

# TRAJEXIA

Total Freedom in Motion Control

CHOOSE

CONTROL

PERFORM

DESIGN

CREATE



» Freedom to communicate

» You decide

» Freedom to design

**trajexia**

# 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.*

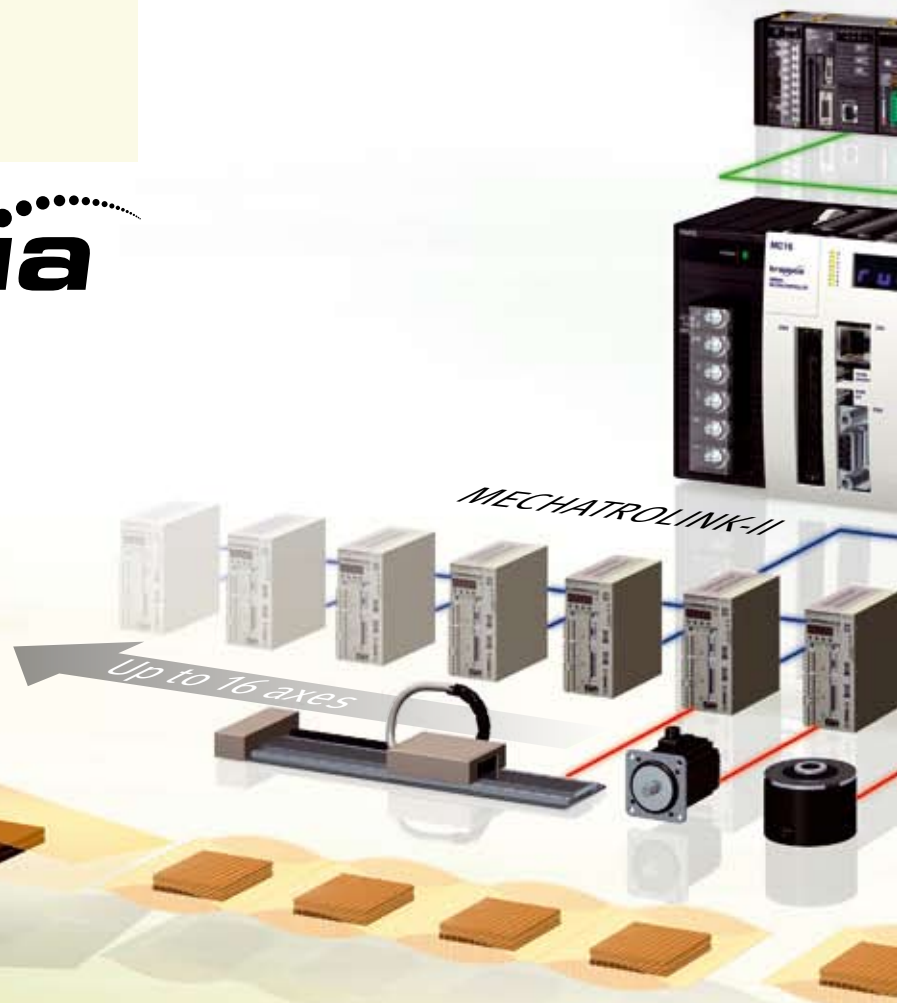
*Trajexia puts you in full control to create the best machines today and... tomorrow.*

