Important Notes on exporting this product or equipment containing this product; If the end-user or application of this product is related to military affairs or weapons, its export may be controlled by ‘Foreign Exchange and Foreign Trade Control Law’ of Japan where export license will be required before product can be exported from Japan.

This product is designed and manufactured for use in General Purpose Industrial Equipment and it is not intended to be used in equipment or system that may cause personal injury or death.

All servicing such as installation, wiring, operation, maintenance and etc., should be performed by qualified personnel only.

Tighten mounting screws with an adequate torque by taking into consideration strength of the screws and the characteristics of material to which the product will be mounted. Over tightening can damage the screw and/or material; under tightening can result in loosening.

*Example: apply 2.7 N·m – 3.3 N·m torque when tightening steel screw (M5) to steel surface.

Install safety equipment to prevent serious accidents or loss that is expected in case of failure of this product.

Consult us before using this product under such special conditions and environments as nuclear energy control, aerospace, transportation, medical equipment, various safety equipments or equipments which require a lesser air contamination.

We have been making the best effort to ensure the highest quality of our products, however, some applications with exceptionally large external noise disturbance and static electricity, or failure in input power, wiring and components may result in unexpected action. It is highly recommended that you make a fail-safe design and secure the safety in the operative range.

If the motor shaft is not electrically grounded, it may cause an electrolytic corrosion to the bearing, depending on the condition of the machine and its mounting environment, and may result in the bearing noise. Checking and verification by customer is required.

Failure of this product depending on its content may generate smoke of about one cigarette. Take this into consideration when the application of the machine is clean room related.

Please be careful when using the product in an environment with high concentrations of sulfur or sulfuric gases, as sulfuration can lead to disconnection from the chip resistor or a poor contact connection.

Do not input a supply voltage which significantly exceeds the rated range to the power supply of this product. Failure to heed this caution may lead to damage of the internal parts, causing smoke and/or fire and other troubles.

The user is responsible for matching between machine and components in terms of configuration, dimensions, life expectancy, characteristics, when installing the machine or changing specification of the machine. The user is also responsible for complying with applicable laws and regulations.

Manufacturer’s warranty will be invalid if the product has been used outside its stated specifications.

Component parts are subject to minor change to improve performance.

Read and observe the instruction manual to ensure correct use of the product.

Repair
Consult to the dealer from whom you have purchased this product for details of repair work. When the product is incorporated to the machine you have purchased, consult to the machine manufacturer or its dealer.

URL
Technical information of this product (Operating Instructions, CAD data, Inquiries) can be downloaded from the following web site. < industrial.panasonic.com/ac/e/ >
Line-up
Servo motor that brings out potential of the machine.

**“Realtime Express” model**

**A6N series**
- Com. period min. 0.0625 ms
- Standard Ethernet cable "1" using

**EtherCAT communication type**

**A6B series**
- CiA 402 protocol is available
- Standard Ethernet cable "1" using

**Linear and DD motor control type**

**A6L series**
- Position, Speed, Thrust control and Block operation
- Drastically reduced setup time by automatic setup

**Ultra compact DC Servo**

**A5M series**
- Line-up: DC24 V/48 V and up to 30 W rotary motor and linear
- Control Line-up: Pulse train, RTEX and EtherCAT

---

*1 Shielded twisted pair cable (CAT5e or higher)
# Ultra High-Speed Network Servo
## MINAS A6N series

### Realtime Express (RTEX)

#### Ultimate Real-time performance
- Com. period min. 0.0625 ms
- Com. speed 100 Mbps Full-duplex
- Velocity response 3200 Hz

#### Functionality to meet various needs
- Precise position latch & comparing
- Infinitely rotatable absolute encoder
- IEC safety I/F model available *1

#### Simple network
- High-performance & Low-cost
- Isochronous established by ASIC
- Easy device development

### [Typical system configuration]

- **Controller**
  - Low-cost Ethernet cable (CAT5e STP)
  - High-efficiency ring topology
  - Devices except servo provided by partners *
  - Inter-node cable length of max. 100 m

- **RTEX**
  - Noise immunity 2.5 kV over with unique error correction (IEC61000-4-4 compliant)

- **Motor**
  - 200 to 240 VAC

### Drive list

<table>
<thead>
<tr>
<th>Motor rated output</th>
<th>Drive power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 W</td>
<td>100 W</td>
</tr>
<tr>
<td>Frame size</td>
<td>Model No.</td>
</tr>
<tr>
<td>A</td>
<td>MADLN 01NE</td>
</tr>
<tr>
<td>A</td>
<td>MADLN 01NE</td>
</tr>
<tr>
<td>B</td>
<td>MADLN 11NE</td>
</tr>
<tr>
<td>B</td>
<td>MADLN 11NE</td>
</tr>
<tr>
<td>C</td>
<td>MADLN 21NE</td>
</tr>
<tr>
<td>C</td>
<td>MADLN 21NE</td>
</tr>
<tr>
<td>E</td>
<td>MADLN 31NE</td>
</tr>
<tr>
<td>E</td>
<td>MADLN 31NE</td>
</tr>
</tbody>
</table>

### Model nomenclature

- **MADLN 15NE**
  - Servo drive
  - A6 family
  - Functionality *
  - Frame size
  - Interface
  - Power input
  - Specifying max. current

#### Compliance

- RoHS
- CE
- UL Listed
- TUV Type 3
- TUV Type 4
- ISO 9001
- ISO 14001

*1: Multi-functional type F. IEC61800-5-2 STO, IEC61508 SIL3.
*2: The communication period and connection of slave devices depend on the controller specification.
*3: For communication period 0.0625 ms, command update period is 0.125 ms only. *4: Slave nodes.

---

* Realtime Express and RTEX are registered trademarks of Panasonic Corporation.
* Realtime Express is a high speed isochronous motion network developed by Panasonic Corporation.
Ultra High-Speed Network Servo
MINAS A6N series

Drive appearance

A6N size A

* This photo shows multi-functional type F. Standard type E does not have X3 and X5 connectors.

Dimensions (mm): W40, H150, D130

Ultra compact A5MN size M
(24 VDC 10 W to 30 W)

* This product is not A6N, but A5N series for specific customers. For more details, refer to the specifications.

* This photo shows the type for linear motor. The type for rotaty motor does not have CN2 and CN3 connectors.

Dimensions (mm): W45, H140, D43
**RTEX Master Board**

**PCIe-Rxx04-RTEX, PCI-R1604**

### Features
- RTEX network Master Board
- Network speed 100 Mbps, Communication Period 0.5 ms
- Support RTEX Standard Servo Profile, Standard I/O Profile
- PCIe-Rxx04-RTEX Basic configuration is 8 axes control (Can be expanded to 16, 24 and 32axes)
- PCI-R1604 Basic configuration is 16 axes control (Can be expanded to 20, 24, 28 and 32axes)
- Easy to wire, saving wiring working-hour
- Max. 32 nodes
- Network connection - 100 BASE-TX, STP Cable (above CAT5e)
- Excellent Error correction
- Multi-axes linear / circular interpolation
- Limit setting functions - soft stop, emergency stop, and two positions

### Specification

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. number of nodes</td>
<td>32</td>
</tr>
<tr>
<td>Max. ring length</td>
<td>200 m</td>
</tr>
<tr>
<td>Max. number of nodes</td>
<td>60</td>
</tr>
<tr>
<td>Connector / cable type</td>
<td>RJ45/RJ45, STP (shielding type)</td>
</tr>
<tr>
<td>Power supply / current consumption</td>
<td>5 Vdc / 1.0A (PCI-R1604)</td>
</tr>
<tr>
<td>Position range</td>
<td>32-bit (x147483648)</td>
</tr>
<tr>
<td>Interpolation</td>
<td>Max. 32 synchronized drive, 2 to 4 axes linear interpolation, and 2 axes arc interpolation</td>
</tr>
<tr>
<td>Gantry motion</td>
<td>Max. 32 slave axes can follow the master axis to move synchronously</td>
</tr>
</tbody>
</table>

### Application Sample
- Semiconductor front/back end process field
- Solar Energy/FPD/PCB field
- Processing machine field

Please contact the following address for details

URL: [http://www.ajinextek.com/ENG/menu02/page01.php](http://www.ajinextek.com/ENG/menu02/page01.php)

### System Configuration

**RTEX Based Motion Network**

- **Master Board**: PCIe-Rxx04-RTEX, PCI-R1604
- **Motion Module**: N3RTEX-PM2Q/4Q
- **DIO Module**: N3RTEX-DI32, N3RTEX-DO32T, N3RTEX-DB32T
- **AIO Module**: N3RTEX-AI16, N3RTEX-AO8
- **Counter Module**: N3RTEX-CNT2

