

Trajexia stand-alone

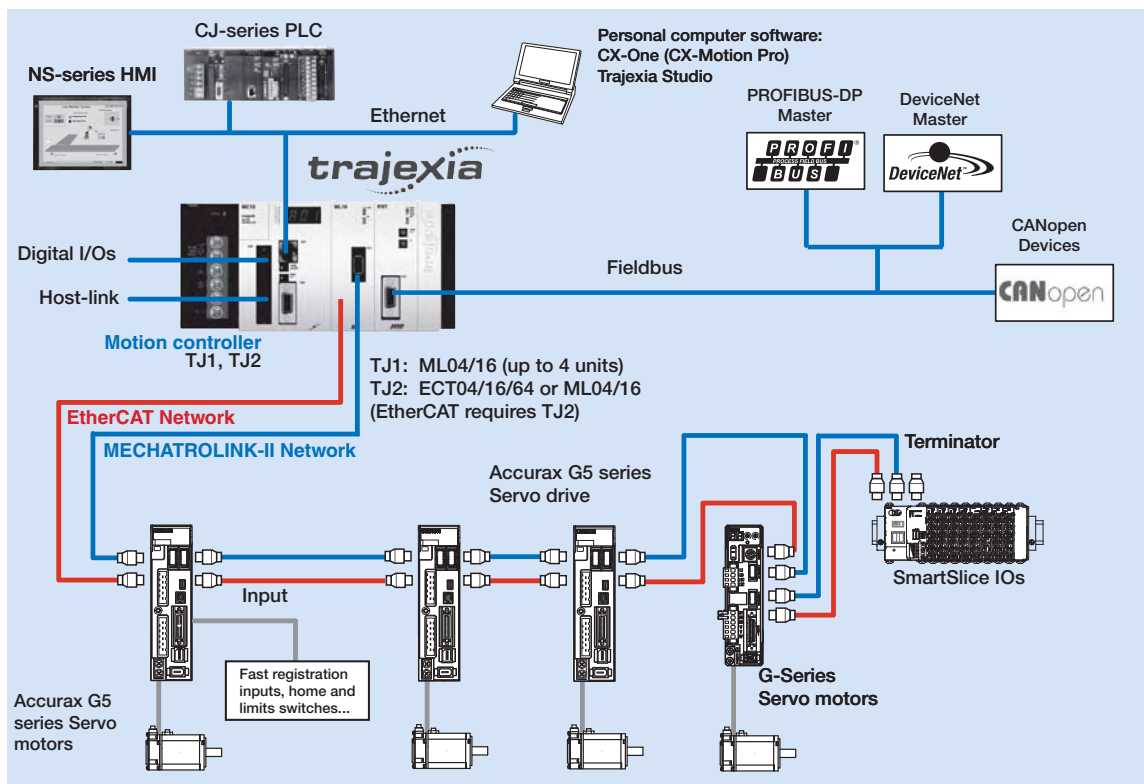
Trajexia motion controller

Stand-alone advanced motion controller over EtherCAT

- Perfect motion control of up to 64 axes. Scalability with EtherCAT masters for 4, 16 and 64 axes.
- Supports position, speed and torque control
- Multi-tasking controller capable of running up to 22 tasks simultaneously
- Advanced motion control such as linear, circular, helical or spherical interpolation, electronic cams and gearboxes via simple motion commands.
- Control of servos, inverters, vision systems and distributed I/Os over a single EtherCAT network
- Support for EtherNet/IP communications
- Advanced debugging tools including data trace and oscilloscope functions
- Open communication: Serial and EtherNet/IP built-in, PROFIBUS-DP, DeviceNet and CANopen



System configuration



Specifications

Trajexia general specifications

Item	Details
Model	TJ□
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 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, cULus, Lloyds, RoHS compliant