## 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**



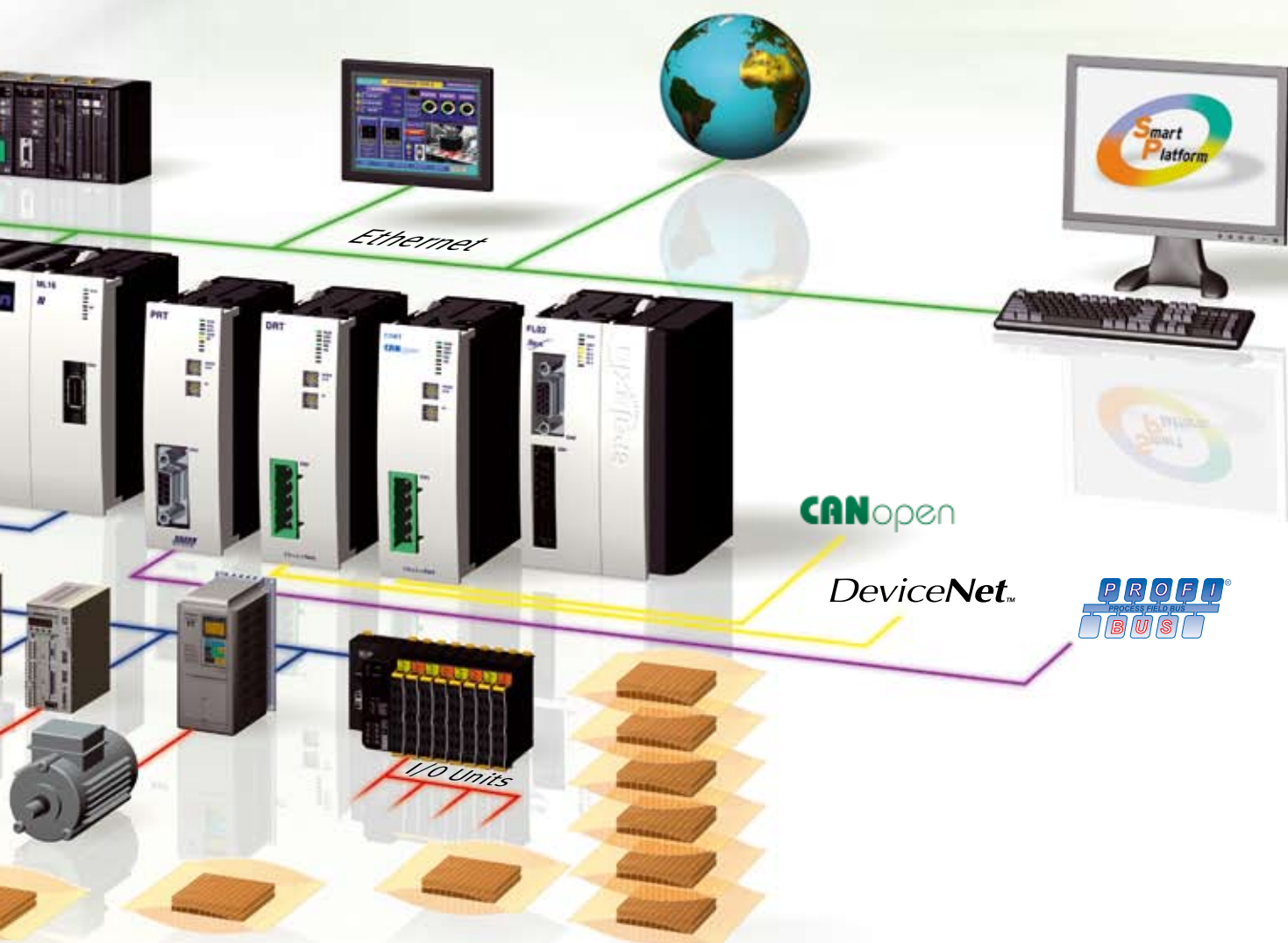
# » Freedom to design

## 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.





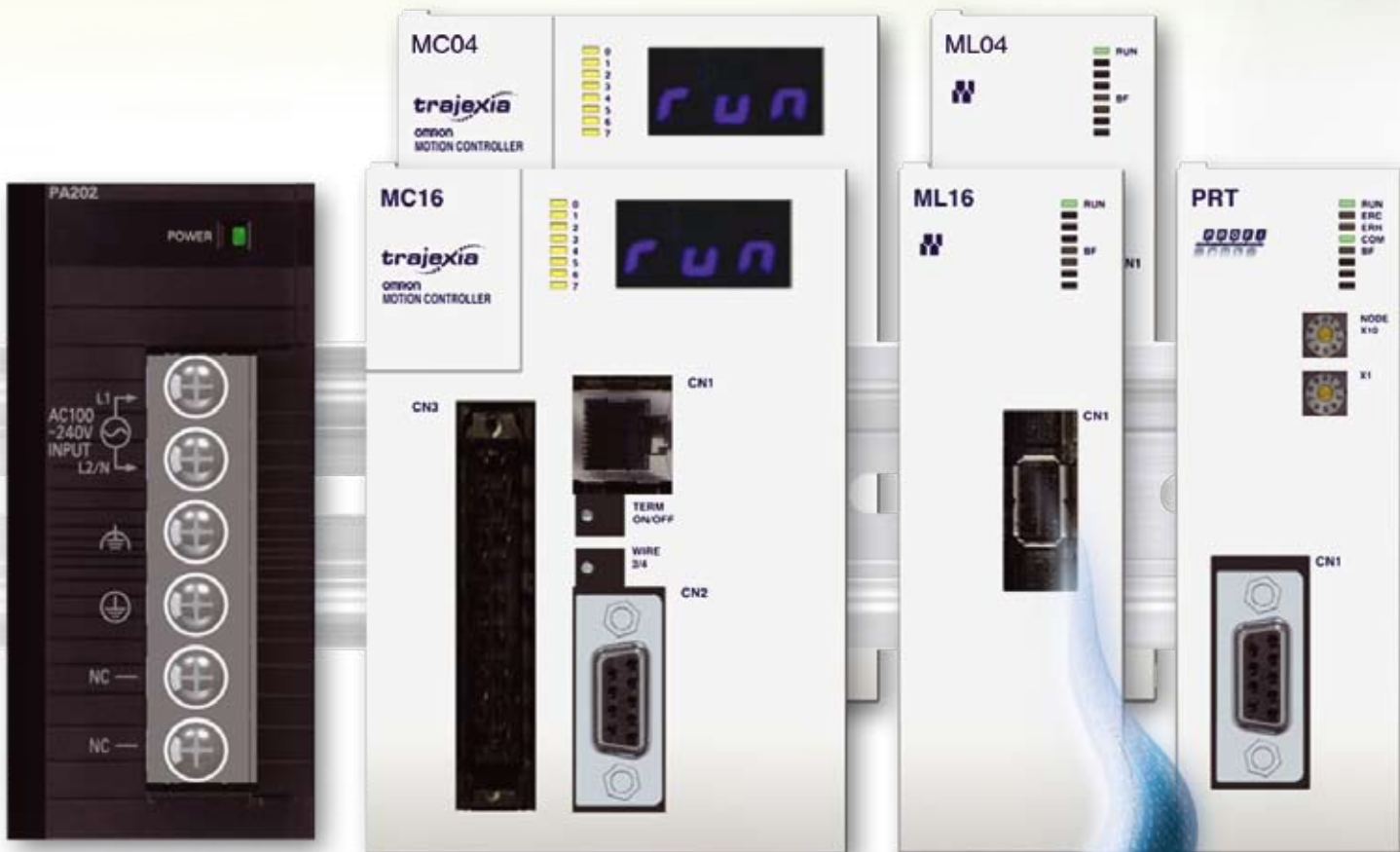
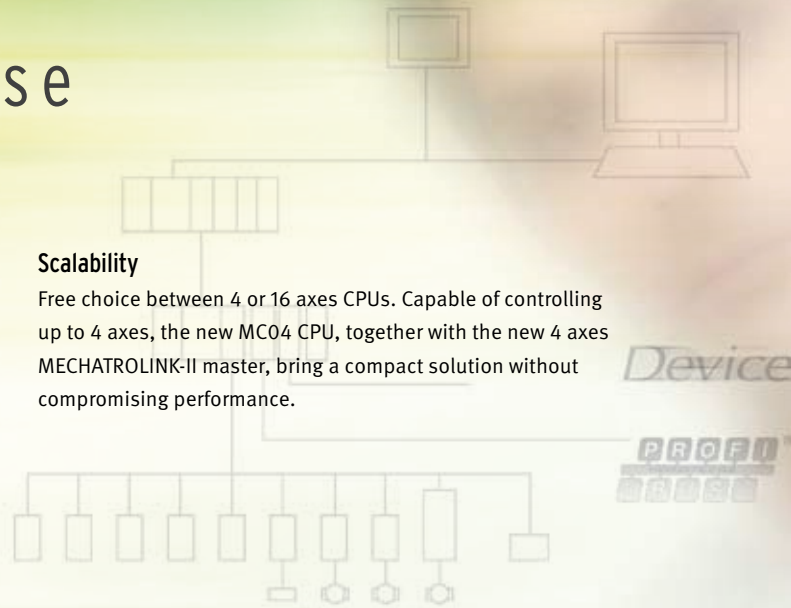
# » Freedom to choose

## 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.

## Scalability

Free choice between 4 or 16 axes CPUs. Capable of controlling up to 4 axes, the new MC04 CPU, together with the new 4 axes MECHATROLINK-II master, bring a compact solution without compromising performance.