### Motion Function Module - N3RTEX-PM2Q/4Q, N3RTEX-CNT2

- **Model**: N3RTEX-PM2Q/N3RTEX-PM4Q
- **Node ID setting**: Decimal number rotary switch x 2 (0-31)
- **Power supply**: DC 24 V / 200 mA
- **LED display**: Power/Yellow, Link/Green, Error/Red, Communication/Green
- **Pulse output**: Interface / Differential, Speed / Max. 10 MPS
- **Encoder input interface**: RJ45 connector / cable type
- **Trigger input**: Differential, Open-collector (24 VDC Level), Open-collector (24 VDC Level)
- **Connector**:
  - Comm.: RJ45 LAN x 2EA
  - 26pin axis connector x 2EA
  - 26pin Motion I/O connector x 1EA
  - Comm.: RJ45 LAN x 2EA
  - 26pin Motion I/O connector x 2EA

### Digital Input / Output Function Module - N3RTEX-DI32, N3RTEX-DO32T, N3RTEX-DB32T

- **Model**: N3RTEX-DI32/N3RTEX-DO32T
- **Node ID setting**: Decimal number rotary switch x 2 (0-31)
- **Power supply**: DC 24 V / 300 mA
- **LED display**: IN1~ IN32 (Green), OUT1~ OUT32 (Red), IN1~ IN32 (Red), OUT1~ OUT32 (Red)
- **Connector**:
  - Comm.: RJ45 LAN x 2EA
  - DINKLE 16 x 2EA (ESC381VM-16P)
  - Comm.: RJ45 LAN x 2EA
  - DINKLE 16 x 2EA (ESC381VM-16P)

### Analog Input / Output Function Module - N3RTEX-AI16, N3RTEX-AO8

- **Model**: N3RTEX-AI16/N3RTEX-AO8
- **Node ID setting**: Decimal number rotary switch x 2 (0-31)
- **Power supply**: DC 24 V / 150 mA
- **LED display**: Power(Yellow), Link(Green), Error(Red), Communication(Green)
- **Connector**:
  - Comm.: RJ45 LAN x 2EA
  - DINKLE 16 x 2EA (ESC381VM-16P)
  - Comm.: RJ45 LAN x 2EA
  - DINKLE 16 x 2EA (ESC381VM-16P)

### General Specification

- **Dimension (HxDxW)**: 112 mm x 90 mm x 44 mm (N3RTEX-PM4Q, DI32, DO32T, DB32T, AI16)
- **Operation temperature**: 0 ~ 55 °C

### Sales area and Language

- Korean
- Chinese
- English

Please contact the following address for details

**For more information**

URL: [http://www.ajinextek.com/ENG/](http://www.ajinextek.com/ENG/)

**Contact**: AJINEXTEK CO., LTD.

9-3, Horim-dong, Dalseo-gu, Daegu-city, Korea

[E-mail: marketing@ajinextek.com](mailto:marketing@ajinextek.com)

TEL: +82-53-593-3700   FAX: +82-53-593-3703
PLC Direct Access RTEX Motion Controller

**PI-2300**

**Features**

**Building a leading edge high speed motion network at low cost under PLC**

- **Direct PLC access**
  - The controller runs the motion program installed in PI while accessing PLC data register.
  - Preparation of ladder program for communication is not required on PLC.
  - No CPU burden on PLC.

- **Simple motion control through data register**
  - Motor can be controlled by operating PLC data register.
  - Multiaxial motor can be controlled/monitored by simply operating numeric values on the data register.
  - PLC operator having no knowledge on communication of motion (RTEX) can control the motor.

- **Stepping motor can be mixed**
  - The motion network can contain servo motor and stepping motor.
  - Ultra high-speed fully-synchronized motion system can be built.

**Specification**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 VDC ± 10% 300 mA MAX</td>
</tr>
<tr>
<td>Operating temperature and humidity</td>
<td>0°C to 50°C, 90%RH max. (no dewing)</td>
</tr>
<tr>
<td>Outline dimensions (mm)</td>
<td>W24.5 x D105 x H160</td>
</tr>
<tr>
<td>Communication with PLC</td>
<td>Ethernet 10/100 BASE-T, Conforms to MC protocol</td>
</tr>
<tr>
<td>Setting tool</td>
<td>PI Assistance (complimentary)</td>
</tr>
<tr>
<td>Control signal I/O</td>
<td>Initialization input, system alarm output and node alarm output</td>
</tr>
<tr>
<td>Motion network</td>
<td>RTEX command updating period: 1 ms</td>
</tr>
<tr>
<td>No. of connection nodes</td>
<td>Max. 16</td>
</tr>
<tr>
<td>Motion control</td>
<td>Positioning and synchronized operation</td>
</tr>
</tbody>
</table>

**2-phase Microstep Drive**

D4610 (1 Axis type) / D4620 (2 Axis type)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable motor</td>
<td>2.55 A/phase or less 2-phase HB type stepping motor</td>
</tr>
<tr>
<td>Micro step resolution</td>
<td>Basic step divided by 200 (for 40000 p/r basic step 1.8 deg motor)</td>
</tr>
<tr>
<td>Communication specification</td>
<td>Realtime Express (RTEX)</td>
</tr>
<tr>
<td>Input signal</td>
<td>Sensor input 4 (HOME, EX, CWLS, CCWLS), encoder input (only D4610) and stop input</td>
</tr>
<tr>
<td>Output signal</td>
<td>Brake output and alarm output Alarm output</td>
</tr>
<tr>
<td>Protective function</td>
<td>Over current, power supply voltage monitoring and step-out detection (only D4610)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0°C to 50°C (no freezing), Storage: -20°C to 60°C (no freezing)</td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>90%RH max. (no dewing), Storage: 90%RH max. (no dewing)</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>Indoor (no direct sunshine). No corrosive gas, flammable gas, oil mist, dust, etc.</td>
</tr>
<tr>
<td>Altitude</td>
<td>Max. 1000 m above sea level</td>
</tr>
<tr>
<td>Operating vibration</td>
<td>Max. 2 G (10 Hz to 250 Hz, in X, Y, Z direction 1 hour), max. 10 G (10s)</td>
</tr>
<tr>
<td>Outline dimensions (mm)</td>
<td>160 x 95 x 29</td>
</tr>
<tr>
<td>Mass</td>
<td>275 g</td>
</tr>
</tbody>
</table>

**Application Sample**

This controller is suitable for semiconductor manufacturing equipment, machine tools, measuring machines, and other machinery.

**System Configuration**

1. Accessing PLC data register from PI-2300 over Ethernet
2. Based on the contents of data register, the PI sends command to each axis (motor operation).
3. The PI writes status information of each axis to data register.

**Sales area and Language**

- Japanese
- English

Only Japanese is used for inquiry over the phone. When making an inquiry in English, please send it to the following address.

**For more information**

URL: [http://www.asahi-engineering.co.jp/english](http://www.asahi-engineering.co.jp/english)

**Contact:**

Asahi Engineering Co., Ltd.  Kodaira Works
3-3-22, Gakuen-Higashicho, Kodaira-shi, Tokyo 187-0043, Japan
[ E-mail: ae-sales@asahi-engineering.co.jp ]
TEL: +81-42-342-4422  FAX: +81-42-342-4423

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**Features**

**Leading Edge High Speed Motion Network (RTEX) At Low Cost**

- **High performance CPU enhances drive capability**
  - Step-out detection
  - Triangle drive prevention
  - Motor over current protection
  - Vibration suppression
  - Brake control (only D4610)
  - Closed loop control by encoder signal (only D4610)

- **RTEX in motion network**
- Network can connect up to 32 axes (depending on master specification)
- Simultaneous multiaxial control within 0.16 ms, 0.5 msec, 1 msec communication period
RTEX Network Motion Control board
MCN-8032P

Features
- RTEX (Real Time Express) servo network
- Network Speed 100 Mbps, communication period 1 ms
- Easy to wire, saving wiring working-hour
- Up to 32 nodes
- Excellent error correction
- Multi-axis linear / circular interpolation
- Multi-axis synchronous motion (for gantry)
- Up to 16 boards in one PC

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTEX motion control</td>
<td>servomotor, Linear motor, stepper motor, I/O module, Pulse module</td>
</tr>
<tr>
<td>Max. number of nodes</td>
<td>32 (MCN-8032P)</td>
</tr>
<tr>
<td>Max. ring loop length</td>
<td>200 m</td>
</tr>
<tr>
<td>Max. node to node length</td>
<td>60 m</td>
</tr>
<tr>
<td>Connector / cable type</td>
<td>RJ45 8 pins, STP (Shielding type)</td>
</tr>
<tr>
<td>Isolation voltage</td>
<td>1500 Vrms</td>
</tr>
<tr>
<td>Noise immunity</td>
<td>Over 2.5 kV</td>
</tr>
<tr>
<td>LED loop status</td>
<td>Link / Comm (two elements LED)</td>
</tr>
<tr>
<td>Position range</td>
<td>32-bit (±2147483648)</td>
</tr>
</tbody>
</table>