Trajexia motion control units

Item	Details			
Model	TJ2-MC64	TJ1-MC16	TJ1-MC04	
Number of axes	64	16	4 (+1 using TJ1-FL02 unit)	
Number of inverters and I/O modules	Up to 64 (Inverters in position, speed or torque mode)	8 maximum (Inverters in position, speed or torque mode)	8 maximum (Max. 4 Inverters in position mode)	
Motion bus	Number of EtherCAT master units ^{*1}	1 EtherCAT master is allowed per controller (see below TJ2-ECT64/ECT16/ECT04 for detailed info)		
	Number of ML2 master units	Up to 4 MECHATROLINK-II master units per controller (see below TJ1-ML16/ML04 for detailed info)		
Cycle time	Selectable 0.25 ms, 0.5 ms, 1 ms or 2 ms	Selectable 0.5 ms, 1 ms or 2 ms		
Programming language	BASIC-like motion language			
Multi-tasking	Up to 22 tasks running simultaneously	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	8 MB	500 KB		
Data storage capacity	Up to 32 MB Flash data storage	Up to 2 MB Flash data storage		
Saving program data, motion controller	Flash-ROM	SRAM with battery backup and Flash-ROM		
Saving program data, personal computer	Via CX-Motion Pro/Trajexia Studio software			
Communication ports	1 Ethernet port and 2 serial ports			
Firmware update	Via CX-Motion Pro/Trajexia Studio software			
Ethernet port	Electrical characteristics	Conform to IEEE 802.3 (100BaseT)		
	Connector	RJ45 Ethernet connector		
	Transmission protocol	Modbus TCP slave		
		TELNET		
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)		
Serial port	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, Modbus RTU slave	
		RS-485 (1:N) RS-422A (1:N)	Host Link master protocol, Host Link slave protocol, ASCII general-purpose, Modbus RTU slave	
	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			

*1. The EtherCAT master unit cannot be used in combination with a MECHATROLINK master unit when using TJ2-MC64 motion controller unit with firmware 2.0132.

Trajexia EtherCAT master units

Item	Specifications		
Model	TJ2-ECT64	TJ2-ECT16	TJ2-ECT04
Controlled devices with EtherCAT interface	Accurax G5 servo drive, MX2 inverter and SmartSlice IOs		
Electrical characteristics	Conform to Ethernet (IEEE 802.3), 100Base Tx		
Communications port	1 EtherCAT communication connector (to connect the EtherCAT twisted-pair cable)		
Transmission speed	100 Mbps		
Topology	Daisy chain, line or drop line		
Communications media	STP Category 5		
Communication cycle	0.5 ms, 1 ms or 2 ms		
Stations slave types ^{*1}	Servo drives (axis) Frequency inverters (axis) I/O modules (devices)		
Number of axes per master / Cycle time ^{*2}	Max.64 axes/2 ms	Max. 16 axes/2 ms	Max. 4 axes/2 ms
	Max.32 axes/1 ms	Max. 16 axes/1 ms	Max. 4 axes/1 ms
	Max. 16 axes/0.5 ms	Max. 16 axes/0.5 ms	Max. 4 axes/0.5 ms
Transmission distance	Up to 100 meters between nodes		
Auxiliary I/Os	8 fast registration inputs		

*1. The TJ2-MC64 CPU supports a total of 1024 digital I/O points and 36 analogue I/O points.

*2. The number of axes per master/ cycle time is currently (TJ2-MC64 motion controller with firmware 2.01.32) limited to:

- Max. 32 axes @ 2ms
- Max. 16 axes @ 1 ms
- Max. 8 axes @ 0.5 ms

Trajexia MECHATROLINK-II master units

Item	Specifications	
Model	TJ1-ML16	TJ1-ML04
Controlled devices with MECHATROLINK-II interface	Accurax G5, G-Series, MX2 inverter and SmartSlice IOs	
Electrical characteristics	Conforms to MECHATROLINK standard	
Communication ports	1 MECHATROLINK-II master	
Transmission speed	10 Mbps	
Communication cycle	0.5 ms, 1 ms or 2 ms	
Stations slave types	Axes or servo drives Frequency inverters I/O modules	
Number of stations per master / Cycle time	Max. 16 Stations/2 ms	Max. 4 Stations/2 ms
	Max. 8 Stations/1 ms	Max. 4 Stations/1 ms
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 122 words (16 bit), configurable, for both directions
Galvanic isolation	Yes

Trajexia DeviceNet slave unit

Items	Specifications
Model	TJ1-DRT
DeviceNet 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 (16 bit), 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 ^{*1}
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

*1. The TJ1-MC16/04 CPUs support a total of 256 digital I/O points and 36 analogue I/O points. The TJ2-MC64 CPU supports a total of 1024 digital I/O points and 36 analogue I/O points.

Trajexia flexible axis unit

Items		Specifications
Model		TJ1-FL02
Number of axes		2. Every axis has 1 analog output, 1 encoder in/out -software configurable - and several digital I/O
Control methods (independent per axis)		±10 V analogue output + encoder input (closed loop) Line driver AB output Stepper pulse output in closed loop or pulse train output in open loop
Encoder	Encoder protocols	Abs SSI 200 kHz, Abs EnDat 1 MHz, Abs Tamagawa and Incremental Line driver AB
	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 EtherCAT interface unit

Item	Specifications
Model	GRT1-ECT
Electrical characteristics	Conform to Ethernet (IEEE 802.3), 100Base-TX
Communication cycle	0.25 ms min.
Power supply	24 VDC
Number of connectable Slices	Up to 64 slices with a maximum amount of 128 bytes ^{*1}
IO mapping	Automatic analogue and digital IO mapping into TJ2-MC64 CPU
Slice unit configuration	Not supported
Supported slice units	See ordering information section

*1. The TJ2-MC64 CPU supports a total of 1024 digital I/O points and 36 analogue I/O points.