Power supply

Motion controller

Ethernet

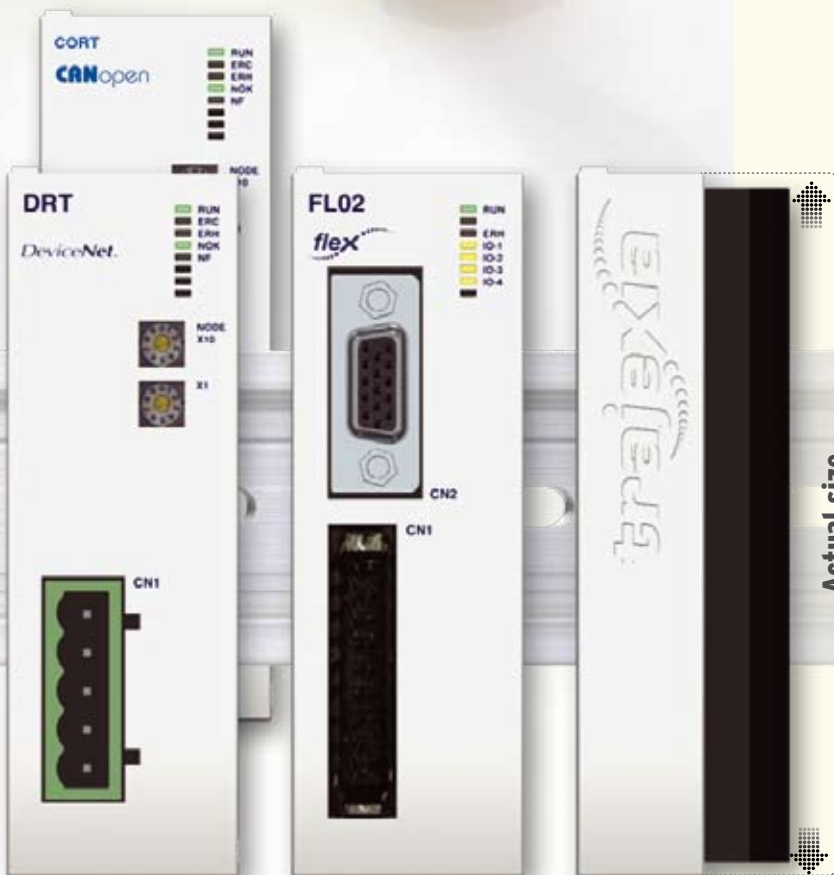
MECHATROLINK-II  
Master

Profibus Slave



## CANopen

CANopen unit



DeviceNet Slave  
*DeviceNet*

Flexible Axis module

End cover

### 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, DeviceNet and CANopen

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

### 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.

**trajexia**

# » Freedom to create



## 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

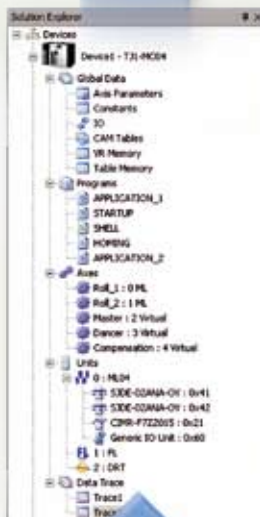
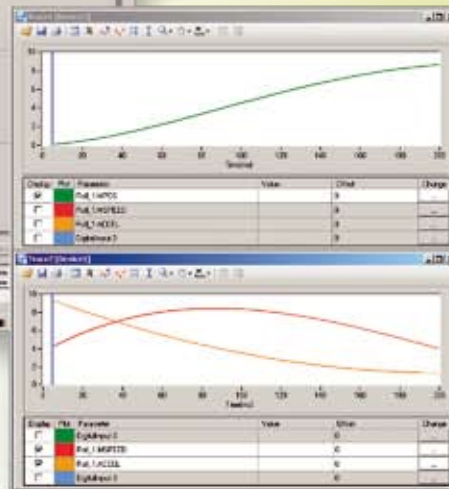
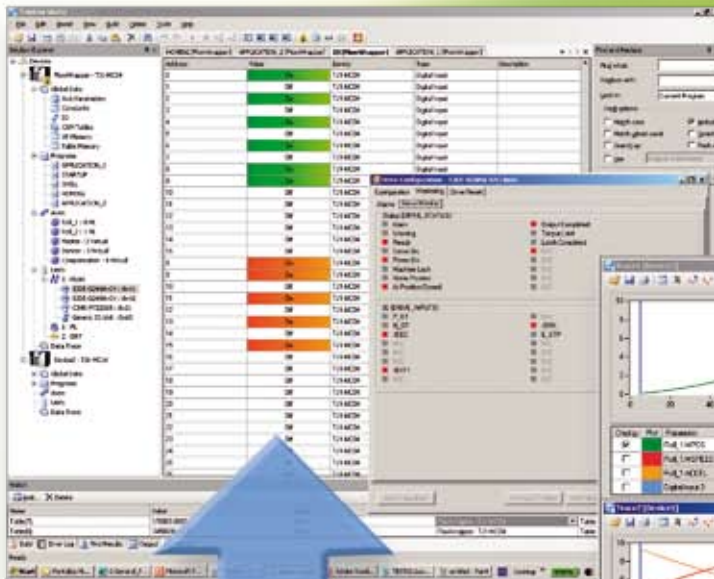
The parameters and functions inside the drives on the MECHATROLINK-II are fully accessible from the Ethernet connection.