Motion
- Interpolation: 32-axes linear interpolation / 2-axes circular interpolation (max. 16 pairs 2-axes circular interpolation)
- Gantry motion: Max. 31 slave axes can follow the master axis to move synchronously
- Position compare signal: All servo axis, up to 1 kHz

Software
- Software utility: MCN80XXP series utility for motion test and diagnosis
- Driver / LIB: Driver for Windows 7 (64 / 32 bits), Windows XP (32 bits), DLL function for windows applications

General specification
- Certification: CE (applying)
- Dimension(L+W+H): 175 mm × 107 mm × 20 mm
- Power consumption: 5 V / 3.3 V @ 1 A (Max.)
- Operation temperature: 0 °C to 60 °C

Application Sample
- Linear and Circular Interpolations
- Gantry Motion
- Position Comparing & Triggering Function

System Configuration
- RTEX System
- Max 32 Nodes
- PC-Based Software
- MINAS A4N/ASBN Servo Motor
- MINAS A12BN Linear Motor
- Stepping Motor
- DD Motor
- Output Module
- Input Module

Sales area and Language
- English
- Chinese

For more information

Contact:
Aurotek Corporation
1st Floor No. 60, Jhoun-Zhi St. Nei-Hu District, Taipei 114, Taiwan
[Email: sales@robot.com.tw]
Tel: +886-2-6600-7574 Fax: +886-2-8752-3347
PCI-Express RTEX Motion Controller
PXRP-3216CN

Features
- 32 axes for RTEX, 4 axes for Pulse Control, total up to 36 axes.
- A device that cannot be connected to network, such as Stepping motor or Hollow motor, can be controlled by pulse train or I/O Control.
- The input signal of I/O connector can use either Sink or Source.
- Torque Control or Position Control can be changed freely in Servo Amplifier. Various parameters can be set from Controller directly.
- It is expert in start with Liner or Circular, then Special interpolation control, such as, Ellipse, Cubic Interpolation or Cam action etc.

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>RTEX Control</th>
<th>Pulse Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Axis</td>
<td>32 axes</td>
<td>4 axes</td>
</tr>
<tr>
<td>Pulse Frequency</td>
<td>1 pps to 400 Mpps</td>
<td>8.191 Mpps</td>
</tr>
<tr>
<td>Accelerating/Decelerating function</td>
<td>Liner6-Curve Acceleration/Deceleration (Asymmetric is OK), Stop Speed</td>
<td>Liner6-Curve Acceleration/Deceleration (Asymmetric is OK)</td>
</tr>
<tr>
<td>Drive function</td>
<td>Liner, Circular, Helical, 3 dimension</td>
<td></td>
</tr>
<tr>
<td>Synchronous function</td>
<td>Synchronous start, Axle linkage, Gantry Axis</td>
<td>Synchronous start</td>
</tr>
<tr>
<td>Override function</td>
<td>Acceleration time, Deceleration time, Object speed, Movement distance</td>
<td>Object speed, Movement distance</td>
</tr>
<tr>
<td>Command method</td>
<td>Realtime Express®</td>
<td></td>
</tr>
<tr>
<td>Communication/Update period</td>
<td>0.5 msec</td>
<td></td>
</tr>
<tr>
<td>Bus</td>
<td>PCI-Express Rev1.1</td>
<td></td>
</tr>
<tr>
<td>OS</td>
<td>Windows (32bit/64 bit)</td>
<td>Windows (32bit/64 bit)</td>
</tr>
<tr>
<td>Development environment</td>
<td>After Visual studio 2010</td>
<td></td>
</tr>
</tbody>
</table>

System Configuration

Software of PC
- Windows, Linux etc.
- DLL, API function

Motion Engine
- Motion Arithmetic
- General I/O signal processing
- Other command processing of PC

FPGA
- PCI-Express Control
- Extension of Pulse Control function

RTEX Control
- Position Control
- Servo Parameter
- General I/O signal
- AD/DA Exchange...etc.

Pulse Train Control
- Pulse Output
- Encoder/Z phase
- General I/O
- Various Limits/ Home Sensor

LAN Connector
- RTEX Communication Data

I/O Connector
- Input/Output

Main functions

Free acceleration and deceleration setting
Starting speed and stopping speed set separately, during working, acceleration time, deceleration time, object speed, movement overrides is possible. Between 1 PPS and 400 MPPS, acceleration and deceleration setting can be set freely in 1msec as a unit.

Hard limit deceleration stop function
The Deceleration while hard limit is collided can be overridden.

Interpolation Control function
Interpolation data up to 5000 steps can be recorded. During working, changing Interpolation data, changing/revising object position, pausing interpolation actions is possible at any time. In addition, from pausing to restarting, exchanging interpolation axis etc. is possible.

Axle linkage function
Axle linkage function is on one axis we can addition and subtraction command position (output pulse) or actual position (input pulse) of another axis.

Gantry Axis Control
Gantry Axis Control is carried as a base function. Using axle linkage function, connect axis Y2 to axis Y1, then send command to axis Y1 only. Axis Y2 is also operating.

Soft landing function
When to stop the bonding equipment etc., according to the overshoot, shock will happen. Parts may be damaged. Soft landing function can control the overshoot, protects machine, material, or worker.

Sales area and Language
- Japanese
- Chinese

Please contact the following address for details.

URL: http://www.cosmotechs.co.jp/ http://www.shhuitong.net/ (chinese)

Contact: COSMOTECHS CO., LTD.
2-6-1 Matsue Atsugi Kanagawa 245-0005 Japan
TEL: +81-49-222-7351 FAX: +81-46-222-7355

Please contact the following address for details.

URL: http://www.cosmotechs.co.jp/ http://www.shhuitong.net/ (chinese)
Stand-Alone Series RTEX Motor Controller
CSRC-32CN

Features
- A Stand-Alone motor control which can control up to 32 axes.
- ECAM, Liner Interpolation, Circular Interpolation, Ellipse Interpolation, Synchronous Control is possible.
- Max. Velocity can reach to 400 Mpps, velocity can be changed in 1 ms, and accurate control is possible.
- Positioning data and feedback can be controlled by 32-bit counter. The resolution of Servo can be used flexibly.
- Modbus Touch Panel can be controlled, Stand-Alone Control is also possible.

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Number of Axes</td>
<td>CP Control : 32 axes + Dummy-Axis : 1 axis</td>
</tr>
<tr>
<td>Position Control</td>
<td>-2147483648 to 2147483647</td>
</tr>
<tr>
<td>Interpolation Control</td>
<td>Liner, Circular, Ellipse, Continuous Interpolation, EAM</td>
</tr>
<tr>
<td>Accelerating / Decelerating Control</td>
<td>1 ms to 65535 ms</td>
</tr>
<tr>
<td>Pulse Frequency</td>
<td>1 pps to 400 Mpps</td>
</tr>
<tr>
<td>Command Updating Period</td>
<td>0.5 ms</td>
</tr>
<tr>
<td>Others</td>
<td>It can be used with Modbus. We provide a multiple support tool.</td>
</tr>
</tbody>
</table>

PLC RTEX Motor Controller Module
CPLM-3216N-YE

Features
- Connect to Yokogawa PLC FA-M3.
- CP Control up to 16 axes, also PP Control up to 16 nodes.
- Special Interpolation mix with Liner, Circular, Ellipse Interpolation is possible.
- Max. Velocity can reach to 200 Mpps, velocity can be changed in 1 ms.
- Positioning data and feedback can be controlled by 32-bit counter. The resolution of Servo can be used flexibly.

Sales area and Language

Japanese

Chinese

For more information
URL: http://www.cosmotechs.co.jp/
http://www.shihuitong.net/ (chinese)

Contact: COSMOTECHS CO., LTD.
2-6-1 Matsue Atsugi Kanagawa 245-0005 Japan
TEL: +81-49-222-7351   FAX: +81-46-222-7355

Stand-Alone Series RTEX Motor Controller
CSRC-32CN

Features
- A Stand-Alone motor control which can control up to 32 axes.
- ECAM, Liner Interpolation, Circular Interpolation, Ellipse Interpolation, Synchronous Control is possible.
- Max. Velocity can reach to 400 Mpps, velocity can be changed in 1 ms, and accurate control is possible.
- Positioning data and feedback can be controlled by 32-bit counter. The resolution of Servo can be used flexibly.
- Modbus Touch Panel can be controlled, Stand-Alone Control is also possible.

