



AUTOMATION SYSTEMS  
GROUP

# MagnaTran® 8 QuadraFly Robot

Enabling Concurrent Exchange of 4 Wafers in Vacuum for High Throughput, Heavy Payload & Small Containment Applications

TOOL AUTOMATION

## Features

- 4 End-Effector Concurrent Transfer of 4 Wafers In Vacuum
- High Capacity Direct Drive Technology Without Dynamic Seals, Drive Belts or Cables
- Proven Reliability > 12.8 Million MCBF
- Patented Time Optimal Trajectory Motion Control
- External Controls Located Up To 15' Away From The Drive
- PASIV User Programmable Robot Access Zones
- Advanced Firmware For Local And Remote Monitoring And Diagnostics
- CE And SEMI S2 Compliant

## Benefits

- Enables Higher Throughput And Tool Productivity Wafers per Hour
- High Reach-Containment Ratio Minimizes Tool Footprint
- High Payload Capacity
- Low Cost Of Ownership
- UHV Compatibility
- Wafer And Equipment Safety
- Global Serviceability
- Meets International Design And Industry Safety Standards

The MagnaTran® 8 QuadraFly robot leverages proven SCARA arm technology and reliable direct drive robotics to provide the simultaneous exchange of 4 wafers in vacuum within a small containment swing diameter. Additionally, the QuadraFly extends the benefits of MagnaTran 7® field proven, direct drive technology to a patented tri-axial drive. Both the tri-axial drive and QuadraFly's Butterfly armset have been designed to accommodate heavier payloads.

The direct magnetic drive technology improves reliability by reducing the number of parts and eliminating the need for a dynamic seal for vacuum isolation. Eliminating the dynamic seal reduces friction, wear, tear and torque resulting in fewer failures. Eliminating stepper motors and/or transmission coupling mechanisms reduces vibration, particles, backlash and increases positional repeatability.

The combination of QuadraFly's fast swap Butterfly armset, Time Optimal Trajectory™ (15-30% faster than S-curve profiles), continuous rotation (eliminates rotational moves > 180°) and the direct drive servo with Brooks proprietary DSP controller provides higher throughput and enables increased productivity.

The PASIV user programmable safety zones prevent possible collision during manual operation thereby insuring the safety of high value wafers and process equipment. Comprehensive diagnostics are accomplished via a graphical user interface at a remote, modem linked, service terminal. Error logging with events are time and date stamped.

Cycle counters are stored in non-volatile memory and critical performance characteristics are monitored and reported graphically. Multi-Sensor interfacing is accomplished via high speed parallel IO (low or high side edge triggered) that enables direct interface to substrate sensors and other peripheral modules such as valves. Real-time information allows position referencing by edge sensing of moving components. The wafer presence may be referenced in macros sequences for safety.



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**SUBSTRATE SIZES**

300mm wafers  
200mm wafers (end effector change required)

**CAPACITY**

3.0 kg (6.6 lbs) \*Per Wrist, pan offset dependent  
10 Nm movement load at wrist plate (inc. end eff.)

**MOUNTING CONFIGURATION**

Top Mount (top or bottom bolt)

**RANGE OF MOTION**

Radial #1/#2: . . . . . Up to 940mm Extension (including end-effectors)  
Z: . . . . . Up to 90mm Maximum  
Theta: . . . . . Infinite  
Swing Diameter: . . . . . 977.9mm minimum (with 10.9mm clearance)

**WEIGHT**

Drive assembly and armset ~ 85.66 kg (190 lbs)

**VACUUM**

Leak rate . . . . . < 5x10<sup>-9</sup> std. cc/sec He  
Base vacuum . . . . . 3x10<sup>-8</sup> Torr

**MAXIMUM TEMPERATURES**

Continuous Operation . . . . Arm Linkage 90°C, Motor Assembly 60°C maximum exposure  
8 Hour Bake Out . . . . . Arm Linkage 110°C, Motor Assembly 120°C maximum exposure

**EXPOSED MATERIALS**

Aluminum (6061), Stainless Steel (301, 304, 416), AM350 (Bellows), Magnetic Materials, Glass, Viton, Perfluoroelastomer

**CONTROL INTERFACES**

Ethernet or RS-232/RS-422 switch selectable serial interface controls (or remote linked service terminal)

Dedicated RS-232 serial interface for the Control Display Module (CDM)

Addition RS-232 serial interface for peripheral devices

Miscellaneous I/O (22 inputs, 20 outputs) for wafer sensing, safety interlocks

Wafer sensing, control I/O may be either low or high side edge triggered

**REPEATABILITY**

Total Placement . . . . . 0.15mm TIR (at appropriate speeds)  
R (Radial) . . . . . 0.1mm (3σ)  
θ (Rotational) . . . . . 0.006° (3σ)  
Z (vertical) . . . . . 0.05mm (3σ)

**WAFER EXCHANGE TIME\***

Typical . . . . . < 6 seconds total for concurrent 4 wafer exchange with backside contact (Elastomer pads)  
Typical . . . . . < 8 seconds total for concurrent 4 wafer exchange with backside contact (Stainless Steel, Quartz and Ceramic pads)

\* Actual times will be arm extension, payload and substrate contact material dependent

**CONFIGURATION OPTIONS & ACCESSORIES**

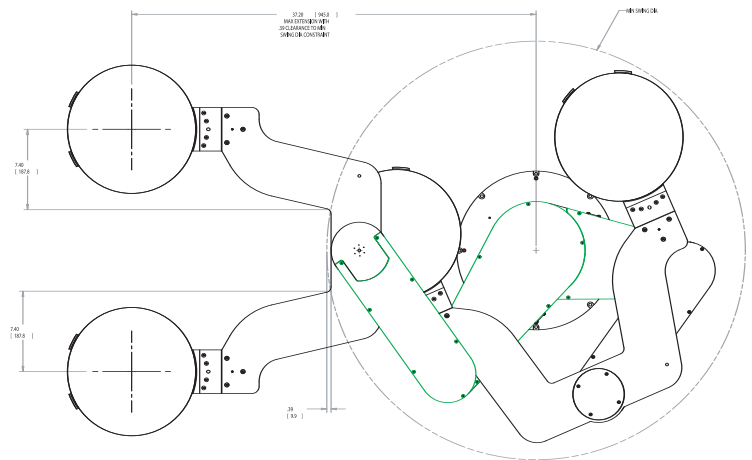
CDM – Hand held terminal for operation, position teaching and standard diagnostics

Fixtures – Standard shipping and calibration fixtures for precision mounting of the arm assembly

Custom designed end-effectors (optional)

Operating manuals on CD (standard)

FRUs (Field Replaceable Units) – Individually tested Arm FRU (optional)



MagnaTran 8 QuadraFly - Layout

*For more information, please contact your local Brooks Automation sales representative or visit [www.brooks.com](http://www.brooks.com).*