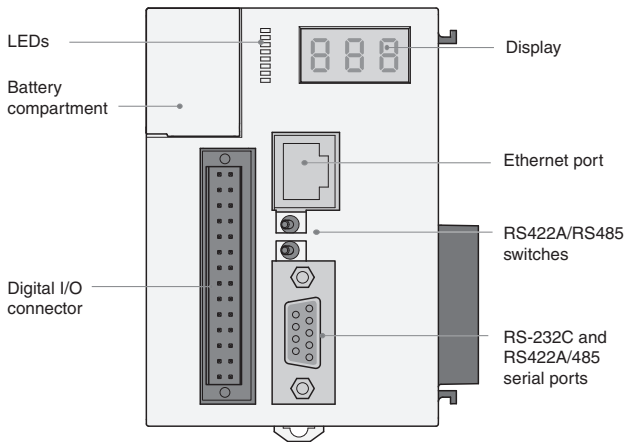
SmartSlice MECHATROLINK-II interface unit

Item	Specifications
Model	GRT1-ML2
Electrical characteristics	Conform to MECHATROLINK standard
Communication cycle	0.5, 1 or 2 ms
Power supply	24 VDC
Number of connectable Slices	Up to 64 slices with a maximum amount of 128 bytes ^{*1}
IO mapping	Automatic analogue and digital IO mapping into TJ1-MC16/04 and TJ2-MC64 CPUs
Slice unit configuration	Not supported
Supported slice units	See ordering information section

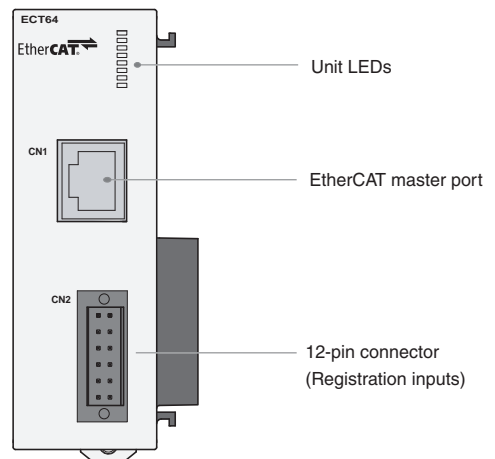
*1. The TJ1-MC16/04 CPUs support a total of 256 digital I/O points and 36 analogue I/O points.
The TJ2-MC64 CPU supports a total of 1024 digital I/O points and 36 analogue I/O points.

Nomenclature

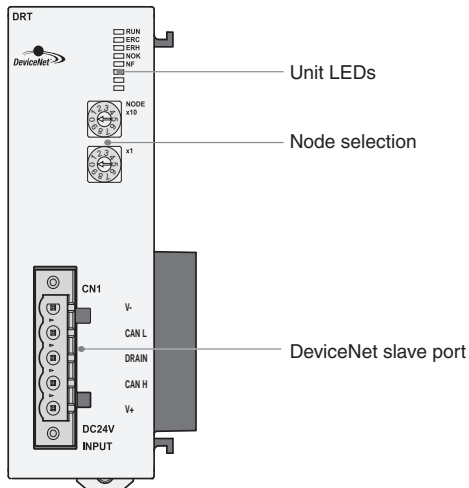
Trajexia motion controller unit - TJ2-MC64, TJ1MC-16/04



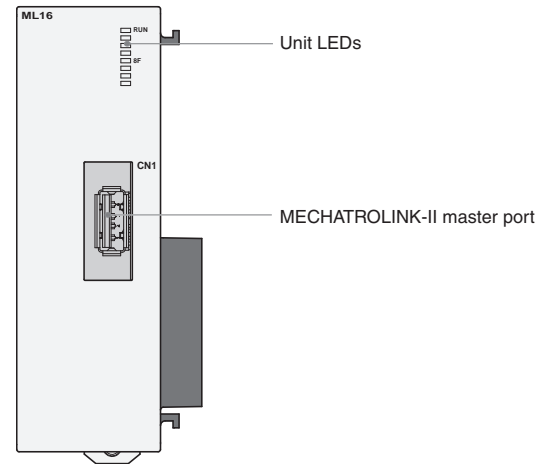
Trajexia EtherCAT master unit - TJ2-ECT04/16/64