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Number of Axes</td>
<td>CP Control : 32 axes + Dummy-Axis : 1 axis</td>
</tr>
<tr>
<td>Position Control</td>
<td>-2147483648 to 2147483647</td>
</tr>
<tr>
<td>Interpolation Control</td>
<td>Liner, Circular, Ellipse, Continuous Interpolation, EAM</td>
</tr>
<tr>
<td>Accelerating / Decelerating Control</td>
<td>1 ms to 65535 ms</td>
</tr>
<tr>
<td>Pulse Frequency</td>
<td>1 pps to 400 Mpps</td>
</tr>
<tr>
<td>Command Updating Period</td>
<td>0.5 ms</td>
</tr>
<tr>
<td>Others</td>
<td>It can be used with Modbus. We provide a multiple support tool.</td>
</tr>
</tbody>
</table>

PCPG-168N-V / PCMC-168N

Features
- Control up to 16 axes in 0.5 ms period, accurate and fast control is possible.
- 4 axes pulse train output is possible. Also it can be performed by mixing with Network Control.
- Provide standard device driver, DLL, API

PCPG-168N-V
- CP Control : besides 16 axes, it can be performed up to 16 axes by PP control or connected to 16 I/O board.
- Max. 32 block can be controlled in 0.5 ms period.
- Provide standard device driver, DLL. We provide sample API to reduce the pressure of user application.

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series</td>
<td>Description</td>
</tr>
<tr>
<td></td>
<td>PCPG-168N-V</td>
</tr>
<tr>
<td></td>
<td>PCMC-168N</td>
</tr>
<tr>
<td>Max. Number of Axes</td>
<td>16 axes (CP Control)</td>
</tr>
<tr>
<td></td>
<td>CP Control : 16 axes + 16 blocks (I/O or PP Control)</td>
</tr>
<tr>
<td>Interpolation Control</td>
<td>Liner Interpolation, Circular Interpolation, Continuous Interpolation</td>
</tr>
<tr>
<td></td>
<td>Liner Interpolation, Circular Interpolation, Continuous Interpolation</td>
</tr>
<tr>
<td>Max. Pulse Frequency</td>
<td>8 Mpps</td>
</tr>
<tr>
<td></td>
<td>8 Mpps</td>
</tr>
<tr>
<td>Command Updating Period</td>
<td>0.5 ms</td>
</tr>
<tr>
<td></td>
<td>0.5 ms</td>
</tr>
</tbody>
</table>

Line-up
- **RTEX Stepping Driver**
  - CTD-0514NS
  - 5-phase stepping driver
  - CP Control method

RTEX Input/Output Module
CTI-16NSW
- 16-point input
- WAGO733 connector
- 2 mA to 5 mA

CTI-32NS
- 32-point input
- WAGO733 connector
- 2 mA to 5 mA

RTEX Analog Input/Output Module
CTAD-08NSB
- AD converter : 8CH
- Analog ⇔ Digital exchange

RTEX Pulse Train Output Module
CTPG-48HNS
- Used for PP Control up to 4 axes
- RTEX ⇔ Pulse Train exchange

Contact:
COSMOTECHS CO., LTD.
2-6-1 Matsue Atsugi Kanagawa 245-0005 Japan
TEL: +81-49-222-7351   FAX: +81-46-222-7355
Turbo PMAC2 Realtime Express Controller

Turbo-PMAC2-RTEX series

Features

High specification motion controller with built-in PLC

- Stand alone specification with built-in high-speed DSP (max. 240 MHz)
  Provided with USB 2.0, Ethernet or RS232C as standard port to communicate with host PC.
  Memory sharing with DPRAM option is possible.
- Advanced trajectory calculations such as inverse kinematics and look ahead
  Advanced trajectory calculations necessary for linear interpolation, arc interpolation and spline interpolation, and robot control, and CP control by micro line segment feed are provided as standard features. All Turbo PMAC functions such as 2D and 3D positional compensation are available.
- Various field networks promote multivendor environment (option)
  By adding CC-Link/DeviceNet/Profibus communication module, different manufacturers’ devices can be connected.
- I/O, pulse I/O, A/D and D/A function without intervention of network
  To standard accessories such as universal I/O, pulse input and pulse output, optional A/D and D/A can be added. Using the remote I/O unit ACC-34AA, expansion of 32 inputs, 32 outputs and universal I/O are possible.
  Because these can directly access the memory without intervention of a network, they can be easily handled.

Specification

<table>
<thead>
<tr>
<th>Hardware specification</th>
<th>Software specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Description</td>
</tr>
<tr>
<td>Processor</td>
<td>DSP56360 series (Freescale) Standard 80 MHz (option 240 MHz)</td>
</tr>
<tr>
<td>Memory</td>
<td>Built in 128 K x 24-bit SDRAM (option 512 K x 24-bit)</td>
</tr>
<tr>
<td>Backup</td>
<td>Settings and program can be stored to Flash RAM</td>
</tr>
<tr>
<td>Communication interface</td>
<td>USB 2.0/Ethernet 100 BASE TX (concurrent use is not possible), RS232C</td>
</tr>
<tr>
<td>Communication Period</td>
<td>Up to 6 kHz (only for Position command)</td>
</tr>
<tr>
<td>Power supply</td>
<td>24 Vcc 900 mA Min.</td>
</tr>
<tr>
<td>Pulse input</td>
<td>A/B phase rectangular input × 1-ch (6 MHz before multiplied by 4)</td>
</tr>
<tr>
<td>Pulse output</td>
<td>Pulse/direction output × 1-ch (max. 1.31 MHz)</td>
</tr>
<tr>
<td>Universal I/O</td>
<td>Input 8 points, output 4 points (sink/source selectable) Remote I/O expandable (ACC-34AA)</td>
</tr>
<tr>
<td>Universal A/D</td>
<td>12 bit × 2-ch (option)</td>
</tr>
<tr>
<td>Universal D/A</td>
<td>±10 V 12-bit × 1-ch (option)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

System Configuration

- Turbo-PMAC2-RTEX
- Ethernet or RS232C
- Touch Panel
- Remote I/O
- Pulse/Dir output
- Direct DA, AD, DIO input/output
- PLC
- CC-Link/DeviceNet/Profibus/CanOpen
- MINAS A5 (1~32-axis)

Application Sample

From the Simplest Application, to the Most Complex and EVERYTHING in Between...

For details, please check out our Video Center for more information.
URL: http://www.deltatau.com/DT_Resources/VideoCenter.aspx

Sales area and Language

- English
- Chinese
- Korean
- Japanese

Please contact the following URL for details:
URL: http://www.deltatau.com/DT_About/aboutCorporateOffices.aspx

For more information
URL: http://www.deltatau.com

Contact: Delta Tau Data Systems, Inc. USA West Coast Headquarters [E-mail: sales@deltatau.com]
21314 Lassen Street Chatsworth, CA 91311, United States
Features

- Compact PLC is easier to operate to control network servo MINAS A6N. (Units of Ver.1.4 or later supports A6N.)
- High speed 100 Mbps communications enable high precision arc/linear/spiral interpolation.
- 2-axis, 4-axis and 8-axis units are lined up and can be used to configure system of up to 16 axes with FPΣ and 256 axes with FP2SH.
- User-friendly tool software [Configurator PM] provides strong support for setup, start and monitor.
- Max. No. of position command points is 600/axis and max. position command rate is 32 Mpps, assuring margin of performance.
- Manual pulser input is provided to enable fine teaching.

Specification

<table>
<thead>
<tr>
<th>Part No. (FPΣ/FP2SH)</th>
<th>AFPG43610/AFPG423610</th>
<th>AFPG43620/AFPG423620</th>
<th>AFPG43630/AFPG423630</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of control axes</td>
<td>2-axis (2 axes x 1 system)</td>
<td>4-axis (4 axes x 1 system)</td>
<td>8-axis (8 axes x 1 system)</td>
</tr>
<tr>
<td>Control method</td>
<td>PTP control, trajectory (CP) control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpolation control</td>
<td>2-axis, 3-axis linear interpolation, 2-axis arc interpolation, 3-axis spiral interpolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control unit</td>
<td>pulser/μm/&quot;/degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning data</td>
<td>600 points/axis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerating/</td>
<td>Linear acceleration/deceleration and S-curve acceleration/deceleration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decelerating method</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accelerating/</td>
<td>0 to 10000 ms (in unit of 1 ms)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decelerating time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning range</td>
<td>Signed 32-bit (−1073741823 to 1073741823 pulses) increment, absolute designation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velocity control</td>
<td>With JOG operation (infinite feed operation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque control function</td>
<td>With real time torque limit function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Origin return</td>
<td>Near home (DOG) search, limit search, Z phase search, hit and stop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creep velocity</td>
<td>Setting is optional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Pulser input operation/ auxiliary output code, auxiliary output contact/dwell time/in position contact/2-axis synchronization operation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Application Sample

- Coil winding machine (Synchronized operation)
- Lens Polish machine
- Inspection machine for electronic device
- Heavy LCD panel handling (synchronized operation)
- Others

System Configuration

Sales area and Language

- Japanese
- English

For more Information

FPΣ URL: http://www3.panasonic.biz/ac/e/fasys/plc/plc/fpg/index.jsp
FP2SH URL: http://www3.panasonic.biz/ac/e/fasys/plc/plc/fp2sh/index.jsp
URL: http://panasonic.net/id/pidsx/global

Contact: Panasonic Industrial Devices SUNX Co.,Ltd.
2431-1, Ushiyama-cho, Kasugai-shi, Aichi, 486-0901, Japan
TEL: +81-568-33-7861 FAX: +81-568-33-8591
Multi PLC Direct Connection 16-axis Motion Controller

“InterMotion” Series JOY-AMXR-P8 Including PLC (Using a C-like Language)

Features
- Directly connectable to Mitsubishi PLC (CPU with Ethernet: e.g. Q03UDECPU).
- Reference to the CPU D register in accordance with MC Protocol.
- Directly connectable to Keyence PLC KV-5000.
- Reference to the CPU D register in accordance with MC Protocol.
- Directly connectable to OMRON PLC (CPU with Ethernet: e.g. CJ1M-CPU11-ETN).
- Reference to CPU the Data Memory In accordance with FINS commands.
- Control with the .NET Framework interface on a Windows PC with Ethernet is possible.
- Position command generation and DIN/DOUT scan controls with the cycle time of 1ms.

