# TRAJEXIA

**Total Freedom in Motion Control**

CHOOSE

CONTROL

PERFORM

DESIGN

CREATE

*trajexia*

## You decide

Advanced Industrial Automation

**OMRON**

# The advanced motion controller
# that puts you in control

*Trajexia is Omron's new motion platform that offers you the performance of a dedicated motion system, the ease of use you get from an automation specialist and the peace of mind you get from a global player. Trajexia puts you in full control to create the best machines today and... tomorrow.*

**Freedom to communicate**

Besides a built-in Ethernet port that provides connectivity meeting today's and foreseeable future communication standards, Trajexia also includes interfaces to popular field buses such as Profibus-DP and DeviceNet.

**trajexia**
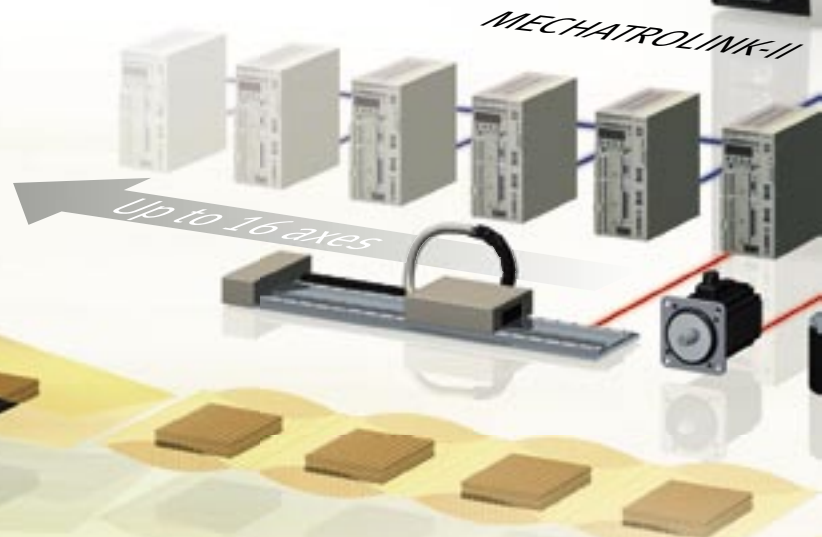
MECHATROLINK-II

Up to 16 axes

# » Freedom to design

### Freedom to control

Trajexia offers perfect control of up to 16 axes over a
MECHATROLINK-II motion bus with independent position,
speed or torque control for every axis. And its powerful motion
instruction set makes programming intuitive and easy.

### Freedom to build

You can select from a wide choice of best-in-class rotary,
linear and direct-drive servos as well as inverters.
And the system is scalable from 2 axes up to 16 axes
and 8 inverters & I/O modules.

Ethernet

*DeviceNet*™

I/O Units

PROFI
BUS
PROCESS FIELD BUS
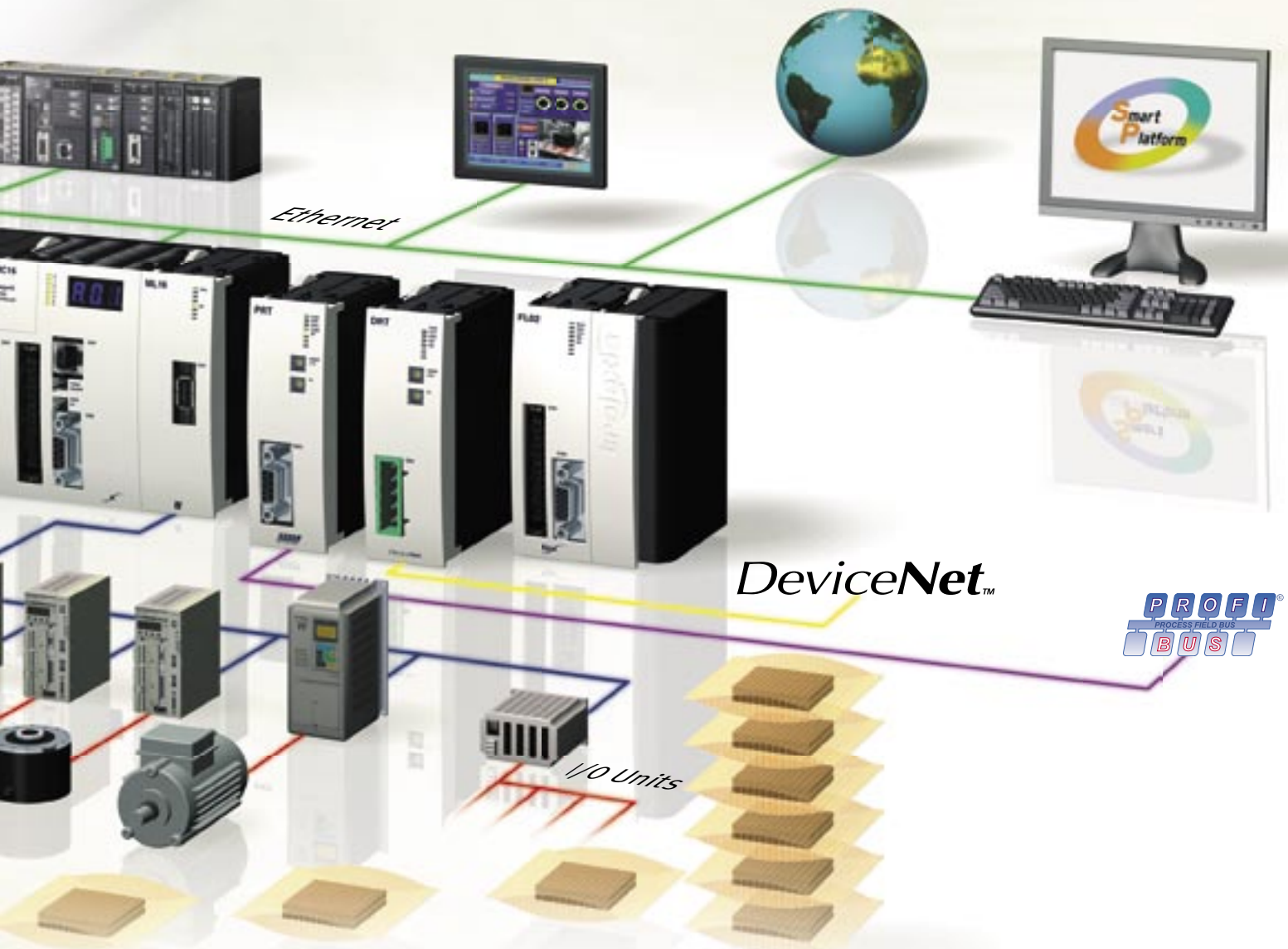
# » Freedom to choose