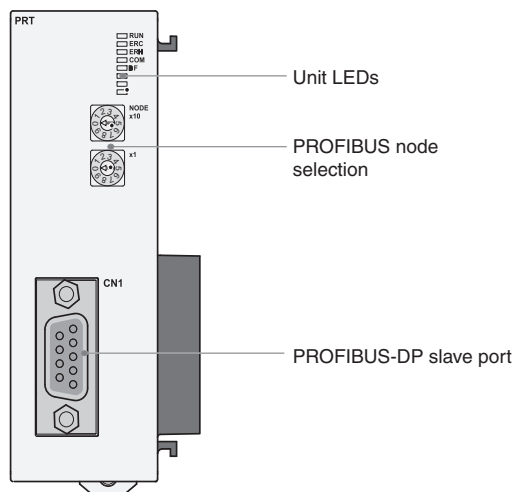
Trajexia DeviceNet slave unit - TJ1-DRT



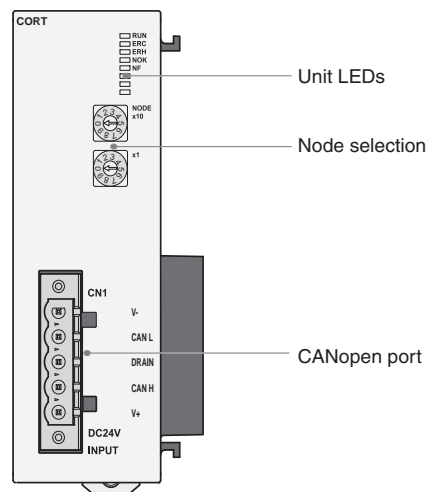
Trajexia MECHATROLINK-II master unit - TJ1-ML16/04