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of control axes</td>
<td>16: Max. 16-axis RTEX interface. For max. 8 axes out of the 16 axes, 10Mpps pulse train position command is possible.</td>
</tr>
<tr>
<td>Controlling method</td>
<td>Independent PTP control for each axis. Max. 8-axis synchronized PTP control. Linear interpolation, 2-axis arc interpolation, 3-axis spiral interpolation. 32-bit length.</td>
</tr>
<tr>
<td>Internal control program development</td>
<td>Control program can be developed using the C-like multiprocessing machine control language “MOS language.” Motion control, IO control, communication control, and sequence control are possible. “MOS Bench AM” is required as a development environment.</td>
</tr>
<tr>
<td>Accessory IO</td>
<td>aCW/aCCW pulse output, aA/aB/aZ input. Servo on, reset output. aOT, alarm input. (The above-mentioned items are for 8 axes.) General-purpose IN 8 points. General-purpose OUT 8 points. Non-insulated RS232-1ch. Insulated RS485-1ch.</td>
</tr>
<tr>
<td>Optional functions</td>
<td>Camera trigger function using aA/aB input counter and general-purpose OUT.</td>
</tr>
<tr>
<td>Optional devices</td>
<td>192IN, 192OUT are available by adding 6 general-purpose 32/32 IO boards. Non-insulated RS232-6ch is available using a RS232C extender board.</td>
</tr>
</tbody>
</table>

PCIExpress-40-axis Motion Control Board, PCI-40-axis Motion Control Board

“RT40PRE”, “RT40PR” Including PLC (Using a C-like Language)

Features
- Max. 40 axes: 32-axis RTEX Interface and 10Mpps pulse train position command for 8 axes.
- Synchronization of axes controlled by RTEX and those controlled by pulse train output is possible.
- Windows Real-time software PLC using the C-like multiprocessing machine control language “MOS language.”
- Windows7 Professional 64 bit and 32 bit are supported.
- Windows10 IoT Enterprise LTSB High End is supported.
- DIN, DOUT, AD, DA, RS232, and RS485 can be controlled in real time as well as motion control boards.

General Purpose 32/32 Input/Output Board

InterMotion Series JOY-RI03232

Features
- Single board with 32 IN points and 32 OUT points
- 10 PIN connector for 8-point IN and 8-point OUT. Can be directly connected to terminal block PRS-DG10-O8 (TOYOGIKEN Co., Ltd).
- 24 V DC supply

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>32 points (8 points × 4 ports), 24 Vcc, 4.7 kΩ</td>
</tr>
<tr>
<td>Output</td>
<td>32 points (8 points × 4 ports), 24 Vcc, 100 mA</td>
</tr>
<tr>
<td>Max. No. of connectable boards</td>
<td>6 (IN 192 points, OUT 192 points)</td>
</tr>
</tbody>
</table>

System Configuration

Keyence PLC, OMRON PLC, InterMotion

Sales area and Language

Sales area and Language

Please contact the following address directly in Japanese.
Note: Now preparing for a document in English.

For more information

URL: http://www.primemotion.com/index.php

Contact: Prime Motion Inc. (InterMotion - Special site: http://www.intermotion.jp)
1134-12, Akaho, Komagane-shi, Nagano, 399-4117, Japan
TEL: +81-265-82-2990 FAX: +81-050-3774-8184
64-Axis Multi-Function Soft Motion Controller
WMX2 for Realtime Express

Features
- Soft Motion controller with "hybrid" network: simultaneous communication of RTEX and EtherCAT. Can reduce the system cost with inexpensive and abundant EtherCAT I/O modules.
- Over 500 API functions for C/C++ and .NET languages. Functions for communication with servos, motion control, and I/O control are available to develop original user motion applications.
- Advanced features such as gantry control, acceleration/deceleration profiles, etc. can be used easily.

Specification

<table>
<thead>
<tr>
<th>Interface Board (SSP-100)</th>
<th>Low Profile PCI Express, Supports 32-Axis RTEX Communication (64 Axes with 2 Boards)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of axes</td>
<td>Maximum 64 axes (CP, PTP, when using 2 SSP-100 boards)</td>
</tr>
<tr>
<td>Interpolation Types</td>
<td>Linear (Maximum 32 axes), Arc (2 axes), 3D Arc (3 axes), Helical (3 axes)</td>
</tr>
<tr>
<td>Interpolation /</td>
<td>0.25ms (16 axes), 0.5ms (32 axes), 0.5ms (64 axes, requires 2 SSP-100 boards)</td>
</tr>
<tr>
<td>Communication Cycle</td>
<td></td>
</tr>
<tr>
<td>Command Modes</td>
<td>Position, Velocity, Torque</td>
</tr>
<tr>
<td>Motion Functions</td>
<td>Positioning (PTP), Jogging, Homing, Buffered API Execution, List Motion, Cubic-Spline, Path interpolation</td>
</tr>
<tr>
<td></td>
<td>Dynamic change of Target position / Speed / Acceleration / Deceleration profile during operation is possible</td>
</tr>
<tr>
<td></td>
<td>Execution time simulation function of API buffer</td>
</tr>
<tr>
<td>Acceleration /</td>
<td>Trapezoidal, S-Curve, Jerk (Jerk-limited or Jerk ratio), Sinusoidal, Parabolic, Trapezoidal moving average.</td>
</tr>
<tr>
<td>Deceleration Profiles</td>
<td>Other Profiles: Two-Velocity, PVT, Profile Specification by Acceleration/Deceleration</td>
</tr>
<tr>
<td>Gantry Control</td>
<td>Complete synchronous gantry control (Synchronization by position synchronization control + speed offset)</td>
</tr>
<tr>
<td>Synchronization Control</td>
<td>Max 32 pairs, One-to-many axis combination, dynamic synchronization axis can be set, changed, released</td>
</tr>
<tr>
<td></td>
<td>Simple synchronization, perfect synchronization (sync displacement correction function for gantry)</td>
</tr>
<tr>
<td>I/O</td>
<td>11600 inputs / 11600 outputs, Supports most commercial EtherCAT I/O modules</td>
</tr>
<tr>
<td>Event Function</td>
<td>Motion command execution based on axis-position and input events, etc., I/O control, Event with output to Windows</td>
</tr>
<tr>
<td>Compensation Functions</td>
<td>Pitch error, Backlash, Straightness correction</td>
</tr>
<tr>
<td>API Supported Language</td>
<td>C (C/C++), .NET (C#, VB), .NET Framework: 4.0 or later</td>
</tr>
</tbody>
</table>
| Recommended Operating Environment | OS: Windows 7, Windows 10  
CPU: Min. Atom 2 GHz (E3845, etc.) 2 cores or more, Memory: 4 GB or more |

Optional Packages
- <PLC Package>
  - Integration of WMX2 with Soft PLC developed by Phoenix Contact Software (formerly known as KW Software).
  - IEC 61131-3 standard programming languages (LD, FBD, ST, IL, SFC) are available. Not only various motion functions of the PLCopen standard but also a wide variety of unique motion functions of WMX2 are offered as FB.
  - Also included is an HMI creation tool based on Microsoft Visual Studio. It also integrates with the API library of WMX2, enabling flexible and powerful programming with C/C++, .NET/C#, and PLC languages.

Robot Control Package
- Supports kinematics and inverse kinematics of various robots (6 axis vertical articulated, SCARA, Delta etc.) as well as closed link mechanisms and link offset.
- Controls multiple robots and other devices with one commercial PC.
- Complete synchronization control between multiple robots and other positioning devices (with 1ms units).
- In combination with the PLC package, program all strokes and all devices with one programming environment (IEC 61131-3)
- Simple programming with our original robot language "RBC". Teaching pendants also available as hardware options.

