

CITIZEN

MC20III

MultiStationMachiningCell



MultiStationMachiningCell Achieves "Innovative Manufacturing"



Mass production by standardization and modularization, and high-mix low volume production by diversification of needs and individualization.

The new manufacturing concept of "consecutive multi-production" reconciles/fuses two conflicting modes of production.

By combining 3 machining modules to give a multi-station configuration, the MC20III is able to handle a variety of machining layouts, allows ultra high productivity through optimal allocation of machining processes, and makes "consecutive multi-production" a reality with software that supports flexible machining process flows.

LFV on the Y axis and a 5-inch chuck are now available as options, further expanding the range of machining.

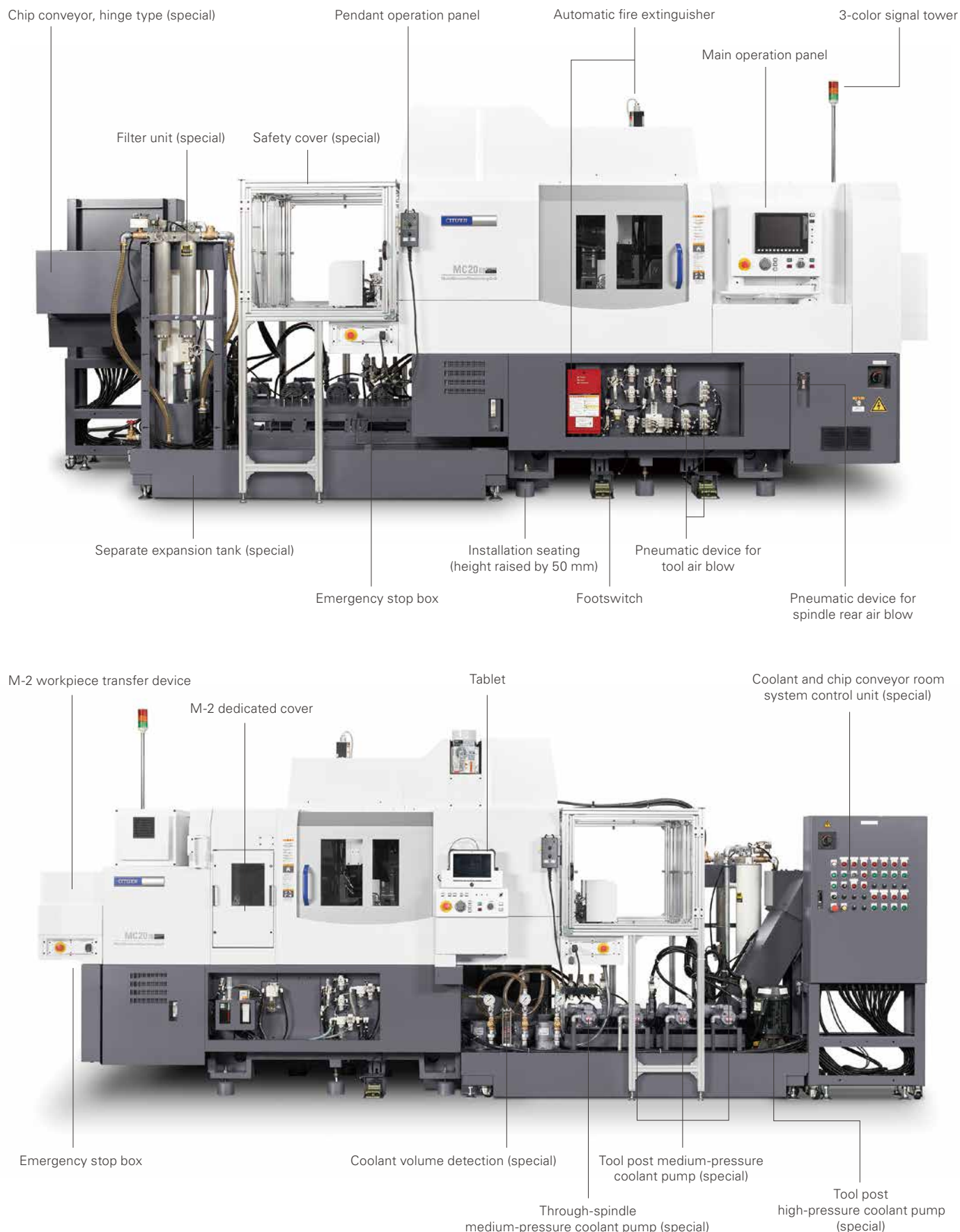


Tremendously Improved Productivity per Unit Area

With the MC20, a production line consisting of three single-spindle CNC automatic lathes can be integrated into a single machine unit. This makes it possible to maintain the same production capacity but drastically

improve the productivity per unit area.