### Remote access

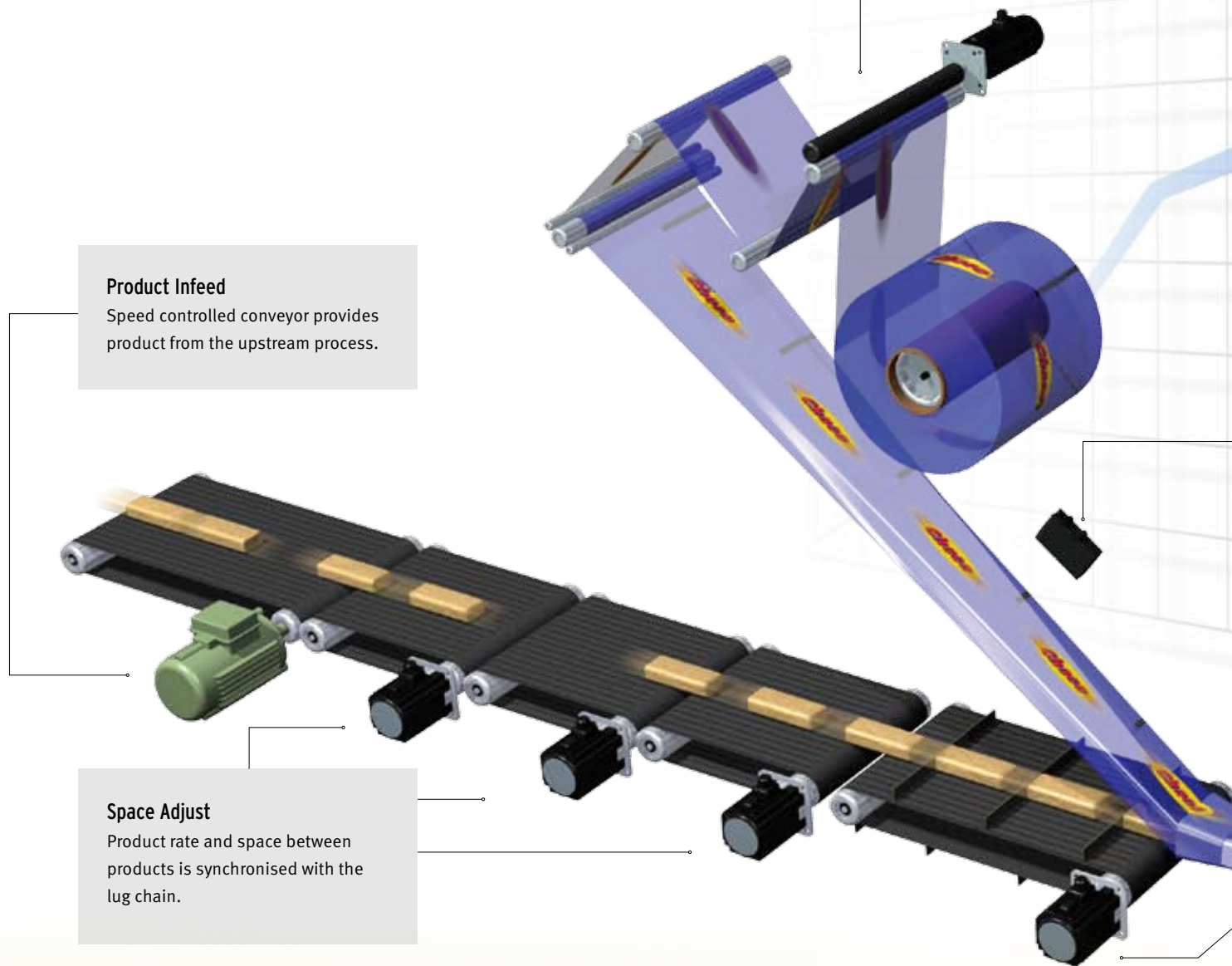
Trajexia's smart architecture allows explicit messaging over Ethernet and through MECHATROLINK-II to provide full transparency down to the actuator level, and making remote access possible.



**trajexia**  
studio



# » 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.

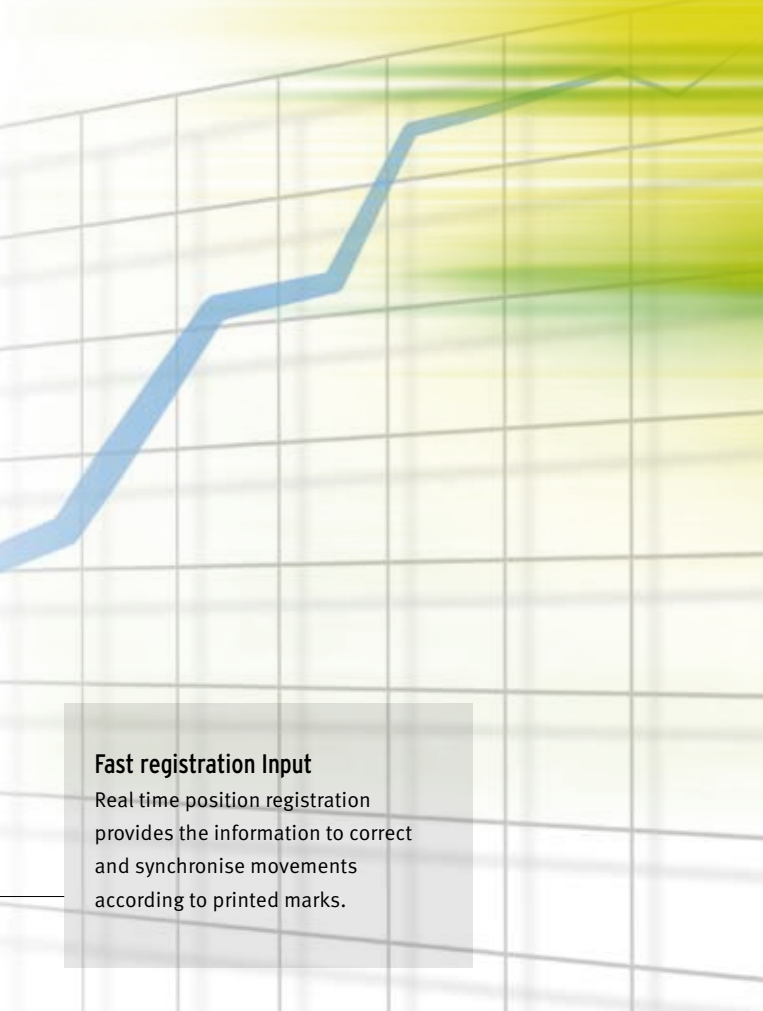
### Best-in-class servo drives

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.



**trajexia**

TJ1-

# Trajexia Motion Controller

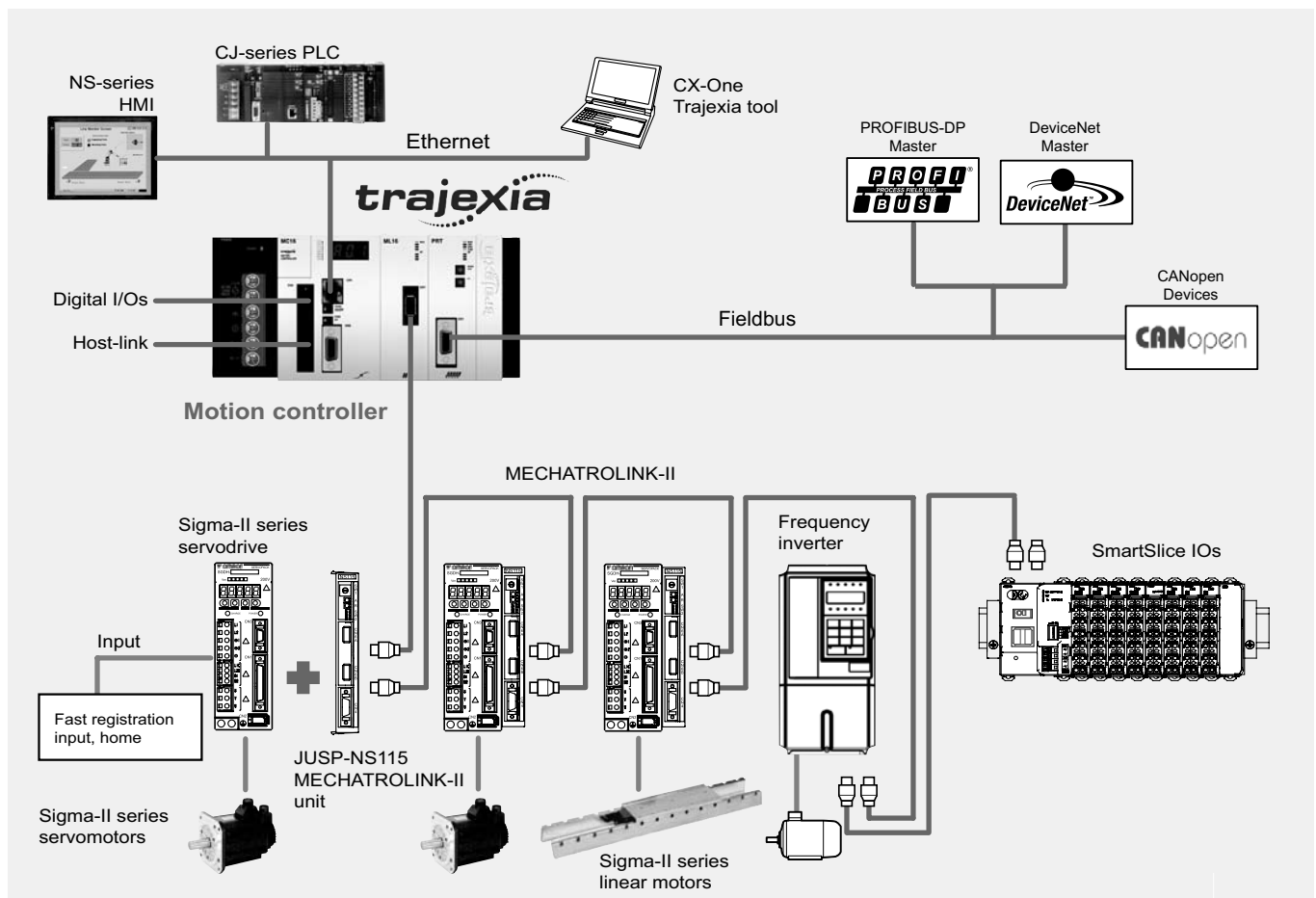
## Stand-Alone Advanced Motion Controller Using MECHATROLINK-II Motion Bus