Application Sample
- FPD Manufacturing Equipment: FPD Exposure Apparatus, LCD Inspection Equipment, Mask defect repair system
- Industrial Robots / Processing machines: Wafer Transfer Robot, Pipe Bender, Various smartphone related automated equipment, Various battery related automated equipment

Sales area and Language
- English
- Japanese
- Korean
- Chinese

For more information
URL WMX2 for RTEX: http://en.softservo.co.jp/technology/platform/rtex/

Contact: Soft Servo Systems, Inc.  
3-1-13 AS Building 2F, Nishiki-cho, Tachikawa, Tokyo 190-0022, Japan  

[Image] Soft Motion Controller with "hybrid" network: simultaneous communication of RTEX and EtherCAT. Can reduce the system cost with inexpensive and abundant EtherCAT I/O modules.

[EtherCAT I/O Modules, Stepping Motor Drivers] Soft Motion controller with "hybrid" network: simultaneous communication of RTEX and EtherCAT. Can reduce the system cost with inexpensive and abundant EtherCAT I/O modules.
**Features**

Motion control board best suited to build motion control system

- **32 axes synchronous control**
  - Servo control of 32 axes in 1 ms period for various applications.

- **Wide array of external interfaces**
  - Because the board is provided with such external interfaces as RS485 communication, 2 external inputs (24 V compatible) and 1 external output, it can be connected to various devices.
  - When multiple inputs/outputs are required, it supports remote I/O function (CUnet).

**PCI Motion Control Board**

- **Model**: 169002-MBP-LE01/01, etc.

**Application Sample**

- Semiconductor equipment
- Chip-Mounter
- Machine tool
- Industrial Robot

**System Configuration**

**Sample 1**: In case that the customer develops the motion software

- **Operation panel**
  - Max. 32-axis
- **PC for upper control**
  - OS: Windows XP
- **Motion control board**
  - Motion software by the customer
  - Device driver for Windows
  - We supply the PCB and servo communication library

**Sample 2**: In case that the customer uses installed software and develops the upper application

- **Display unit**
  - Max. 32-axis
- **Teaching Pendant**
  - PC for upper control
  - OS: Windows XP
  - RTOS: VxWORKS, QNX, LINUX, etc.
- **Motion control board**
  - Special software:
    - We prepare the pulse output command which is equal to LSI.
    - Linear and circular interpolation
    - Linear or S-curve Acceleration/Deceleration
    - Homing function, etc.
- **Motion software**
  - Developed by the customer

** Specification**

<table>
<thead>
<tr>
<th>Series list</th>
<th>Model</th>
<th>No. of control axes</th>
<th>Built-in pulse train conversion software</th>
<th>Built-in PLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>169002-MBP-LE01/01</td>
<td>32</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>169002-MBP-LE01/02</td>
<td>32</td>
<td>○</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>169002-MBP-LE01/11</td>
<td>16</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>169002-MBP-LE01/12</td>
<td>16</td>
<td>○</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>169002-MBP-LE01/21</td>
<td>8</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>169002-MBP-LE01/22</td>
<td>8</td>
<td>○</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>169002-MBP-LE01/23</td>
<td>8</td>
<td>–</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>

**Architecture**

- **CPU**: SH4 HD6417750R 200 MHz

**Memory**

- **FLASH ROM**: 8 MB
- **SDRAM**: 16 MB
- **SRAM**: 128 KB
- **EEPROM**: 8 KB
- **Shared memory**: 128 KB

**Servo interface**

- **Connector**: RJ-45 x 2
- **Interface**: Compatible with MINAS A4N/A5IN series

**External input**

- **2 PORT** (with sink/source switching)

**External output**

- **1 PORT** (with sink/source switching)

**Remote I/O**

- **CUnet**

**Serial interface specification**

- **Interface**: RS-485
- **Transmission rate**: 115.2 kbps (Max.)

**Compatible OS**

- Microsoft Windows XP

For more information

URL: [http://www.tietech.co.jp/english/index.html](http://www.tietech.co.jp/english/index.html) (Japan)


Contact: TIETECH Co., Ltd.

1-3-4 Shioya-cho, Minami-ku, Nagoya 457-0078, Japan

TEL: +81-52-824-7375 FAX: +81-52-811-4737
PLC Motion Unit
B3632101-UNT-LE02

Features
PLC motion unit best suited to build motion control system

- 32 axes synchronous control
  All servos sync to the host device assuring precise CP control. Communication period is 1 ms over max. 32 axes allowing various control settings.

- Software interface easily transportable from pulse train type software
  Command functions such as single axis FTP control, linear interpolation, arc interpolation, origin return and drive parameter change are provided. The unit will operate as the host controller sets the parameters and calls DLL functions. (DLL functions will be disclosed.)

- Connection of Yokogawa PLC to Panasonic network servo
  By connecting the unit to the host PLC via PCI bus and to the driving section via network interface, various monitoring operations can be performed without stress. The combination of the unit and PLC expands functions such as to external signal interface.

Specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Item</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. No. of control axes</td>
<td>CPU</td>
<td>SH4 7750R 200 MHz ( Renesas)</td>
<td>CPU clock 50 MHz</td>
</tr>
<tr>
<td></td>
<td>ROM</td>
<td>Flash ROM 8 MByte</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EEPROM</td>
<td>8 kbyte</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RAM</td>
<td>SDRAM 8 MByte</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DIPRAM</td>
<td>256 kbyte</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bus</td>
<td>Bus width 32-bit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power supply</td>
<td>Internal power supply</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Main power supply 5 V / 3.3 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPU power supply 3.3 V, 1.5 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FPGA 3.3 V, 2.5 V, 1.2 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WDT</td>
<td>Watching time 1.6 s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LED</td>
<td>2 points RUN Green</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LINK Green</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communication</td>
<td>RS232C 1-ch</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RTEX 1-ch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Setup</td>
<td>DIPSW Universal input 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For JTAG/ICE connection 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For FPGA setting 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OS</td>
<td>VxWorks6.4</td>
<td></td>
</tr>
</tbody>
</table>

Sales area and Language

- Japan
- English

For more information

URL: http://www.tietech.co.jp/english/index.html (Japan)
URL: http://www.tietech.com.cn (China)

Application Sample

- Semiconductor equipment
- Chip-Mounter
- Machine tool
- Industrial Robot

System Configuration

Sample 1: In case that the customer develops the motion software

Motion control board
Motion software by the customer
Device driver for Windows
PC for upper control
OS: WindowsXP, QNX, LINUX, etc.

Sample 2: In case that the customer uses installed software and develops the upper application.

Motion control board
Motion software developed by the customer
Device driver for Windows
PC for upper control
OS: WindowsXP

Contact: Tietech Co., Ltd.
1-3-4 Shioya-cho, Minami-ku, Nagoya 457-0078, Japan
TEL: +81-52-824-7375 FAX: +81-52-811-4737
Motion Coordinator and RTex Interface Module

**MC664 / MC664-X**

**Features**
- Up to 128 Axes
- Servo period 50 μsec minimum (8 axes)
- Precise 64 Bit Motion Calculations with Quad Core Cortex A9 1 GHz Processor (P662)
- Dedicated Communications Core (P962)
- Built-in EtherCAT Port
- EtherCAT, Sercos, SLM and RTex Digital Drive Interfaces
- Linear, Circular, Helical and Spherical Interpolation
- Flexible CAM shapes, Linked Motion
- EnDat, BISS and SSI Absolute Encoder Supported
- Hardware Linked Outputs for Camera / Laser Control
- Ethernet-IP / Modbus TCP / Ethernet Interface Built-In
- Anybus-CC Module for Flexible Factory Comms Including Profinet/Proibus
- IEC 61131-3 Programming
- Multi-tasking BASIC Programming
- Text File Handling
- Robotic Transformations
- SD Memory Card Slot
- CANopen + EtherCAT I/O Expansion
- Backlit LCD Display
- RoHS and CE Approved