Maintenance efficiency is also improved since coolant tanks and chip conveyors (op.) can be integrated into a single coolant tank and chip conveyor.



Modular Concept

The machine comprises three modules of the same type that provide a turnkey solution in a single dedicated machine with a high degree of completion, achieved by blending the customer's requirements with Citizen's proposal.

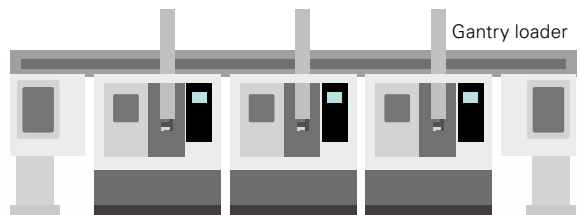
Each module comprises a headstock that can be equipped with a variety of chucking systems and a gang tool post that can accommodate up to 6 tools. "Optimization of the machining processes" enabled by

selecting the right combination of modules shortens machining times and makes ultra-high productivity possible.

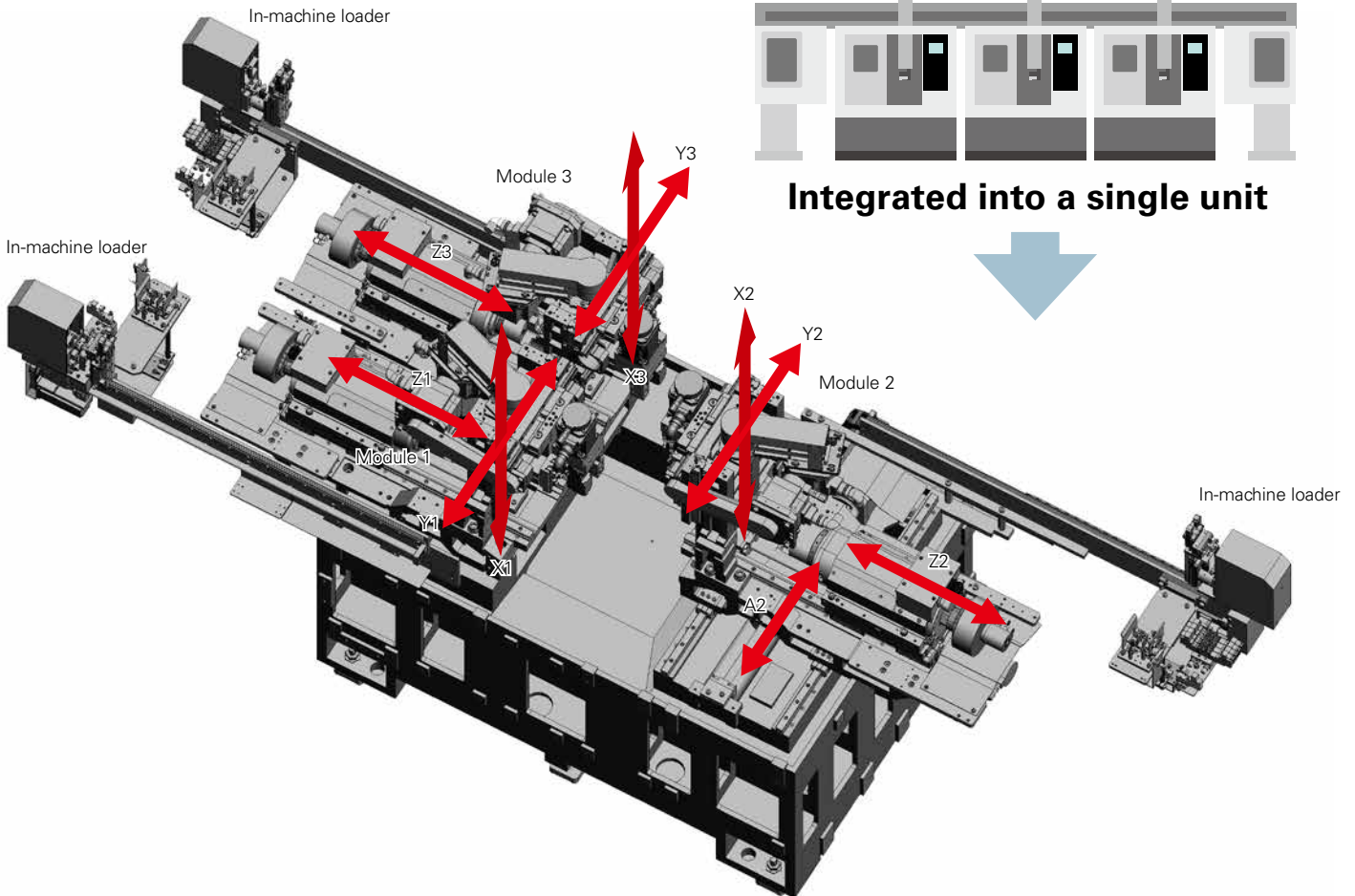
Using modules of the same type also lessens the burden on users by reducing the stock of maintenance parts, shortening the time needed to learn maintenance procedures and train operators, and so on.