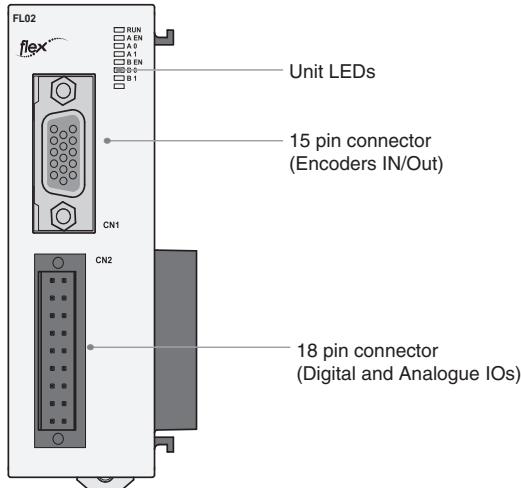
Trajexia PROFIBUS-DP unit - TJ1-PRT



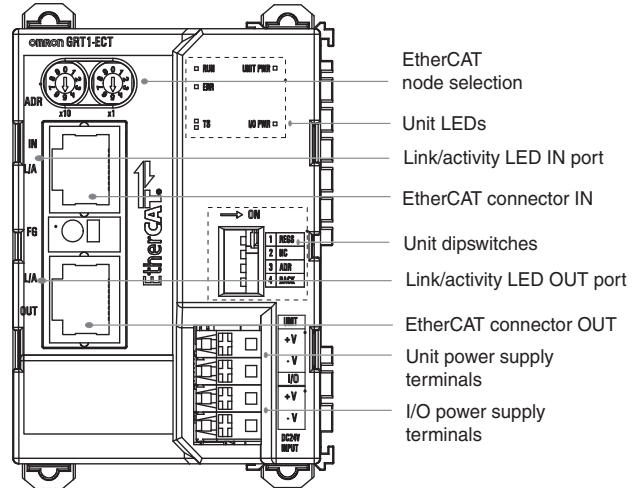
Trajexia CANopen unit - TJ1-CORT



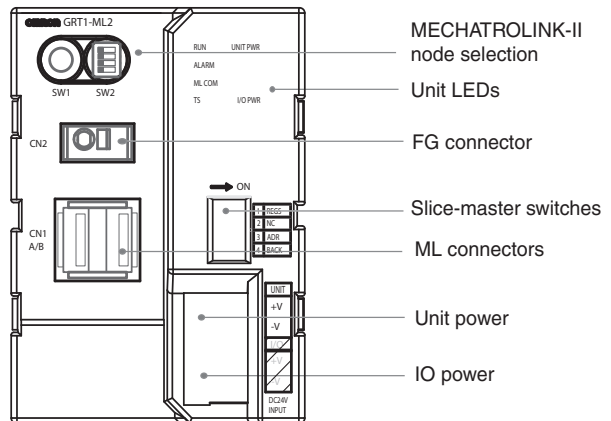
Trajexia Flex axis unit - TJ1-FL02



SmartSlice EtherCAT interface unit - GRT1-ECT

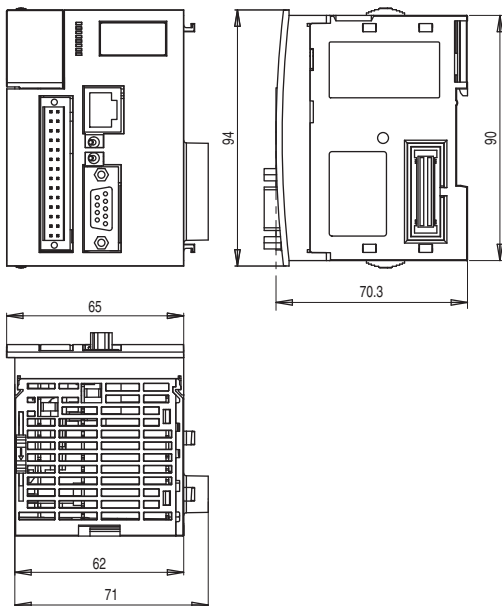


SmartSlice MECHATROLINK-II interf. unit - GRT1-ML2

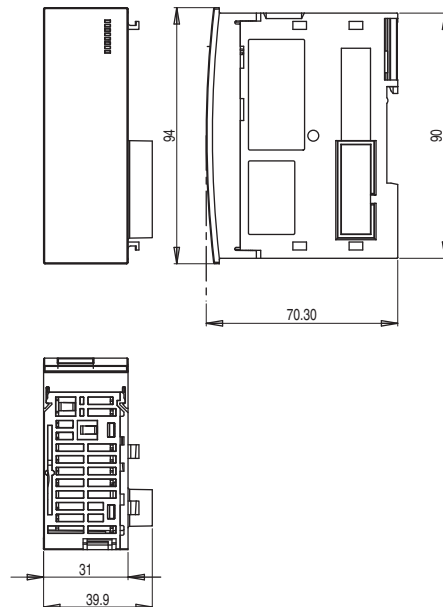


Dimensions

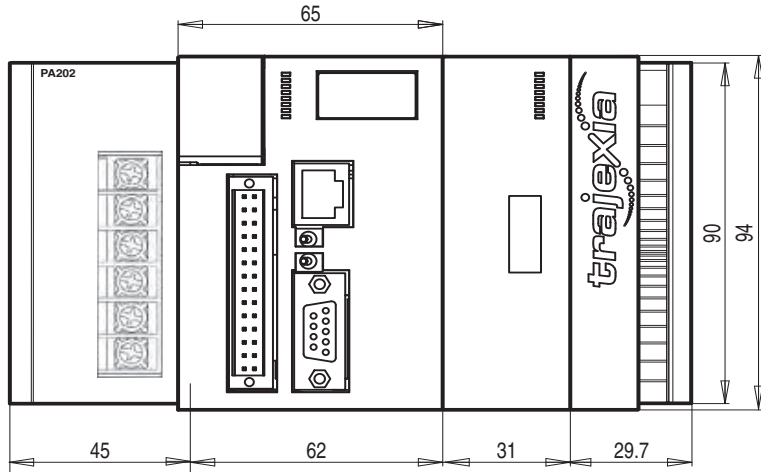
Trajexia motion controller - TJ2-MC64, TJ1-MC16/04



Trajexia units - TJ1-ML16/04, -PRT, -DRT, -CORT, -FL02, TJ2-ECT64/16/04

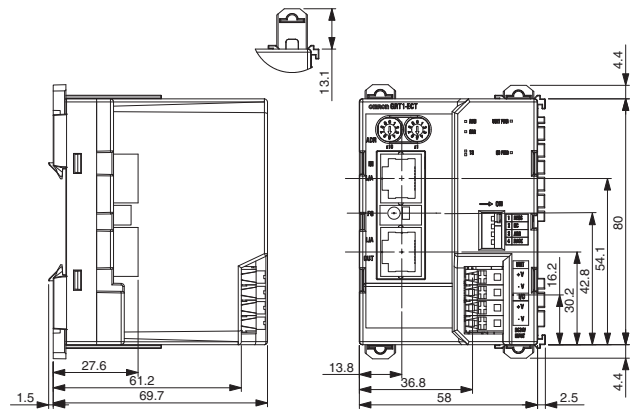
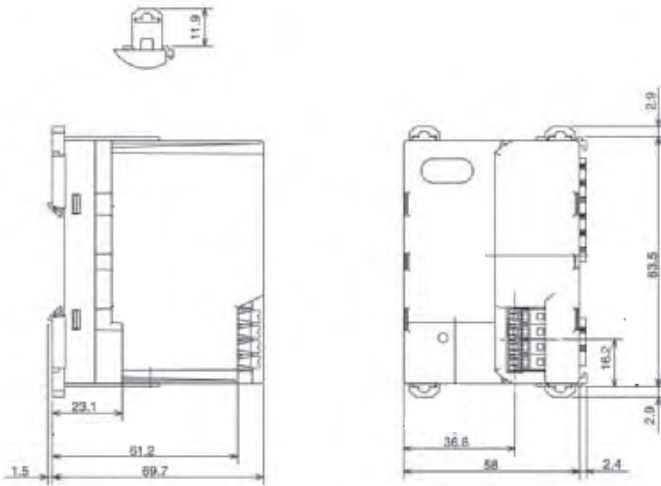