## Perfect motion control

At the heart of Trajexia lies the new TJ1 multi-tasking motion coordinator. Powered by a 32-bit DSP, it's specifically designed to meet the most demanding motion tasks such as e-cam, e-gearbox and registration control and interpolation... with best performance and all via simple motion commands.
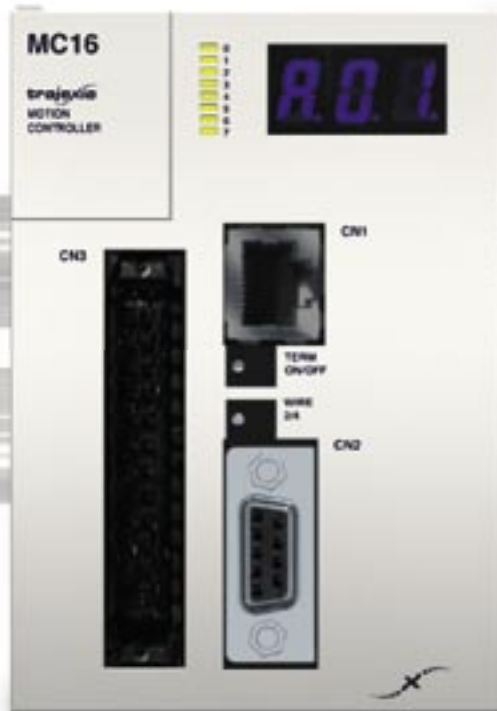
Power supply      Motion controller      MECHATROLINK-II Master      Profibus Slave

*Ethernet*

## Direct connectivity via Ethernet

Trajexia's Ethernet built-in port provides direct and fast connectivity to PLCs and HMIs while providing full access to the drives over a MECHATROLINK-II motion bus.

## Serial Port

A serial port provides direct connectivity with Omron PLCs, HMIs or any other field device.

## Local I/Os

Freely-configurable embedded I/Os in the controller enable you to perfectly tailor Trajexia to your machine design.

## MECHATROLINK-II Master

The MECHATROLINK-II master performs perfect control of up to 16 servos, inverters or I/Os while allowing complete transparency across the whole system.

## Profibus-DP and DeviceNet

Standardised on Profibus or DeviceNet? That's no problem. Trajexia offers both these interfaces on request plus many more.

## Flexible Axis module

The Flexible Axis module allows full control of two actuators via an analogue output or pulse train. The module supports the main absolute encoder protocols allowing the connection of an external encoder to the system.

## Drives

A wide choice of best-in-class rotary, linear and direct-drive servos as well as inverters are available to fit your needs in compactness, performance and reliability.

## Remote I/Os

The I/Os on the MECHATROLINK-II motion bus provides for system expansion while keeping the devices under one motion bus.

**DeviceNet Slave**　　**Flexible Axis module**　　**End cover**

*DeviceNet™*

Actual size

*trajexia*

# Intuitive and powerful engineering

Trajexia's intuitive and easy programming tool, based on the Motion Basic instruction set, includes dedicated commands for linking axes, e-cams, e-gearboxes etc. What's more, multitasking capability provides total freedom in application design.

### Design simplicity
Handling from 2 to 16 axes, the system's scalability provides you with a single application for several versions of your machine.

### Keep your know-how safe
Trajexia's sophisticated encryption method guarantees complete protection and confidentiality for your valuable know-how.

### Advanced tools
Trajexia's advanced debugging tools, including trace and oscilloscope functions, ensure efficient operation and minimum downtime.

### Automatic recognition of devices
The servos, inverters and I/Os connected to the MECHATROLINK-II motion bus are automatically identified and configured, allowing you to set up your system in minutes.