- 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 interpolated 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, DeviceNet and CANopen as options

**trajexia**



## System Configuration



## Specifications

### Trajexia 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) 57 to 100 Hz Acceleration: 9.8 m/s <sup>2</sup> , in X, Y and Z directions for 80 minutes.
Shock resistance	143 m/s <sup>2</sup> , 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, cULus, Lloyds (cULus approval pending for TJ1-MC04 and TJ1-ML04) RoHS compliant

### Trajexia Motion Control Units

Item	Details
Model	TJ1-MC16 TJ1-MC04
Number of axes	16 4 (+1 using TJ1-FL02 unit)
Number of inverters and I/O modules	8 maximum (Inverters in speed or torque mode)
Number of MECHATROLINK-II master units	Up to 4 MECHATROLINK-II master units (see below TJ1-ML16/ML04) 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
Built-in Digital I/O	16 Inputs and 8 Outputs, for general purpose
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, Host Link slave protocol, ASCII general-purpose RS-422A (1:N) Host Link master protocol, Host Link slave protocol, 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

### Trajexia MECHATROLINK-II Master Units

Item	Specifications
Model	TJ1-ML16 TJ1-ML04
Controlled devices with MECHATROLINK-II interface	Junma MLII, Sigma-2 and Sigma-3 Servo drives, SmartSlice IOs, other I/O units and V7, F7 and G7 Frequency inverters
Electrical characteristics	Conforms 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.4 Stations / 2ms Max.8 Stations / 1ms Max.4 Stations / 1ms Max.4 Stations / 0.5 ms (Only Sigma-3 drives) Max.4 Stations / 0.5 ms (Only Sigma-3 drives )
Transmission distance	Max.50 meters without using repeater



### Trajexia PROFIBUS Slave Unit

Items	Specifications
Model	TJ1-PRT
PROFIBUS standard	Conforms 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 kbps
Node numbers	0 to 99
I/O size	0 to 120 words (16bit), configurable, for both directions
Galvanic isolation	Yes

### Trajexia DeviceNet Slave Unit

Items	Specifications
Model	TJ1-DRT
PROFIBUS standard	Conforms to DeviceNet standard of CIP edition 1
Communication ports	1 DeviceNet Slave
Transmission speed	125, 250 and 500 Kbps, auto-detect
Node numbers	0 to 63
I/O size	0 to 32 words (16bit), configurable, for both directions
Galvanic isolation	Yes

### Trajexia CANopen Unit

Items	Specifications
Model	TJ1-CORT
Electrical Characteristics	Conforms to CAN 2.0 B
Communication ports	1 CANopen
Transmission speed	20, 50, 125 and 500 Kbps
Implemented CiA Standards	DS301, DS302
PDO Support	8 TPDO and 8 RPDO
PDO Mapping	Each PDO can be mapped into TJ1-MC16/04 VR, Table, Analogue and digital IO. BASIC commands assign mapping and start address (*)
CANopen slave configuration	Any SDO message can be sent using BASIC during start-up and operation
CANopen network states	CANopen network can be set to Pre-operational and Operational using BASIC
CANopen slave emergencies	Available using BASIC command
Galvanic isolation	Yes

**Note:** (\*) TJ1-MC16/04 CPUs support a total of 256 digital IO points and 36 Analogue IO points.

### Trajexia 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 200 kHz, EnDat 1 MHz 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

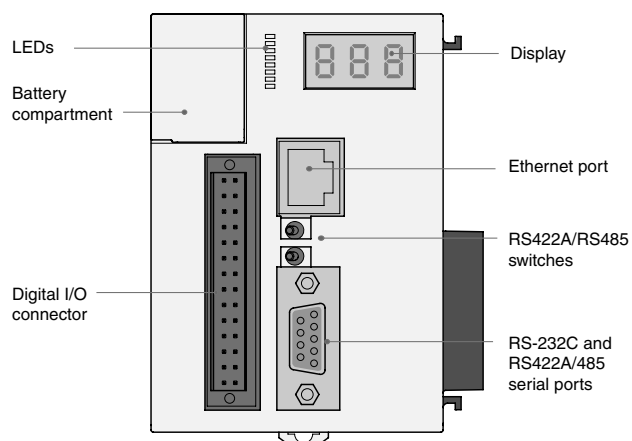
### SmartSlice MECHATROLINK-II Interface Unit

Item	Specifications
Model	GRT1-ML2
Electrical characteristics	Conform to MECHATROLINK standard
Communication cycle	0.5, 1 or 2 ms
Power supply	24Vdc
Number of connectable Slices	Up to 64 slices with a maximum amount of 128 bytes (*)
IO mapping	Automatic analogue and digital IO mapping into TJ1-MC16/04 CPU
Slice unit configuration	Not supported
Supported slice units	See ordering information section

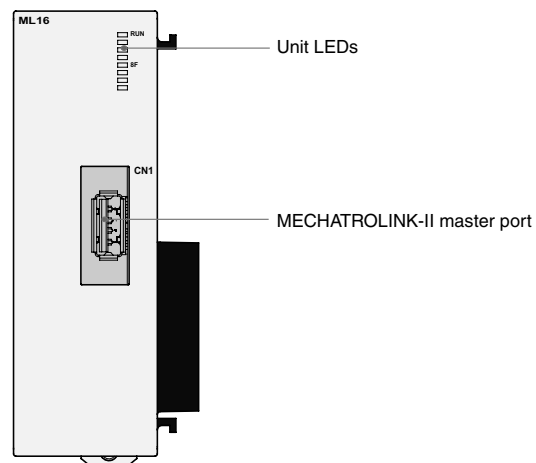
**Note:** (\*) TJ1-MC16/04 CPUs support a total of 256 digital IO points and 36 Analogue IO points.