Trajexia system - CJ1W-PA202 + TJ1-MC16 + one module + TJ1-TER



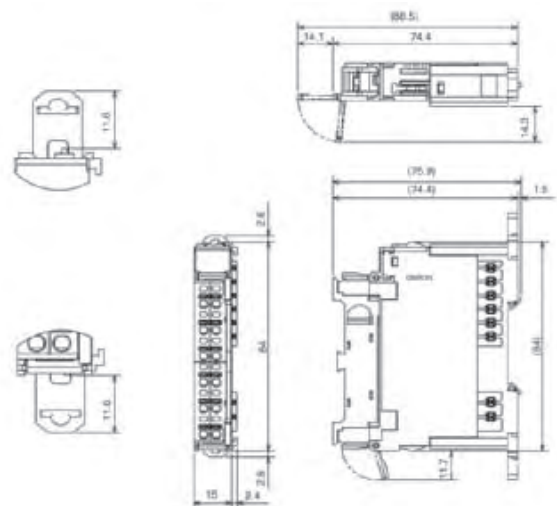
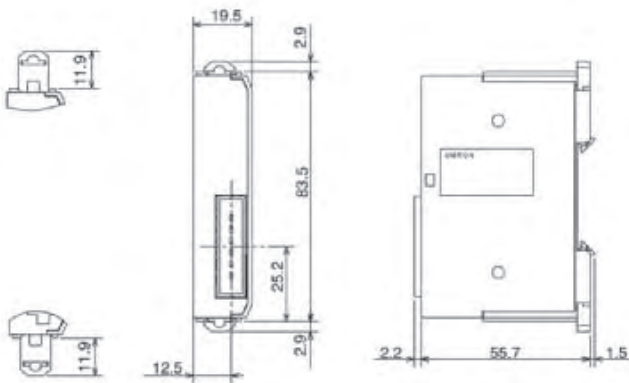
SmartSlice interface unit - GRT1-ML2

SmartSlice interface unit - GRT1-ECT

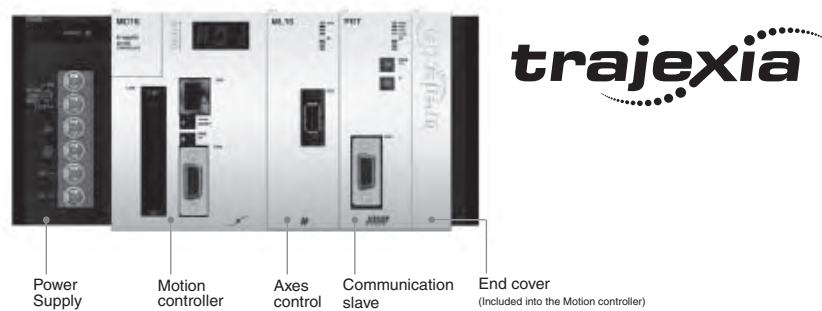


SmartSlice end unit - GRT1-END

SmartSlice I/O units - GRT1_



Ordering information



Trajexia motion controller

Name	Model
Trajexia motion controller Unit, up to 64 axes. (Trajexia end cover unit TJ1-TER is included)	TJ2-MC64
Trajexia motion controller unit, up to 16 axes. (Trajexia end cover unit TJ1-TER is included)	TJ1-MC16
Trajexia motion controller unit, up to 4 axes. (Trajexia end cover unit TJ1-TER is included)	TJ1-MC04
Power supply for Trajexia system, 100-240 VAC	CJ1W-PA202
Power supply for Trajexia system, 24 VDC	CJ1W-PD022

Trajexia - axes control modules

Name	Model
Trajexia EtherCAT master unit (up to 64 servo drives) ^{*1}	TJ2-ECT64
Trajexia EtherCAT master unit (up to 16 servo drives)	TJ2-ECT16
Trajexia EtherCAT master unit (up to 4 servo drives)	TJ2-ECT04
Trajexia MECHATROLINK-II master unit (up to 16 stations)	TJ1-ML16
Trajexia MECHATROLINK-II master unit (up to 4 stations)	TJ1-ML04
Trajexia flexible axis unit (for 2 stations)	TJ1-FL02

*1. The number of servo drives is currently limited to 32 when using TJ2-MC64 motion controller with firmware 2.0132.