### Full access to devices from one connection
The parameters and functions inside the drives on the MECHATROLINK-II are fully accessible from the Ethernet connection.
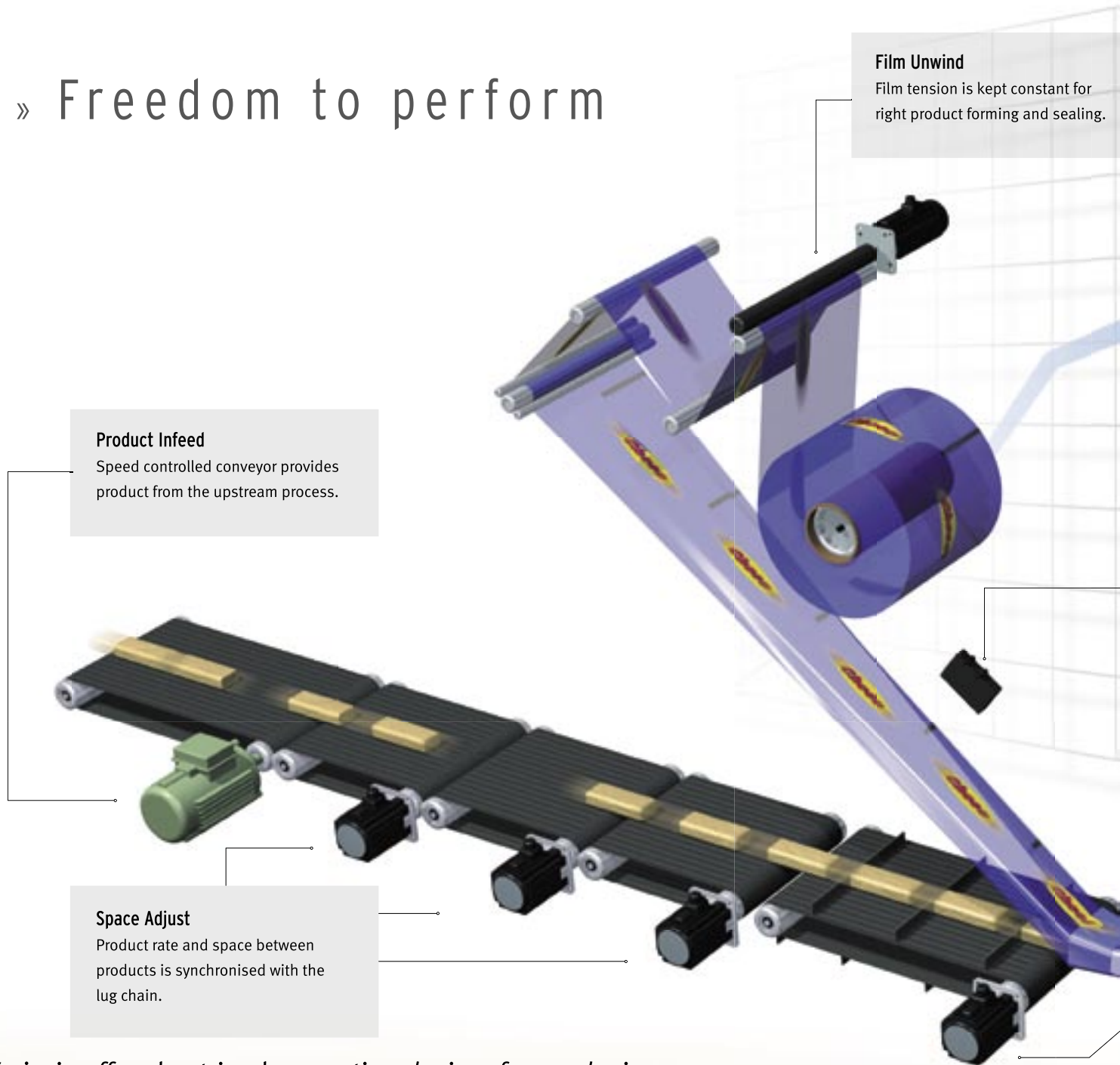
### Remote access
Trajexia's smart architecture allows explicit messaging over Ethernet and through MECHATROLINK-II to provide full transparency down to the actuator level, and making remote access possible.

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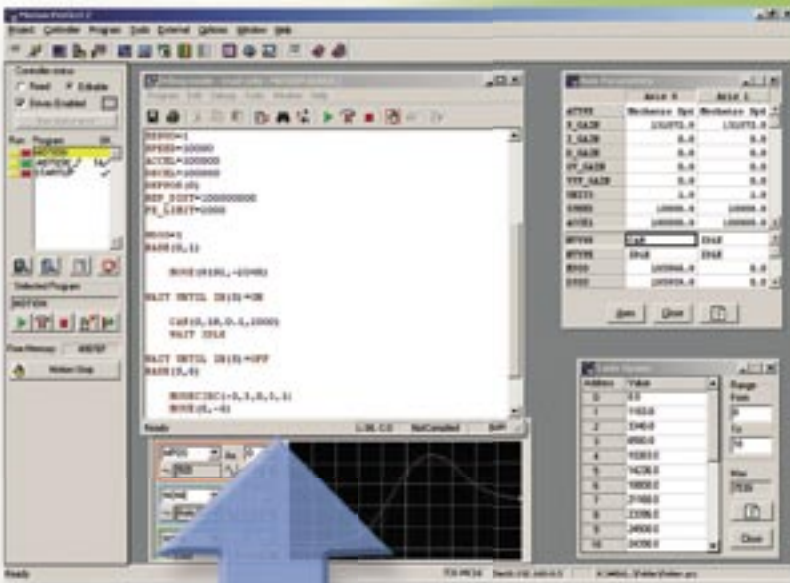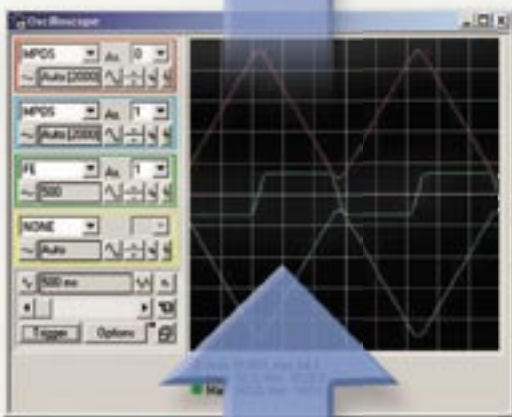
# » Freedom to perform

**Film Unwind**
Film tension is kept constant for right product forming and sealing.

**Product Infeed**
Speed controlled conveyor provides product from the upstream process.

**Space Adjust**
Product rate and space between products is synchronised with the lug chain.

*Trajexia offers best-in-class motion devices for producing the best automation solutions for today and tomorrow...*

**Perfect control of 16 axes**
Controlling all 16 axes with a total system cycle time of 1 ms, Trajexia ensures fastest operation at highest accuracy.