## Nomenclature

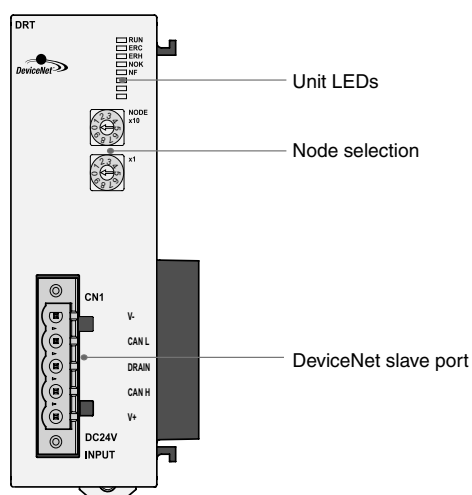
**Trajexia Motion Controller Unit - TJ1-MC16/04**



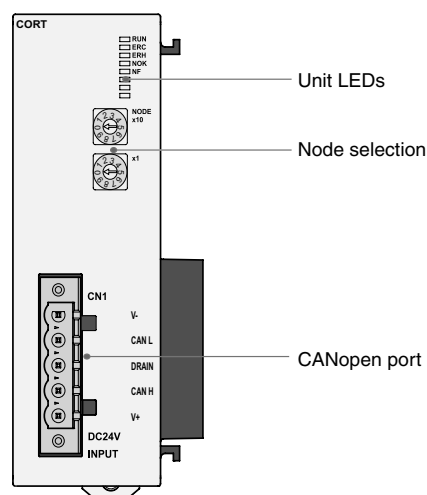
**Trajexia MECHATROLINK-II Master Unit - TJ1-ML16/04**



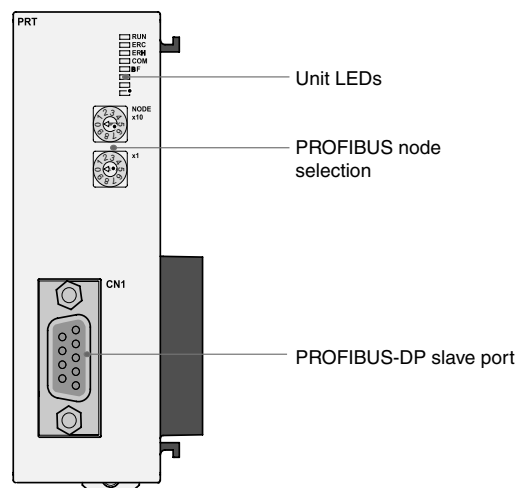
**Trajexia DeviceNet Slave Unit - TJ1-DRT**