**Specification**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Configuration</strong></td>
<td></td>
</tr>
<tr>
<td>Axes</td>
<td>Extended</td>
</tr>
<tr>
<td>Max Axis</td>
<td>128</td>
</tr>
<tr>
<td>Max discrete wire axis</td>
<td>24</td>
</tr>
<tr>
<td>Max Networked axis</td>
<td>128 (P862)</td>
</tr>
<tr>
<td>Max virtual axes</td>
<td>128</td>
</tr>
<tr>
<td>Processor</td>
<td>ARM A9 (Single/Quad core)</td>
</tr>
<tr>
<td>Clock frequency</td>
<td>1000 MHz (Max)</td>
</tr>
<tr>
<td>Servo update rate</td>
<td>8 ms (4 ms x MC664 - 50 μs (8 axis at 50 μs)</td>
</tr>
<tr>
<td>Encoder input frequency</td>
<td>6 MHz</td>
</tr>
<tr>
<td>Encoder output frequency</td>
<td>3 MHz</td>
</tr>
<tr>
<td>User memory</td>
<td>8 MByte</td>
</tr>
<tr>
<td>Max data table size</td>
<td>512000</td>
</tr>
<tr>
<td>Flash data memory</td>
<td>32 × 16000</td>
</tr>
<tr>
<td>VR</td>
<td>655/36</td>
</tr>
<tr>
<td>Position register precision</td>
<td>64 bit</td>
</tr>
<tr>
<td>Math precision</td>
<td>Double FP</td>
</tr>
<tr>
<td>Real time clock</td>
<td>Yes</td>
</tr>
<tr>
<td>Slapper (Stop &amp; Direction)</td>
<td>Option</td>
</tr>
<tr>
<td>Servo (x10 V &amp; Encoder)</td>
<td>Option</td>
</tr>
<tr>
<td>Drive interfaces</td>
<td></td>
</tr>
<tr>
<td>Hydraulics</td>
<td>Option</td>
</tr>
<tr>
<td>Panasonic RTex</td>
<td>Option</td>
</tr>
<tr>
<td>Ethernet RTex</td>
<td>Option</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
</tr>
<tr>
<td>Profinet</td>
<td>Yes (slave)</td>
</tr>
<tr>
<td>CANopen</td>
<td>Yes (server)</td>
</tr>
<tr>
<td>USB (V1.1)</td>
<td>Yes</td>
</tr>
<tr>
<td>Ethernet (10/100 base-T)</td>
<td>Yes</td>
</tr>
<tr>
<td>Ethernet IP</td>
<td>Yes (server)</td>
</tr>
<tr>
<td>MODBUS-RTU</td>
<td>Yes</td>
</tr>
<tr>
<td>MODBUS-TCP/IP</td>
<td>Yes</td>
</tr>
<tr>
<td>RS232/RS485</td>
<td>Yes</td>
</tr>
<tr>
<td>CC-Link</td>
<td>Yes</td>
</tr>
<tr>
<td>Prodigy</td>
<td>Option</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>Option</td>
</tr>
<tr>
<td>Anybus support</td>
<td>Option</td>
</tr>
<tr>
<td>Hostlink</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Network**
- Ethernet based MINAS A4N / A5N / A6N
- 100 Mbps 1 m/sec or 500 usec update operation

**Software**
- Motion Perfect v4
- All Support Software
- ASCII import
- DSP
- Software
- DXF import
- PC application

**Expansion**
- Memory slot card
- 80 up to 16 GB
- Expansion modules
- 6 + 1

**Physical**
- Weight
- 750 g
- Mouting
- DIN / Panel
- Operating Temp
- 0 - 45 °C
- Power
- Supply Voltage DC 24 V
- Consumption (exc. PO)
- 625 mA

**Certification**
- CE approval
- RoHS Compliant

**System Configuration**

**Application Sample**

URL: Sample applications
http://www.triomotion.uk/public/applications/applications.php

Please refer to the sample and typical applications for the MC646 with A6N as shown above URL.

**Sales area and Language**

- English

Please contact the following address for details.

**For more information**

URL: Panasonic Expansion Module

URL: The specifications for the MC646

Contact: Trio Motion Technology Ltd.
Shannon Way, Tewkesbury, Gloucestershire, GL20 8ND, United Kingdom
TEL: +44-1684-292333  FAX: +44-1684-297929
Motion Coordinator and RTEX Interface Module

MC4N-RTEX

Features
- Up to 32 RTEX Digital Drive Axes
- Supports Position, Speed and Torque Drive Modes
- Up to 1024 I/O
- Linear, Circular, Helical and Spherical Interpolation
- Flexible CAM shapes, Linked Motion
- Isolated Encoder Port
- EnDat and SSI Absolute Encoder Supported
- Hardware Linked Output for Camera / Laser Control
- Ethernet-IP / Modbus TCP / Trio ActiveX / TCP / Uniplay HMI / UDP / Ethernet Interface Built-In
- Precise 64 Bit Motion Calculations with 532 MHz ARM 11 Processor
- IEC 61131-3 Programming
- Multi-tasking BASIC Programming
- Text File Handling
- Robotic Transformations
- 4 high speed registration inputs
- Isolated RS232 and RS485 ports
- SD Memory Card Slot
- CANopen I/O Expansion
- Backlit LCD Display
- RoHS and CE Approved

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Axes 0</td>
<td>Extended</td>
<td>Built-in I/O</td>
</tr>
<tr>
<td></td>
<td>Max axes</td>
<td>32</td>
<td>Bi-directional I/O 24 VDC</td>
</tr>
<tr>
<td></td>
<td>Networked axes</td>
<td>32</td>
<td># registration inputs</td>
</tr>
<tr>
<td></td>
<td>Max virtual axes</td>
<td>32</td>
<td>Registration input speed</td>
</tr>
<tr>
<td></td>
<td>Processor</td>
<td>ARM11</td>
<td>WDOG output</td>
</tr>
<tr>
<td></td>
<td>Clock frequency</td>
<td>532 MHz</td>
<td>Expansion I/O</td>
</tr>
<tr>
<td></td>
<td>Servo update rate</td>
<td>1 ms - 500 μs</td>
<td>12 bit ±10 V analogue inputs</td>
</tr>
<tr>
<td></td>
<td>Encoder input frequency</td>
<td>6 MHz</td>
<td>12 bit ±10 V analogue outputs</td>
</tr>
<tr>
<td></td>
<td>Slipper output frequency</td>
<td>2 MHz</td>
<td>User memory</td>
</tr>
<tr>
<td></td>
<td>Max data table size</td>
<td>512kB</td>
<td>Max axes</td>
</tr>
<tr>
<td></td>
<td>Flash data memory</td>
<td>32 x 16000</td>
<td>Max virtual axes</td>
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<td></td>
<td>VR</td>
<td>4096</td>
<td>Processor</td>
</tr>
<tr>
<td></td>
<td>Position register precision</td>
<td>64 bit</td>
<td>Clock frequency</td>
</tr>
<tr>
<td></td>
<td>Maths precision</td>
<td>Double FP</td>
<td>Servo update rate</td>
</tr>
<tr>
<td></td>
<td>Real time clock</td>
<td>Yes</td>
<td>Encoder input frequency</td>
</tr>
<tr>
<td></td>
<td>Panasonic RTEX</td>
<td>Yes</td>
<td>Slipper output frequency</td>
</tr>
<tr>
<td></td>
<td>Auxiliary Axis</td>
<td>Yes</td>
<td>Max data table size</td>
</tr>
<tr>
<td></td>
<td>Drive interfaces</td>
<td></td>
<td>Flash data memory</td>
</tr>
<tr>
<td></td>
<td>DeviceNet</td>
<td>Yes (slave)</td>
<td>VR</td>
</tr>
<tr>
<td></td>
<td>CANopen</td>
<td>Yes (server)</td>
<td>Position register precision</td>
</tr>
<tr>
<td></td>
<td>Ethernet (10/100) base-T</td>
<td>Yes</td>
<td>Maths precision</td>
</tr>
<tr>
<td></td>
<td>Ethernet IP</td>
<td>Yes</td>
<td>Real time clock</td>
</tr>
<tr>
<td></td>
<td>TCP/IP Client</td>
<td>Yes</td>
<td>Panasonic RTEX</td>
</tr>
<tr>
<td></td>
<td>MODBUS-RTU</td>
<td>Yes</td>
<td>Auxiliary Axis</td>
</tr>
<tr>
<td></td>
<td>MODBUS-TCP/IP</td>
<td>Yes</td>
<td>Drive interfaces</td>
</tr>
<tr>
<td></td>
<td>RS232 RS485</td>
<td>Yes</td>
<td>Communication</td>
</tr>
<tr>
<td></td>
<td>Hostlink</td>
<td>Yes</td>
<td>Encoder ports</td>
</tr>
<tr>
<td></td>
<td>Reference input</td>
<td>Yes</td>
<td>Pulse + direction output</td>
</tr>
<tr>
<td></td>
<td>Incremental (A+B) output</td>
<td>Yes</td>
<td>SSI Absolute</td>
</tr>
<tr>
<td></td>
<td>SinDat Abs</td>
<td>Yes</td>
<td>Encoder ports</td>
</tr>
</tbody>
</table>

Performance
- Robotic Transformations
- Linear, Circular, Helical and Spherical Interpolation
- Supports Position, Speed and Torque Drive Modes
- Isolated Encoder Port
- Hardware Linked Output for Camera / Laser Control
- Ethernet-IP / Modbus TCP / Trio ActiveX / TCP / Uniplay HMI / UDP / Ethernet Interface Built-In
- Precise 64 Bit Motion Calculations with 532 MHz ARM 11 Processor

Application Sample

URL: Sample applications
http://www.triomotion.uk/public/applications/applications.php
Please refer to the sample and typical applications for the MC4N with A6N as shown above URL.

System Configuration

Up to 32 Axes
MINAS A6N
UNIPLAY HMI

Sales area and Language

Please contact the following address for details.