**Real multi-tasking**
Trajexia is a real multi-tasking controller capable of running up to 14 tasks simultaneously.

**Robust and stable motion bus**
Specifically designed for motion control, MECHATROLINK-II offers the communication speed and time accuracy essential to guarantee perfect motion control of servos.

**Best-in-class servo drives**
Offering a wide variety of rotary and linear servomotors, Omron's Sigma II servo series is designed with NO compromise on quality, reliability and performance to guarantee best-in-class motion control.

**Inverters and servos over the same bus**
The inverters connected to the MECHATROLINK-II are driven at the same update cycle time as the servo drives.
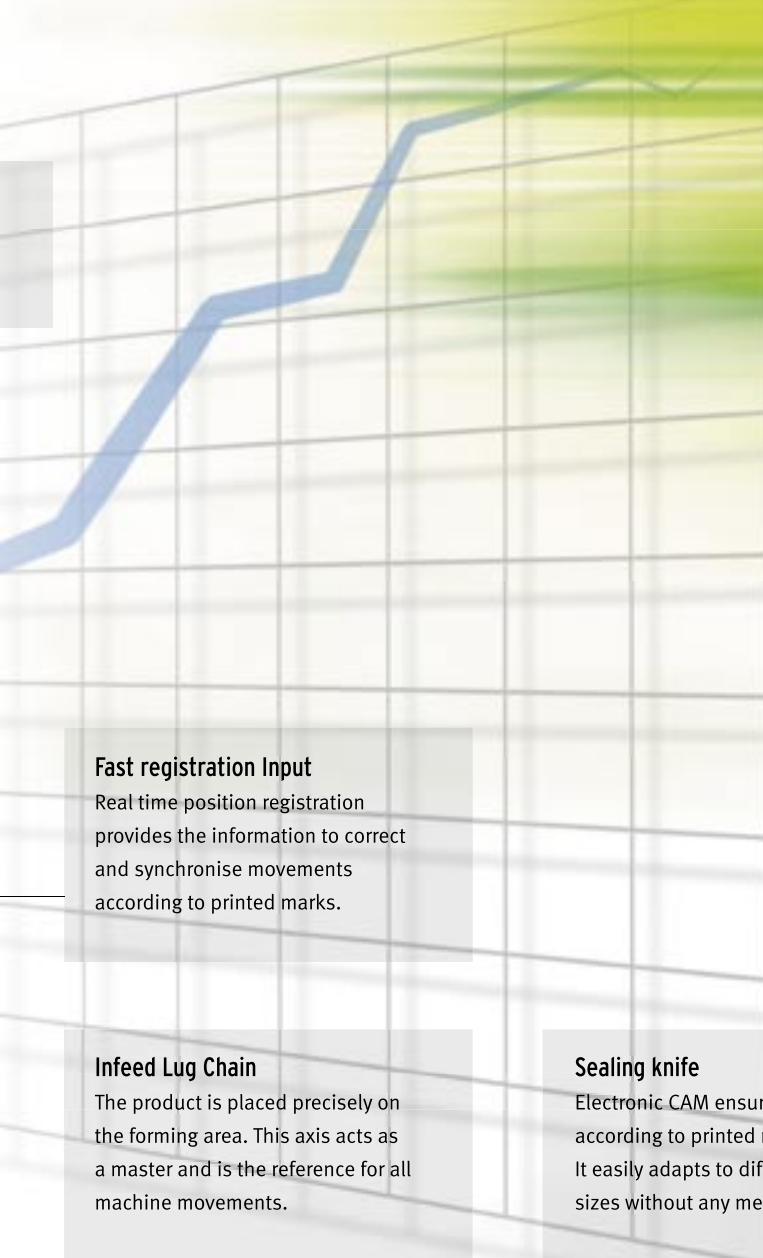
**Fast registration Input**
Real time position registration
provides the information to correct
and synchronise movements
according to printed marks.

**Infeed Lug Chain**
The product is placed precisely on
the forming area. This axis acts as
a master and is the reference for all
machine movements.

**Sealing knife**
Electronic CAM ensures film cutting
according to printed mark position.
It easily adapts to different product
sizes without any mechanical change.

**Outfeed conveyor**
Inverters can easily be integrated
for speed controlled axes.

**Longitudinal Seal**
Sealing rolls electronically geared to lug
chain for film pulling control, registration
is used to match the printed area with
the product position.

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# OMRON

# Trajexia Motion Controller

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## Stand-Alone Advanced Motion Controller Using Mechatrolink-II Motion Bus

- 16 axes advanced motion coordination over a robust and fast motion link MECHATROLINK-II
- Supports position, speed and torque control
- Each axis can run complex interpolation moves, e-cams and e-gearboxes
- Advanced debugging tools including trace and oscilloscope functions
- Hardware registration input for each servo axis
- Control of servos, inverters and I/Os over a single motion network
- Multi-tasking controller capable of running up to 14 tasks simultaneously
- Open communication - Ethernet built-in, PROFIBUS-DP and DeviceNet as options