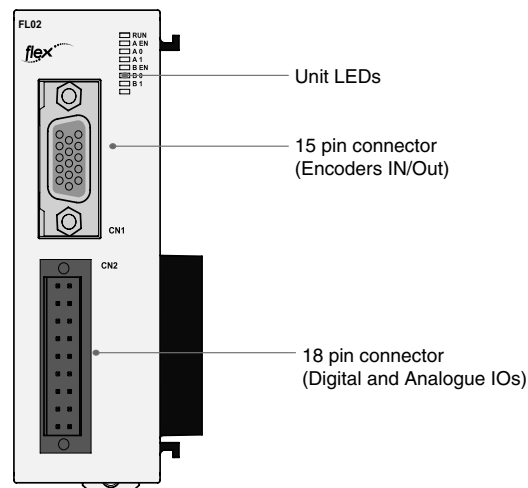
**Trajexia CANopen Unit - TJ1-CORT**



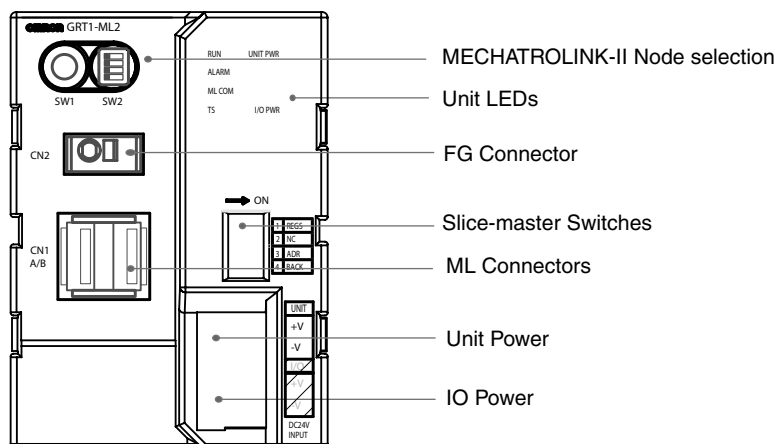
**Trajexia PROFIBUS-DP Unit - TJ1-PRT**



**Trajexia Flex Axis Unit - TJ1-FL02**

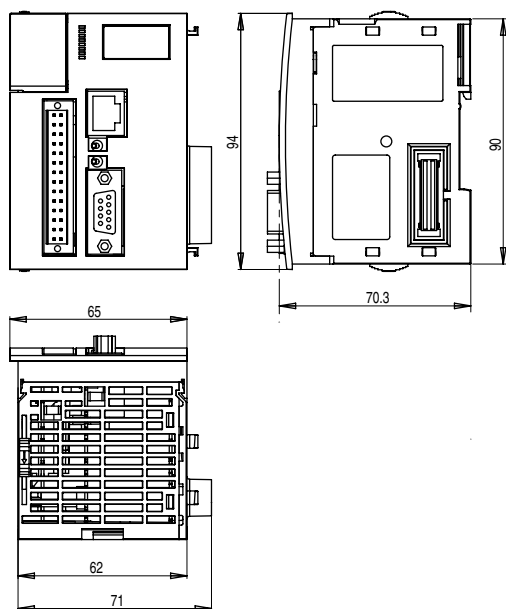


## SmartSlice MECHATROLINK-II Interface Unit - GRT1-ML2

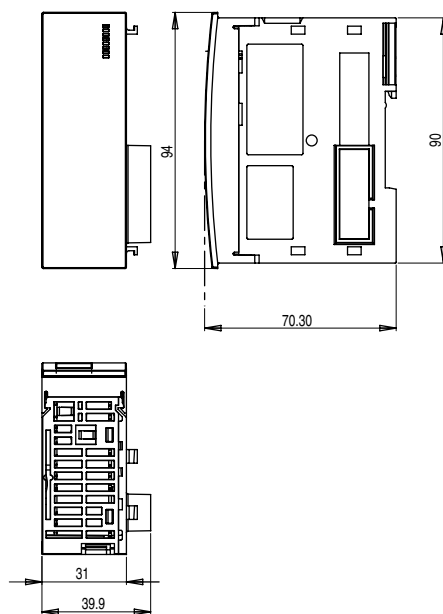


## Dimensions

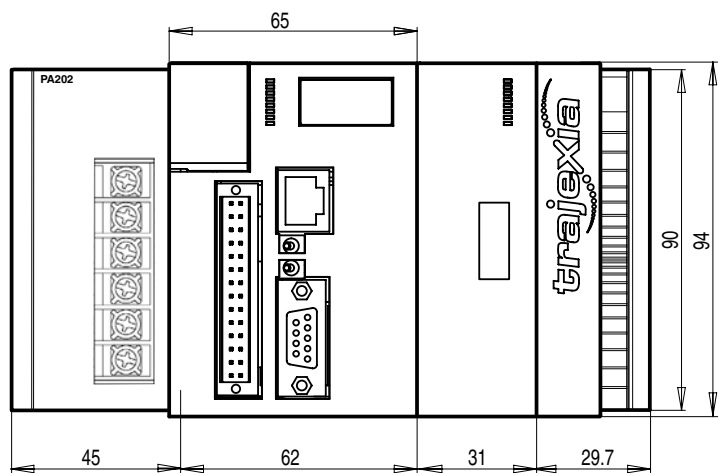
### Trajexia Motion Controller - TJ1-MC16/04



### Trajexia Modules - TJ1-ML16/04, -PRT, -DRT, -CORT, -FL02

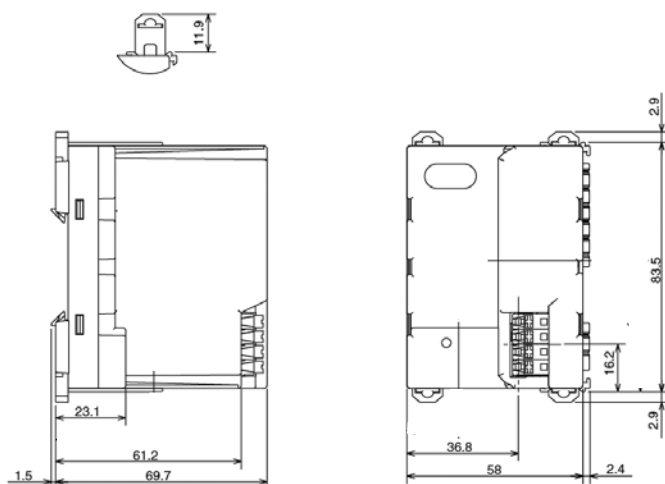


### Trajexia System - CJ1W-PA202 + TJ1-MC16 + One Module + TJ1-TER

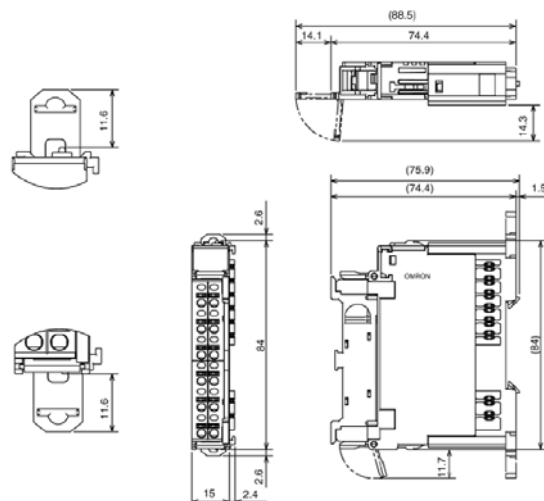




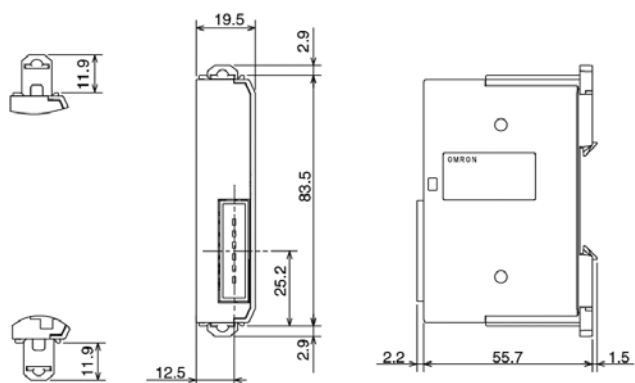
## SmartSlice Communication unit - GRT1-ML2



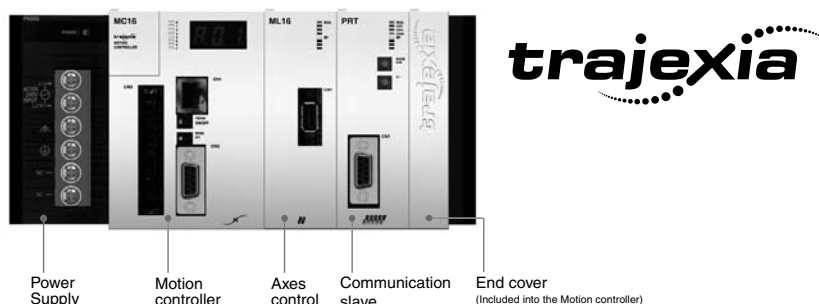
## SmartSlice I/O units - GRT1-\_



## SmartSlice End unit - GRT1-END



## Ordering Information



### Trajexia motion controller

Name	Model
Trajexia Motion Controller Unit, up to 4 axes. (Trajexia end cover unit TJ1-TER is included)	TJ1-MC04
Trajexia Motion Controller Unit, up to 16 axes. (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 4 stations)	TJ1-ML04
Trajexia MECHATROLINK-II Master Unit (up to 16 stations)	TJ1-ML16
Trajexia Flexible Axis Unit (for 2 Axes)	TJ1-FL02

### Trajexia - Communication modules

Name	Model
Trajexia DevicNet slave unit	TJ1-DRT
Trajexia PROFIBUS-DP slave unit	TJ1-PRT
Trajexia CANopen unit	TJ1-CORT