Basic construction and axis configuration

Conventional machining line



Integrated into a single unit



LFV (low-frequency vibration cutting) technology

* "LFV" is a registered trademark of Citizen Watch Co., Ltd.

LFV* is a technology for performing machining while vibrating the X and Z servo axes in the cutting direction in synchrony with the rotation of the spindle. It reduces various problems caused by chips entangling with the product or tool, and is effective for small-diameter deep hole machining and the machining of difficult-to-cut materials.

Shape differences of chips of the same weight (SUS304)



Chips with LFV

Chips generated by conventional cutting

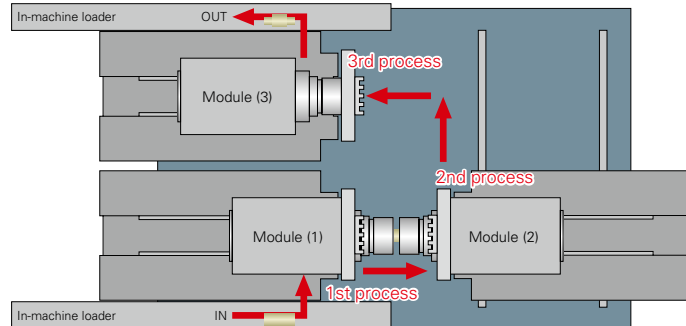


Optimization of Machining Processes

The entrance and exit for workpieces and the route between them can be set as required, so processes can be allocated to each module in the most appropriate way for specific workpieces, and the most appropriate machining process flow can be selected.

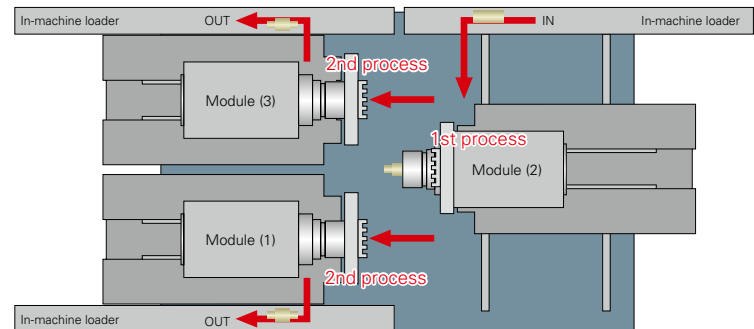
Sharing among 3 processes ((1) -> (2) -> (3))

Simultaneous machining on 3 axis control groups where the machining processes are shared among 3 modules substantially increases productivity. The reverse flow ((3) -> (2) -> (1)) is also possible.



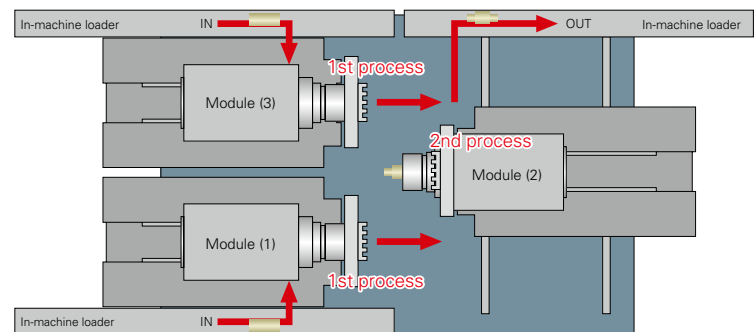
Sharing the 2nd process ((2)-> (1) / (2)-> (3))

This type of flow is effective for workpieces with a long 2nd process machining time. Wasted time is minimized by performing the 1st process machining at module (2) and sharing the time-consuming 2nd process machining between modules (1) and (3).