## System Configuration
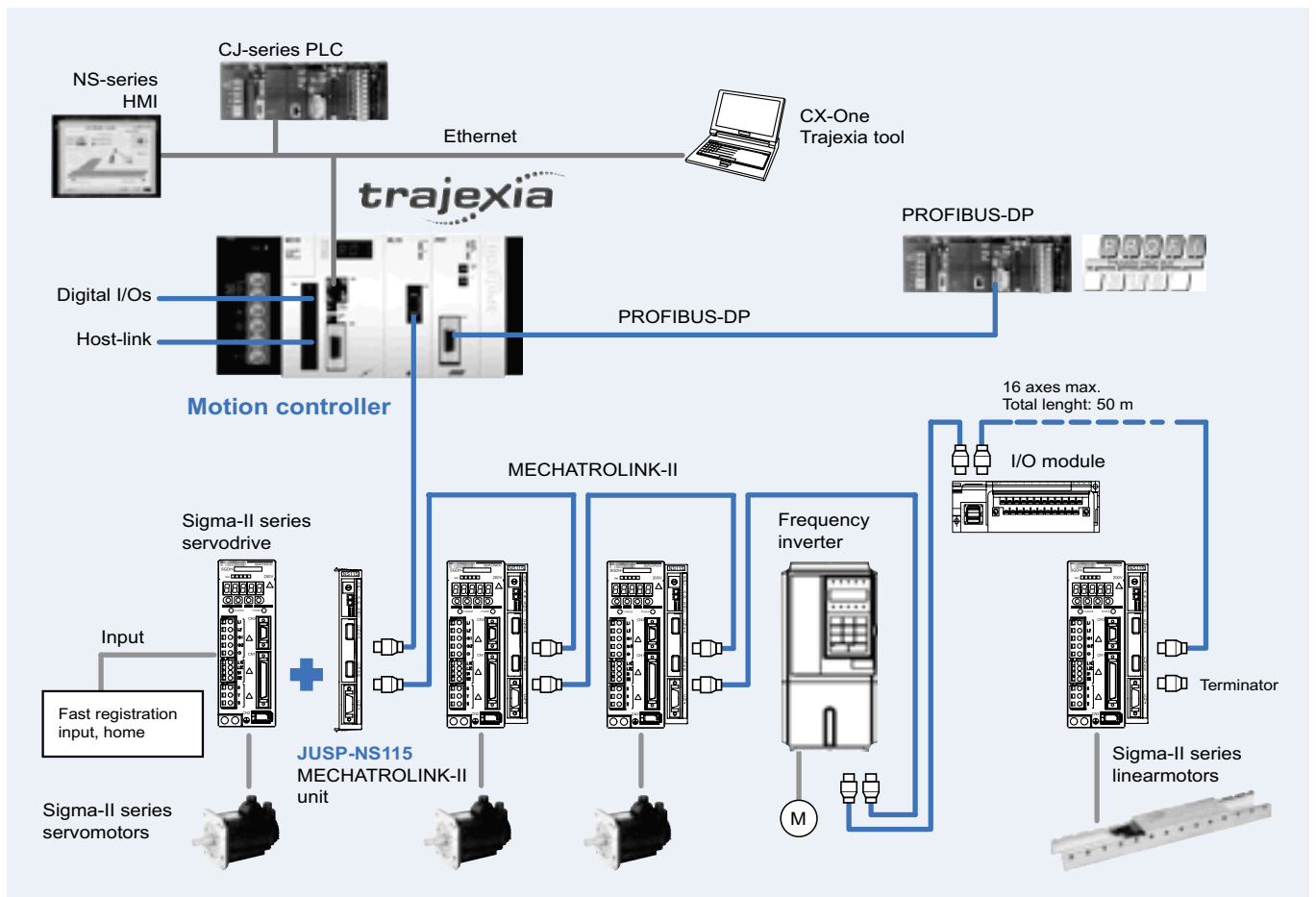
## Specifications

### General Specifications

| Item | Details |
|---|---|
| Model | TJ1-☐ |
| Ambient operating temperature | 0 to 55° C |
| Ambient operating humidity | 10 to 90%RH |
| Ambient storage temperature | -20 to 70° C |
| Ambient storage humidity | 90% max. (with no condensation) |
| Atmosphere | No corrosive gases |
| Vibration resistance | 10 to 57 Hz: (0.075 mm amplitude)<br>57 to 100 Hz Acceleration: 9,8 m/s$^2$, in X, Y and Z directions for 80 minutes. |
| Shock resistance | 143 m/s$^2$, 3 times each X, Y and Z directions. |
| Insulation resistance | 20 MOhm |
| Dielectric strength | 500 Volt |
| Protective structure | IP20 |
| International standards | CE, EN 61131-2 and RO (Approval pending for cULus and Lloyds) |

### Motion Control Unit

| Item | | Details | |
|---|---|---|---|
| Model | | TJ1-MC16 | |
| Number of axes | | 16 | |
| Number of inverters and I/O modules | | 8 maximum | |
| Number of Mechatrolink-II master units | | Up to 4 Mechatrolink-II master units (TJ1-ML16, see below) can be connected | |
| Cycle time | | Selectable 0.5 ms, 1 ms or 2 ms | |
| Programming language | | BASIC-like Motion language | |
| Multi-tasking | | Up to 14 tasks running simultaneously | |
| Digital I/O | | 16 Inputs and 8 Outputs freely configurable | |
| Measurement units | | User definable | |
| Available memory for user programs | | 500KB | |
| Data storage capacity | | Up to 2 MB flash data storage | |
| Saving program data, motion controller | | SRAM with battery backup and Flash-ROM | |
| Saving program data, personal computer | | Trajexia Motion Perfect software manages a backup on the hard disk of the personal computer. | |
| Communication ports | | 1 Ethernet port and 2 serial ports | |
| Firmware update | | Via Trajexia software tool | |
| Ethernet port | Electrical characteristics | Conform to IEEE 802.3 (100BaseT) | |
| | Connector | RJ45 Ethernet connector | |
| Serial port | Electrical characteristics | Conform 1 port to RS232C and 1 port to RS485/RS422A (selectable by switch) | |
| | Connector | SUB-D9 connector (Counterpart included in the package) | |
| | Synchronization | Start-stop synchronization (asynchronous) | |
| | Baud rate | 1200 / 2400 / 4800 / 9600 / 19200 / 38400 bps | |
| | Transmission format | Databit Length | 7 or 8 bit |
| | | Stop Bit | 1 or 2 bit |
| | | Parity Bit | Even/Odd/None |
| | Transmission mode | Point-to-multipoint (1:N) | |
| | Transmission protocol | RS-232C (1:1) | Host Link master protocol,<br>Host Link slave protocol,<br>ASCII general-purpose |
| | | RS-422A (1:N) | Host Link master protocol,<br>Host Link slave protocol,<br>ASCII general-purpose |
| | | RS-485 (1:N) | ASCII general-purpose |
| | Galvanic isolation | RS422A port | |
| | Communication buffers | 254 bytes | |
| | Flow control | None | |
| | Terminator | Yes, selectable by switch | |
| | Cable length | 15 m for RS232 and 500 meter for RS422/485 | |