Note: The TJ1-ML04 and TJ1-ML16 supported by the TJ2-MC64 motion controller are V2 (Version 2) and lot number equal or above Lot. No.091019 (YYMMDD).

Trajexia - communication modules

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

EtherCAT - related devices

Servo system & frequency inverters

Name	Model	
Accurax G5 servo drive EtherCAT built-in	R88D-KN□□□-ECT	
MX2 inverter with EtherCAT option board	Frequency inverter	3G3MX2-A□
	EtherCAT option board	3G3AX-MX2-ECT

Note: Refer to servo systems and frequency inverter sections for detailed specs and ordering information

SmartSlice IOs system

Function	Specification	Model
SmartSlice Interface unit	SmartSlice EtherCAT interface unit	GRT1-ECT
End plate, one unit required per bus interface		GRT1-END
4 NPN inputs	24 VDC, 6 mA, 3-wire connection	GRT1-ID4
4 PNP inputs	24 VDC, 6 mA, 3-wire connection	GRT1-ID4-1
8 NPN inputs	24 VDC, 4 mA, 1-wire connection + 4xG	GRT1-ID8
8 PNP inputs	24 VDC, 4 mA, 1-wire connection + 4xV	GRT1-ID8-1
4 AC inputs	110 VAC, 2-wire connection	GRT1-IA4-1
4 AC inputs	230 VAC, 2-wire connection	GRT1-IA4-2
4 NPN outputs	24 VDC, 500 mA, 2-wire connection	GRT1-OD4
4 PNP outputs	24 VDC, 500 mA, 2-wire connection	GRT1-OD4-1
4 PNP outputs with short-circuit protection	24 VDC, 500 mA, 3-wire connection	GRT1-OD4G-1
4 PNP outputs with short-circuit protection	24 VDC, 2 A, 2-wire connection	GRT1-OD4G-3
8 NPN outputs	24 VDC, 500 mA, 1-wire connection + 4xV	GRT1-OD8
8 PNP outputs	24 VDC, 500 mA, 1-wire connection + 4xG	GRT1-OD8-1
8 PNP outputs with short-circuit protection	24 VDC, 500 mA, 1-wire connection + 4xG	GRT1-OD8G-1
2 relay outputs	240 VAC, 2 A, 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
2 Pt100 inputs	Pt100, 2-wire or 3-wire connection	GRT1-TS2P
2 Pt1000 inputs	Pt1000, 2-wire or 3-wire connection	GRT1-TS2K
2 Thermocouple inputs	Types B, E, J, K, N, R, S, T, U, W, PL2, with cold junction compensation	GRT1-TS2T

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

GX-Series I/O Blocks

Name	Specification	Model
16 NPN inputs	24 VDC, 6 mA, 1-wire connection, expandable	GX-ID1611
16 PNP inputs	24 VDC, 6 mA, 1-wire connection, expandable	GX-ID1621
16 NPN outputs	24 VDC, 500 mA, 1-wire connection, expandable	GX-OD1611
16 PNP outputs	24 VDC, 500 mA, 1-wire connection, expandable	GX-OD1621
8 inputs and 8 outputs, NPN	24 VDC, 6 mA input, 500 mA output, 1-wire connection	GX-MD1611
8 inputs and 8 outputs, PNP	24 VDC, 6 mA input, 500 mA output, 1-wire connection	GX-MD1621
16 NPN inputs	24 VDC, 6 mA, 3-wire connection	GX-ID1612
16 PNP inputs	24 VDC, 6 mA, 3-wire connection	GX-ID1622
16 NPN outputs	24 VDC, 500 mA, 3-wire connection	GX-OD1612
16 PNP outputs	24 VDC, 500 mA, 3-wire connection	GX-OD1622
8 inputs and 8 outputs, NPN	24 VDC, 6 mA input, 500 mA output, 3-wire connection	GX-MD1612
8 inputs and 8 outputs, PNP	24 VDC, 6 mA input, 500 mA output, 3-wire connection	GX-MD1622
16 relay outputs	250 VAC, 2 A, 1-wire connection, expandable	GX-OC1601
4 analogue inputs, current/voltage	±10 V, 0-10 V, 0-5 V, 1-5 V, 4-20 mA	GX-AD0471
2 analogue outputs, current/voltage	±10 V, 0-10 V, 0-5 V, 1-5 V, 4-20 mA	GX-DA0271
2 encoder open collector inputs	500 kHz Open collector input	GX-EC0211
2 encoder line-driver inputs	4 MHz Line driver input	GX-EC0241

Note: The GX-Series I/O blocks are only supported by the T2-MC64 motion controller and with official firmware release above 2.0132.

