protection/Sleep mode	Yes		
	mcAnywhere Control/Contact/Service	Optional		
	External signal output	Optional		
	Tricolour status lamp	Optional		
	ERGO-LUX	Optional		
	Angle Master Advance II	Optional		
	Easy 3D-Setup Software	Yes		
	Renishaw Probe	Optional		
	Automatic dielectric water refilling	Optional		
	Connection to external cooling system	Optional		
	Additional axes/rotational axis	Optional		
	Tool package/automation solutions	Optional		

Power connection: 3-phase 400 V/AC, PE, ± 10%, 50/60 Hz, primary fuse 32 A slow

Pneumatic connection: 5–7 kgf/cm³, 500–700 kpa, minimum air flow rate 75 l/min, 3/8" hose connection

The EDM system should be set up on a suitable hard industrial floor and preferably on a consolidated concrete floor. Any shielding that may be necessary in conformity with the EMC Directive is not included in the equipment supplied by Mitsubishi Electric.

The cooling unit contains fluorinated greenhouse gas R410A. For further information, please refer to the associated operating instructions.

Details can be found in the assembly plan of the machine:
www.mitsubishi-edm.de/download

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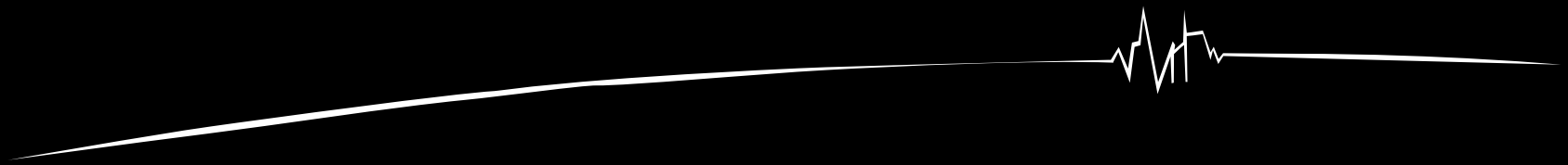

Subject to technical modification and error / 21.01.2016 / Art. No. 279101

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