### Mechatrolink-II Master Unit

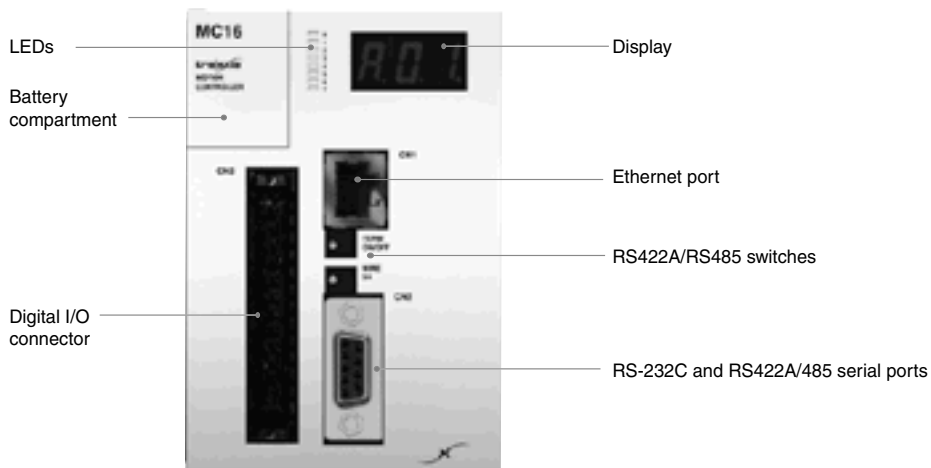| Item | Specifications |
|---|---|
| Model | TJ1-ML16 |
| Controlled devices with Mechatrolink-II interface | Sigma-2 and Sigma-3 Servo drives, various I/O units and V7, F7 and G7 Frequency inverters |
| Electrical characteristics | Conform to MECHATROLINK standard |
| Communication ports | 1 MECHATROLINK-II master |
| Transmission speed | 10Mbps |
| Communication cycle | 0.5 ms, 1ms or 2ms |
| Stations slave types | Axes or Servo drives |
| | Frequency inverters |
| | I/O Modules |
| Number of stations per master / Cycle time | Max.16 Stations / 2ms |
| | Max.8 Stations / 1ms |
| | Max.4 Stations / 0.5 ms (Only Sigma-3 Servo drives) |
| Transmission distance | Max.50 meters without using repeater |

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## Profibus Slave Unit

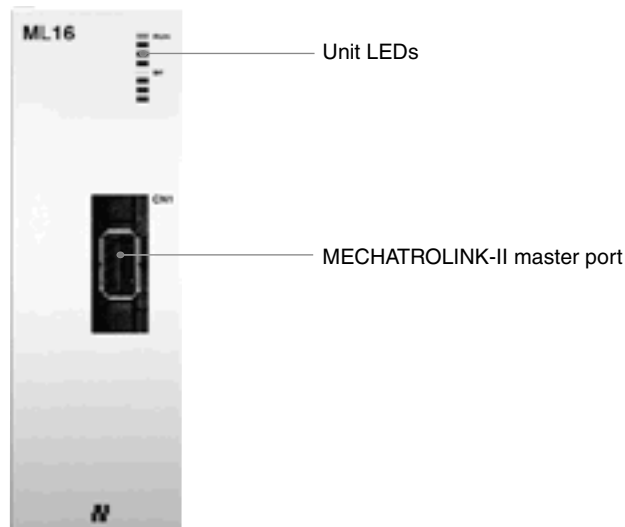| Items | Specifications |
|---|---|
| Model | TJ1-PRT |
| PROFIBUS standard | Conform to PROFIBUS-DP standard EN50170 (DP-V0) |
| Communication ports | 1 PROFIBUS-DP Slave |
| Transmission speed | 9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 3000, 6000 and 12000 kbits/s |
| Node numbers | 0 to 99 |
| I/O size | For both directions a configurable size of 0 to 122 words(16bit) |
| Galvanic isolation | Yes |

## Flexible Axis Unit

| Items | | Specifications |
|---|---|---|
| Model | | TJ1-FL02 |
| Number of axes | | 2 |
| Control method | | ±10V Analogue Output in closed loop or pulse train output in open loop |
| Encoder | Position/speed Feedback | 2 Incremental and Absolute encoders |
| | Absolute encoder standards supported | SSI, EnDat and Tamagawa |
| | Encoder Input maximum frequency | 6 MHz |
| | Encoder/Pulse Output max. frequency | 2 MHz |
| Auxiliary I/Os | | 2 Fast registration Inputs, 2 definable inputs, 2 Enable output, 4 position switch outputs or axes reset |
| Galvanic isolation | | Yes |

## Nomenclature

### Trajexia Motion Controller Unit - TJ1-MC16



- LEDs
- Battery compartment
- Digital I/O connector
- Display
- Ethernet port
- RS422A/RS485 switches
- RS-232C and RS422A/485 serial ports