Vision system

Name	Specification	Model
Vision system with EtherCAT interface	NPN	FZM1-350-ECT
	PNP	FZM1-355-ECT
Smart camera with EtherCAT interface	NPN/ Color camera	FQ-MS120-ECT
	NPN/ Monochrome camera	FQ-MS120-M-ECT
	PNP/ Color camera	FQ-MS125-ECT
	PNP/ Monochrome camera	FQ-MS125-M-ECT

Note: The vision systems are only supported by the T2-MC64 motion controller and with official firmware release above 2.0132.

MECHATROLINK-II - related devices

Servo system & frequency inverters

Name	Specification	Model
Accurax G5 servo drive ML-II built-in		R88D-KN□□□-ML2
G-Series servo drive ML-II built-in		R88D-GN□□□H-ML2
MX2 inverter with MECHATROLINK-II option board	Frequency inverter	3G3MX2-A□
	ML2 option board	3G3AX-MX2-MRT

Note: Refer to servo systems and frequency inverter sections for detailed specs and ordering information

SmartSlice IOs system

Function	Specification	Model
SmartSlice Interface unit	SmartSlice MECHATROLINK-II interface unit	GRT1-ML2 ¹
End plate, one unit required per bus interface		GRT1-END
4 NPN inputs	24 VDC, 6 mA, 3-wire connection	GRT1-ID4
4 PNP inputs	24 VDC, 6 mA, 3-wire connection	GRT1-ID4-1
8 NPN inputs	24 VDC, 4 mA, 1-wire connection + 4xG	GRT1-ID8
8 PNP inputs	24 VDC, 4 mA, 1-wire connection + 4xV	GRT1-ID8-1
4 AC inputs	110 VAC, 2-wire connection	GRT1-IA4-1
4 AC inputs	230 VAC, 2-wire connection	GRT1-IA4-2
4 NPN outputs	24 VDC, 500 mA, 2-wire connection	GRT1-OD4
4 PNP outputs	24 VDC, 500 mA, 2-wire connection	GRT1-OD4-1
4 PNP outputs with short-circuit protection	24 VDC, 500 mA, 3-wire connection	GRT1-OD4G-1
4 PNP outputs with short-circuit protection	24 VDC, 2 A, 2-wire connection	GRT1-OD4G-3
8 NPN outputs	24 VDC, 500 mA, 1-wire connection + 4xV	GRT1-OD8
8 PNP outputs	24 VDC, 500 mA, 1-wire connection + 4xG	GRT1-OD8-1
8 PNP outputs with short-circuit protection	24 VDC, 500 mA, 1-wire connection + 4xG	GRT1-OD8G-1
2 relay outputs	240 VAC, 2 A, 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
2 Pt100 inputs	Pt100, 2-wire or 3-wire connection	GRT1-TS2P
2 Pt1000 inputs	Pt1000, 2-wire or 3-wire connection	GRT1-TS2K
2 Thermocouple inputs	Types B, E, J, K, N, R, S, T, U, W, PL2, with cold junction compensation	GRT1-TS2T

*1. The GRT1-ML2 supports the GRT1-IA4-1, GRT1-IA4-2, GRT1-OD4G-3, GRT1-TS2P, GRT1-TS2K and GRT1-TS2T slice units only in combination with TJ2-MC64 motion controller. They are not supported in combination with TJ1-MC16/04.

Refer to Automation systems catalogue for detailed specs and accessories information

MECHATROLINK-II cables

Name	Remarks	Model
MECHATROLINK-II cables	0.5 meter	FNY-W6003-A5
	1 meter	FNY-W6003-01
	3 meters	FNY-W6003-03
	5 meters	FNY-W6003-05
	10 meters	FNY-W6003-10
	20 meters	FNY-W6003-20
	30 meters	FNY-W6003-30
MECHATROLINK-II terminator	Terminating resistor	FNY-W6022
MECHATROLINK-II repeater	Network repeater	FNY-REP2000

Computer software

Specifications	Model
CX-Motion Pro V1.3.3 or higher	CX-One
Trajexia Studio ¹ V1.3.3 or higher	TJ1-Studio

*1. When the Trajexia Studio software is included in CX-One, then it is called CX-Motion Pro.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Terms and Conditions of Sale

1. **Offer; Acceptance.** These terms and conditions (these "**Terms**") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "**Products**") by Omron Electronics LLC and its subsidiary companies ("**Omron**"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
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 - d. Delivery and shipping dates are estimates only; and
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17. **Export Controls.** Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (ii) sale of products to "forbidden" or other proscribed persons; and (iii) disclosure to non-citizens of regulated technology or information.
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