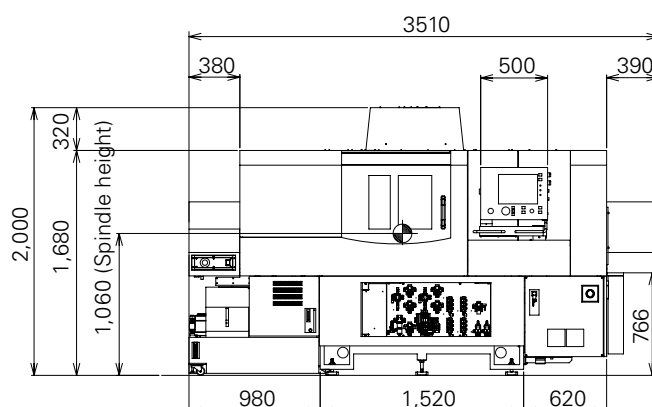
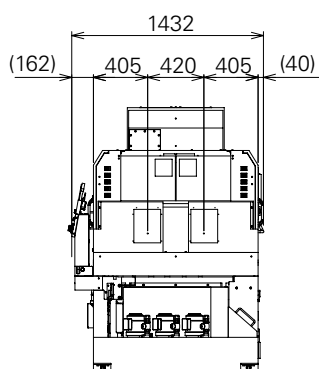


Sharing the 1st process ((1)-> (2) / (3)-> (2))

This type of flow is effective for workpieces with a long 1st process machining time. Wasted time is minimized by sharing the 1st process machining between modules (1) and (3).



External Dimensions





Machine specifications

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| Item | MC20 III (MC20-4M3) | |
| Chuck size | 4-inch chuck | |
| Maximum through-spindle workpiece diameter | 20 mm Dia. | |
| Maximum workpiece length | 70 mm | |
| Maximum diameter of drilling with the spindle | 7 mm Dia. | |
| Maximum diameter of tapping with the spindle | M6 | |
| Spindle speed | Max. 8,000 min ⁻¹ (differs depending on the chuck type) | |
| Rotary tools on the gang tool post | | |
| Maximum drilling diameter | 5 mm Dia. | |
| Maximum tapping diameter (cutting tap) | M5 | |
| Spindle speed | Max.8,000 min ⁻¹ | |
| Tool capacity (standard machining specification) | 5 per module | |
| Turning tools | 2 | |
| Cross drilling tools | 3 | |
| Tool capacity (turning/cross machining/end-face machining specification) | 6 per module | |
| Turning tools | 2 | |
| Cross drilling tools | 2 | |
| End-face drilling tool | 2 | |
| Tool capacity (maximum machining specification) | 9 per module | |
| End-face sleeve | 4 | |
| Cross drilling tools | 1 | |
| End-face drilling tool | 4 | |
| Tool size | | |
| Turning tool | 13 mm Sq. | |
| Sleeve | 19.05 mm Dia., 20 mm Dia. | |
| Rapid traverse rate | | |
| X axis | 32 m/ min | |
| Y axis | 32 m/ min | |
| Z axis | 32 m/ min | |
| A axis | 40 m/ min | |
| Motor | | |
| For spindle (built-in motor) 2.2/3.7 kW | | |
| For rotary tools on gang tool post | 0.75 kW | |
| For coolant pump | 0.18 kWx3 | |
| Medium-pressure coolant 0.75kWx3 | | |
| For lubrication pump | 0.003 kW | |
| Loader axis drive motor | 0.2 kWx2 | |
| Center height | 1,060 mm | |
| Rated power consumption | 16 kVA | |
| Load operation average power consumption | 8.4 kVA | |
| Total load current | 66 A | |
| Main breaker capacity | 100 A | |
| Pneumatic device | Required pressure | 0.5 MPa |
| | Required flow rate | 231 NL/ min |
| Machine size | W 3,120xD 1,432xH 2,000 mm | |
| Machine weight | 3,640 kg | |