### Trajexia Mechatrolink-II Master Unit - TJ1-ML16



- Unit LEDs
- MECHATROLINK-II master port

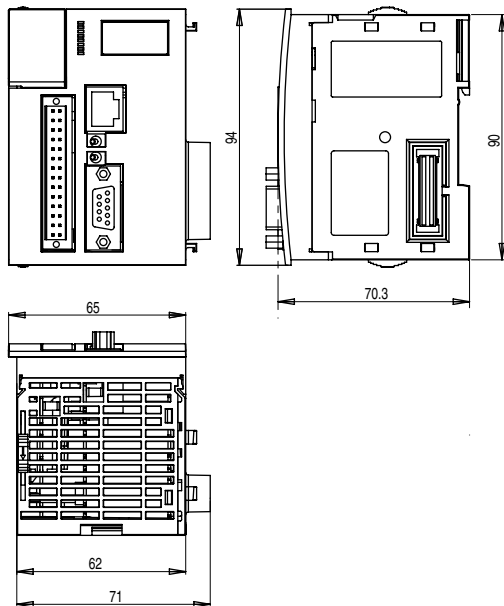## Trajexia PROFIBUS-DP Slave Unit - TJ1-PRT

PRT

Unit LEDs

PROFIBUS node sellection

PROFIBUS-DP slave port
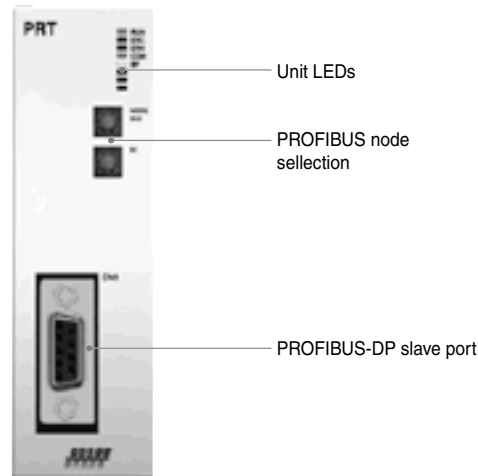
## Dimensions

**Trajexia Motion Controller - TJ1-MC16**

94

90

70.3

65

62

71

**Trajexia Modules - TJ1-ML16, TJ1-PRT, TJ1-FL02**

94

90

70.30

31

39.9
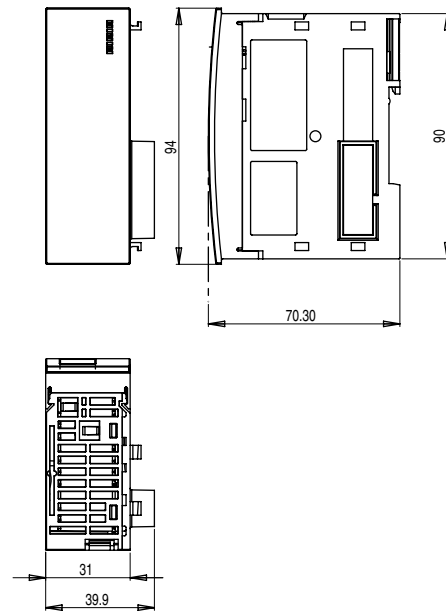
**Trajexia System - CJ1W-PA202 + TJ1-MC16 + One Module + TJ1-TER**

PA202

65

90

94

45

62

31

29.7

# OMRON

## Ordering Information



Power Supply — Motion controller — Axes control — Communication slave — End cover (Included into the Motion controller)
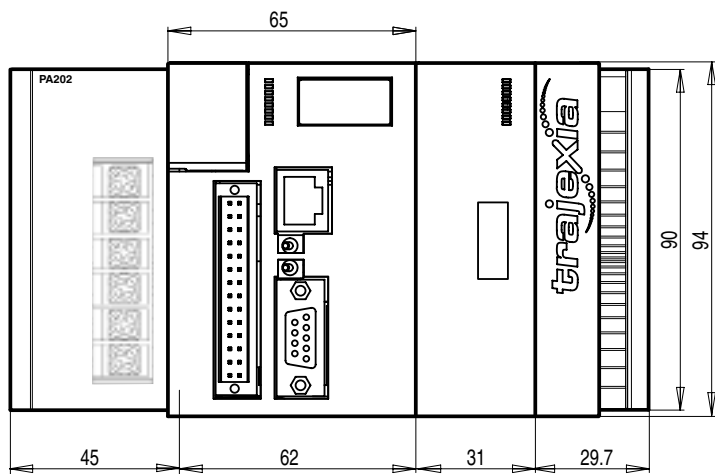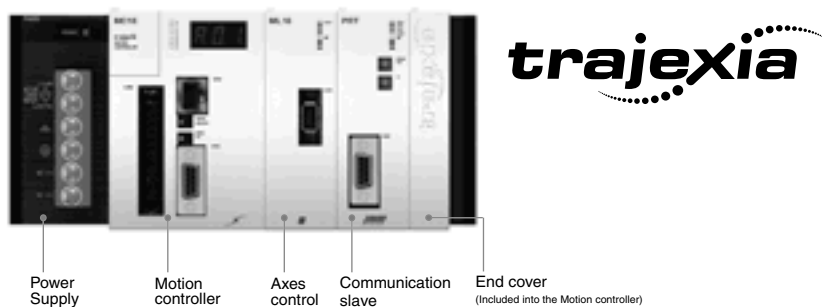
### Trajexia motion controller

| Name | Model |
|---|---|
| Trajexia Motion Controller Unit. (Trajexia end cover unit TJ1-TER is included) | TJ1-MC16 |
| Power Supply for Trajexia system, 100-240V AC | CJ1W-PA202 |
| Power Supply for Trajexia system, 24V DC | CJ1W-PD022 |

### Trajexia - Axes control modules

| Name | Model |
|---|---|
| Trajexia MECHATROLINK-II Master Unit (up to 16 Axes) | TJ1-ML16 |
| Trajexia Flexible Axis Unit (for 2 Axes) | TJ1-FL02 |