### MECHATROLINK-II - Related devices

#### Servo System & Frequency Inverters

Name	Remarks	Model
MECHATROLINK-II interface unit for Servos and Inverters	For Sigma-II series Servo drives. (Firmware version 39 or later)	JUSP-NS115
	Junma servo drives with MECHATROLINK-II port built-in the drive	SJDE-□□ANA-OY
	For Varispeed V1000 Inverter. Release by 2008 (For Inverter's version supported contact your Omron sales office)	SI-T3
	For Varispeed V7 Inverter (For Inverter's version supported contact your Omron sales office)	SI-TV7
	For Varispeed F7, G7 Inverter (For Inverter's version supported contact your Omron sales office)	SI-T

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

#### SmartSlice IOs system

Function	Specification	Model
SmartSlice Interface unit	SmartSlice MECHATROLINK-II inteface unit	GRT1-ML2
End plate, one unit required per bus interface		GRT1-END
4 NPN inputs	24 V DC, 6 mA, 3-wire connection	GRT1-ID4
4 PNP inputs	24 V DC, 6 mA, 3-wire connection	GRT1-ID4-1
8 NPN inputs	24 V DC, 4 mA, 1-wire connection + 4xG	GRT1-ID8
8 PNP inputs	24 V DC, 4 mA, 1-wire connection + 4xV	GRT1-ID8-1
4 NPN outputs	24 V DC, 500 mA, 2-wire connection	GRT1-OD4
4 PNP outputs	24 V DC, 500 mA, 2-wire connection	GRT1-OD4-1
4 PNP outputs with short-circuit protection	24 V DC, 500 mA, 3-wire connection	GRT1-OD4G-1
8 NPN outputs	24 V DC, 500 mA, 1-wire connection + 4xV	GRT1-OD8
8 PNP outputs	24 V DC, 500 mA, 1-wire connection + 4xG	GRT1-OD8-1
8 PNP outputs with short-circuit protection	24 V DC, 500 mA, 1-wire connection + 4xG	GRT1-OD8G-1
2 relay outputs	240 V AC, 2A, normally-open contacts	GRT1-ROS2
2 analogue inputs, current/voltage	±10 V, 0-10 V, 0-5 V, 1-5 V, 0-20 mA, 4-20 mA	GRT1-AD2
2 analogue outputs, voltage	± 10 V, 0-10 V, 0-5 V, 1-5 V	GRT1-DA2V
2 analogue outputs, current	0-20 mA, 4-20 mA	GRT1-DA2C

**Note:** Refer to Automation Systems catalogue for detailed specs and accessories information

## MECHATROLINK-II Cables

Name	Remarks	Model
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 Repeater	Network repeater	JEPMC-REP2000

## Other IO modules

Name	Remarks	Lenght	Model
MLII IO modules	64-point digital input and 64-point digital output (24VDC)	-	JEPMC-IO2310
	Analogue input: -10V to +10V, 4 channels	-	JEPMC-AN2900
	Analogue output: -10V to +10V, 2 channels	-	JEPMC-AN2910
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

## Computer Software

Specifications	Model
Trajexia Studio v1.0 or higher	TJ1-Studio

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

**OMRON EUROPE B.V.** Wegalaan 67-69, NL-2132 JD, Hoofddorp, The Netherlands. Tel: +31 (0) 23 568 13 00 Fax: +31 (0) 23 568 13 88 [www.industrial.omron.eu](http://www.industrial.omron.eu)

**Austria**

Tel: +43 (0) 2236 377 800  
[www.industrial.omron.at](http://www.industrial.omron.at)

**Belgium**

Tel: +32 (0) 2 466 24 80  
[www.industrial.omron.be](http://www.industrial.omron.be)

**Czech Republic**

Tel: +420 234 602 602  
[www.industrial.omron.cz](http://www.industrial.omron.cz)

**Denmark**

Tel: +45 43 44 00 11  
[www.industrial.omron.dk](http://www.industrial.omron.dk)

**Finland**

Tel: +358 (0) 207 464 200  
[www.industrial.omron.fi](http://www.industrial.omron.fi)

**France**

Tel: +33 (0) 1 56 63 70 00  
[www.industrial.omron.fr](http://www.industrial.omron.fr)

**Germany**

Tel: +49 (0) 2173 680 00  
[www.industrial.omron.de](http://www.industrial.omron.de)

**Hungary**

Tel: +36 1 399 30 50  
[www.industrial.omron.hu](http://www.industrial.omron.hu)

**Italy**

Tel: +39 02 326 81  
[www.industrial.omron.it](http://www.industrial.omron.it)

**Middle East & Africa**

Tel: +31 (0) 23 568 11 00  
[www.industrial.omron.eu](http://www.industrial.omron.eu)

**Netherlands**

Tel: +31 (0) 23 568 11 00  
[www.industrial.omron.nl](http://www.industrial.omron.nl)

**Norway**

Tel: +47 (0) 22 65 75 00  
[www.industrial.omron.no](http://www.industrial.omron.no)

**Poland**

Tel: +48 (0) 22 645 78 60  
[www.industrial.omron.pl](http://www.industrial.omron.pl)

**Portugal**

Tel: +351 21 942 94 00  
[www.industrial.omron.pt](http://www.industrial.omron.pt)

**Russia**

Tel: +7 495 648 94 50  
[www.industrial.omron.ru](http://www.industrial.omron.ru)

**Spain**

Tel: +34 913 777 900  
[www.industrial.omron.es](http://www.industrial.omron.es)

**Sweden**

Tel: +46 (0) 8 632 35 00  
[www.industrial.omron.se](http://www.industrial.omron.se)

**Switzerland**

Tel: +41 (0) 41 748 13 13  
[www.industrial.omron.ch](http://www.industrial.omron.ch)

**Turkey**

Tel: +90 216 474 00 40  
[www.industrial.omron.com.tr](http://www.industrial.omron.com.tr)

**United Kingdom**

Tel: +44 (0) 870 752 08 61  
[www.industrial.omron.co.uk](http://www.industrial.omron.co.uk)

**More Omron representatives**

[www.industrial.omron.eu](http://www.industrial.omron.eu)

*Authorised Distributor:***Control Systems**

• Programmable logic controllers • Human-machine interfaces • Remote I/O

**Motion & Drives**

• Motion controllers • Servo systems • Inverters

**Control Components**

• Temperature controllers • Power supplies • Timers • Counters • Programmable relays  
• Digital panel indicators • Electromechanical relays • Monitoring products • Solid-state relays  
• Limit switches • Pushbutton switches • Low voltage switch gear

**Sensing & Safety**

• Photoelectric sensors • Inductive sensors • Capacitive & pressure sensors • Cable connectors  
• Displacement & width-measuring sensors • Vision systems • Safety networks • Safety sensors  
• Safety units/relay units • Safety door/guard lock switches