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| Standard Accessories |
| Spindle chucking device, Spindle cooling device |
| Emergency stop box, Machine relocation detector |
| Rotary tool spindle drive device of the gang tool post |
| Workpiece transfer device (module 1, module 3) |
| Door lock device |

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| Special Accessories |
| Workpiece pusher, Workpiece transfer device (module 2) |
| Pneumatic device for spindle seating confirmation |
| Pneumatic device for chuck air blower |
| Chip conveyor (hinge type) with dedicated coolant tank |
| Pneumatic device for spindle rear air blow |
| Pneumatic device for workpiece separator's hand air blower |
| Pneumatic device for tool air blow |
| Coolant tank device (scraper disposal type) |
| Coolant discharge detector, Medium-pressure coolant device |
| Pendant operation panel, Footswitch, Tablet |
| 3-color signal tower, Automatic fire extinguisher |
| Fire damper, LFV |
| Bar loader interface (with cut-off confirmation function) |

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| Standard NC Functions |
| Various preparation functions, Background edit function |
| On-machine program check function |
| High-speed program check function |
| Axis feed overlap function |
| Spindle speed fluctuation detection function |
| Corner chamfering/Corner rounding |
| Tool nose radius compensation, Circular interpolation |
| Thread cutting canned cycle, Multiple repetitive cycle for turning |
| Product count, 8 digits, Interference check function |
| Program storage capacity equivalent to 160 m (approx. 64 kB) |
| 10.4-inch color LCD touch panel, Automatic power-off function |
| I/O interface (RS232C, compact flash, USB) |

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| Special Additional NC Functions |
| Program storage capacity 1200 mm (approx. 480 kB) |
| User macro, Sub-micron command |
| Synchronized tapping function, Canned drilling cycle, |
| Spindle constant surface speed control function |
| Differential speed rotary tool function |
| Tool life management I, Tool life management II |
| Milling interpolation function |
| Run using program in external memory |
| Polygon function, Hobbing function |
| Helical interpolation function, Slant helical interpolation function |
| Geometric command function, Variable lead thread cutting |
| Circular thread cutting |
| Simultaneous thread cutting in two axis control groups I, II |
| Coordinate rotation command function |
| User macro G-code call, High-speed synchronized tapping function, Optional block skip (9 sets) |

CITIZEN MACHINERY CO., LTD.

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|----------------|---------------------------|--|----------------------|
| CITIZEN | JAPAN | CITIZEN MACHINERY CO., LTD. 4107-6 Miyota, Miyota-machi, Kitasaku-gun, Nagano-ken, 389-0206, JAPAN | TEL. 81-267-32-5901 |
| | SOUTH ASIA / KOREA | CITIZEN MACHINERY CO., LTD. 4107-6 Miyota, Miyota-machi, Kitasaku-gun, Nagano-ken, 389-0206, JAPAN | TEL. 81-267-32-5901 |
| | TAIWAN | CINCOM MIYANO TAIWAN CO., LTD. 10Fl., No.174, Fuh Sing N. Rd., Taipei, TAIWAN | TEL. 886-2-2715-0598 |
| | CHINA | CITIZEN (CHINA) PRECISION MACHINERY CO., LTD. 10058, XINHUA ROAD OF ZHOUCUN, ZIBO, SHANDONG, P.R. CHINA | TEL. 86-533-6150560 |
| | GERMANY | CITIZEN MACHINERY EUROPE GmbH Mettinger Strasse 11, D-73728 Esslingen, GERMANY | TEL. 49-711-3906-100 |
| | UK | CITIZEN MACHINERY UK LTD 1 Park Avenue, Bushey, WD23 2DA, UK | TEL. 44-1923-691500 |
| | ITALIA | CITIZEN MACCHINE ITALIA s.r.l. Via Guglielmo Marconi 47 24040 Comun Nuovo (BG), ITALY | TEL. 39-035-877738 |
| | FRANCE | HESTIKA FRANCE S.A.S. 1385 Avenue du Môle Z.A.E des Lacs 3, 74130 AYZE, FRANCE | TEL. 33-4-5098-5269 |
| | SPAIN | EGASCA, S.A. Poligono Industrial Erisono 2, 20600 Eibar (Gipuzkoa), SPAIN | TEL. 33-4-5098-5269 |
| | AMERICA | MARUBENI CITIZEN-CINCOM INC. 40 Boroline Road Allendale, NJ 07401, U.S.A. | TEL. 1-201-818-0100 |

URL: <https://cmj.citizen.co.jp/>

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