### Trajexia - Communication modules

| Name | Model |
|---|---|
| Trajexia PROFIBUS-DP slave unit | TJ1-PRT |

### Mechatrolink-II - Related devices

| Name | Remarks | Model |
|---|---|---|
| Distributed I/O modules | 64-point digital input and 64-point didital output (24VDC) | JEPMC-IO2310 |
| | Analogue input: -10V to +10V, 4 channels | JEPMC-AN2900 |
| | Analogue output: -10V to +10V, 2 channels | JEPMC-AN2910 |
| Mechatrolink-II cables | 0.5 meter | JEPMC-W6003-A5 |
| | 1 meter | JEPMC-W6003-01 |
| | 3 meters | JEPMC-W6003-03 |
| | 5 meters | JEPMC-W6003-05 |
| | 10 meters | JEPMC-W6003-10 |
| | 20 meters | JEPMC-W6003-20 |
| | 30 meters | JEPMC-W6003-30 |
| Mechatrolink-II terminator | Terminating resistor | JEPMC-W6022 |
| Mechatrolink-II interface unit | For Sigma-II series Servo drives. (Firmware version 39 or later) | JUSP-NS115 |
| | For Varispeed V7 Inverter (For Inverter's version supported contact your Omron sales office) | SI-T/V7 |
| | For Varispeed F7, G7 Inverter (For Inverter's version supported contact your Omron sales office) | SI-T |

### I/O Cables

| | Remarks | Lenght m | Model |
|---|---|---|---|
| I/O Cable for JEPMC-IO2310 | With connector on the IO2310 side | 0.5 | JEPMC-W5410-05 |
| | | 1.0 | JEPMC-W5410-10 |
| | | 3.0 | JEPMC-W5410-30 |

### Servo System & Frequency Inverters

**Note:** Refer to Motion & Drives catalogue for detailed specs and ordering information

### Computer Software

| Specifications | Model |
|---|---|
| Trajexia Motion Perfect and CX-Drive V1.2 or higher | TJ1-Tools |
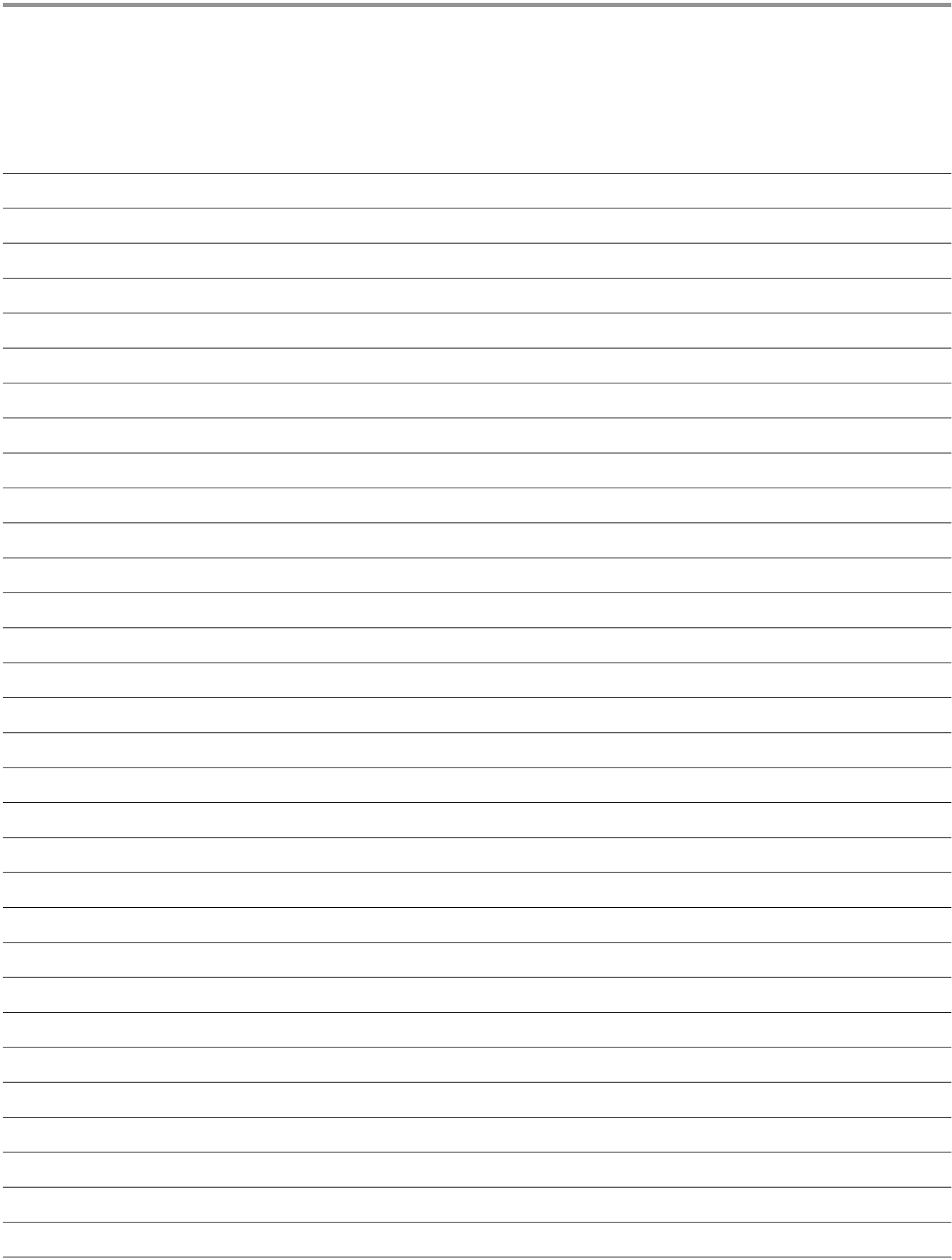
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

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