For more information

URL: Specification for the MC4-N RTEX Mini Master

Contact: Trio Motion Technology Ltd.
Shannon Way, Tewkesbury, Gloucestershire, GL20 8ND, United Kingdom
TEL: +44-1684-292333  FAX: +44-1684-297929
RTEx AnyWire Gateway

AG42-R1

Features

Connect AnyWire Reduced Wiring I/O System to RTEx

- AnyWire reduced wiring system has Dual-Bus function which transfers DI/O and AI/O on the same transfer line but independent of each other.
- AnyWire reduced wiring system is cable free specification and uses general purpose wires
- Layout free, e.g. T branch, multi drop and tree wiring
- Simple one-touch connection, branch and extension by using insulation displacement connector
- Max. No. of I/O points is 2560 and max. No. of units connected to I/O terminal is 128
- Max. connecting route length 1000 m

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of exclusive blocks</td>
<td>3 to 11 (depending on No. of points used)</td>
</tr>
<tr>
<td>Effective data transmission rate</td>
<td>183 kbps/256 points (at transfer clock: 62.5 kHz)</td>
</tr>
<tr>
<td>Transmission scheme</td>
<td>Full quadruplex total frame cyclic system</td>
</tr>
<tr>
<td>Synchronization system</td>
<td>Frame/bit synchronization system</td>
</tr>
<tr>
<td>Data length/frame</td>
<td>1 bit to 1024 bit</td>
</tr>
<tr>
<td>Connection topology</td>
<td>Bus (multi drop, T branch, tree)</td>
</tr>
<tr>
<td>Transmission protocol</td>
<td>Dedicated protocol (AnyWireBus)</td>
</tr>
<tr>
<td>Error control</td>
<td>Double check</td>
</tr>
<tr>
<td>Max. No. of connecting Bit-Bus I/O points</td>
<td>512 points (IN:256 points + OUT:256 points)</td>
</tr>
<tr>
<td>Word-Bus I/O points</td>
<td>2048 points (IN:1024 points + OUT:1024 points) or 128 words (IN:64 words + OUT:64 words)</td>
</tr>
<tr>
<td>Max. No. of connected units</td>
<td>128 (Total of Bit-Bus terminals and Word-Bus terminals)</td>
</tr>
<tr>
<td>Max. cycle time&lt;sup&gt;3&lt;/sup&gt;</td>
<td>0.85 ms/128 points [1.4 ms/256 points], 2.4 ms/512 points, 4.4 ms/1024 points (transfer clock: 62.5 kHz)</td>
</tr>
<tr>
<td>RAS function</td>
<td>Transmission line breakage position detection and transmission line short-circuit detection</td>
</tr>
<tr>
<td>Transmission cable&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Cable free</td>
</tr>
<tr>
<td>General purpose (VCTF) 2-core 0.75 mm² to 1.25 mm²; transmission only (D, G)</td>
<td></td>
</tr>
<tr>
<td>General purpose (VCTF) 4-core 0.75 mm² to 1.25 mm²; including power supply (D, G, 24 V, 0 V)</td>
<td></td>
</tr>
<tr>
<td>Other general purpose cables 0.9 mm² to 1.25 mm²; e.g. parallel</td>
<td></td>
</tr>
<tr>
<td>Special flat cable 0.75 mm² to 1.25 mm²; including power supply (D, G, 24 V, 0 V)</td>
<td></td>
</tr>
<tr>
<td>Max. transmission distance&lt;sup&gt;*&lt;/sup&gt;</td>
<td>(for reference)</td>
</tr>
<tr>
<td>1 km (7.8 kHz), 500 m (15.6 kHz), [200 m(31.3 kHz), 100 m (2.5 kHz)]</td>
<td></td>
</tr>
</tbody>
</table>

* The number depends on the master. *2. Typical values at the top speed. *3. Diameter varies with transmission distance.

Sales area and Language

- English
- Japanese

Only Japanese is used for inquiry over the phone. When making an inquiry in English, please send it to the following address.

For more information

URL: http://www.anywire.jp/

Contact: AnyWire corporation Headquarters
1 Babausho, Nagakakyo-city, Kyoto 617-8550, Japan
TEL: +81-75-356-4911 (Japanese only) FAX: +81-75-356-1613

For developing RTEx product, this ASIC is necessary. (See note)

Communication ASIC MNM1221

Note: As long as the target is noncompetitive to Panasonic products.

### Communication ASIC MNM1221

<table>
<thead>
<tr>
<th>Part No. for ordering</th>
<th>DV0P444-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packing quantities</td>
<td>90</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>3.3 V</td>
</tr>
<tr>
<td>Current consumption</td>
<td>Max. approx. 100 mA (for reference)</td>
</tr>
<tr>
<td>Operating ambient temperature</td>
<td>~40°C to +85°C</td>
</tr>
<tr>
<td>Package</td>
<td>LQFP100pin 14 mm × 14 mm Lead pitch 0.5 mm</td>
</tr>
<tr>
<td>RoHS</td>
<td>Compliant</td>
</tr>
<tr>
<td>Operation mode</td>
<td>Master/slave</td>
</tr>
</tbody>
</table>
**EtherCAT communication driver**

**MINAS A6B series**

---

**High-performance**
- Frequency response: 3200 Hz
- Supports network communication “EtherCAT”.
- High-Speed 100 Mbps
- Real-time auto tuning function, Anti-vibration filters are available.

---

**Operability**
- Smallest EtherCAT drive in market.
- Wireless connection using wireless LAN dongle (option)
  - Wireless connection with PC and smartphone via access point by just mounting to servo driver.
- Supports PC setup software “PANATERM”
- Lifespan diagnosis/Deterioration diagnosis
  - Warning output for Servo (motor and driver) lifespan and machine deterioration limit.

---

**Standards**
- Official EtherCAT Conformance Tested model available.
- IEC safety I/F model available.*1

---

**System configuration example**
- EtherCAT specification
- Device profile: CoE (CANOpen over EtherCAT)
- Control mode: csp, pp, hm, cv, cs, pv, tq
- Homing mode: 1 to 14, 17 to 30, 33, 34, 35, 37
- Synchronized mode: DC (Synchronized), SM2 (Synchronized), FreeRun (Non-synchronized)
- Supported cycle time: 125 µs, 250 µs, 500 µs, 1 ms, 2 ms, 4 ms

---

**Drive list**

<table>
<thead>
<tr>
<th>Drive power supply</th>
<th>Motor rated output</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 W</td>
<td>100 W</td>
</tr>
<tr>
<td>1-phase 100 to 120 VAC</td>
<td>01B</td>
</tr>
<tr>
<td>1 or 3-phase 200 to 240 VAC</td>
<td>MADL</td>
</tr>
<tr>
<td>3-phase 200 to 230 VAC</td>
<td>MEDL</td>
</tr>
</tbody>
</table>

Because there is the case that is different from the part number in the table by the motor, please check the combination in the catalog of the A6 series always.

- ☐ : Drivers specification....
- N : Without safety function
- T : With safety function
- ☆ : Drivers specification....
- E : For rotary motor (standard)
- F : For rotary motor (multifunction)
- L : For linear/DD motor (standard)
- M : For linear/DD motor (multifunction)

**Appearance**
- 7-seg LED (2-digit) Servo status display
- Connector X7 for analog monitor
  - For monitoring speed, torque, etc.
- Main circuit charge lamp
- Connector XA for power input connection
- Connector XB for regenerative resistor and motor connection
- Connector (X3)* for safety function
- Connector X4 for I/O
  - Connection to sensor inputs and alarm outputs
- Connector X5 for feedback scale (not available)*
  - For full closed control
- Connector X6 for encoder
  - For Panasonic serial data
- EtherCAT indicator
  - RUN........ EMS status (Green)
  - ERR........ Alarm status (Red)
  - L/A IN ....... Indication of LINK state and operation state
  - L/A OUT ...... of each port physical layer
- USB connector X1 for connection to PC
  - For PANATERM
- Connector X2A: IN for EtherCAT
  - Connection to TX of upstream node
- Connector X2B: OUT for EtherCAT
  - Connection to RX of downstream node
- Connector X3: OUT for EtherCAT
  - Connection to RX of downstream node

---

**Compliance**
- RoHS
- CoC
- CE
- UL
- UL-LISTED
- TUV
- TUV NORDIC
- TUV NORDIC CAMEX
- TUV NORDIC CERTIFIED

---

*Supported by multifunction type. EN61800-5-2:STO, EN61508: SIL3.

---

*The photo is A6BF series. There are no X3 and X5 connectors in the A6BE series.
EtherCAT communication driver
MINAS A5B series

High-Performance
- Frequency response: 2300 Hz
- Supports network communication “EtherCAT”
- High-Speed 100 Mbps
- Real-time auto tuning function, Anti-vibration filters are available.

High-functions
- EtherCAT with many supported applications
  - 3 control modes, 32 hrs methods, DC(Synch.), SM2(Synch.), FreeRun (Non-synch.)
  - System-up possible with various slaves.
  - Supports PC-based controller.
- A5BL(for Linear motor), A5MB(DC24 V, 48 V) are available.

Operability
- Smallest EtherCAT drive in market.
- Supports pc setup software “PANATERM”

Standards
- Official EtherCAT Conformance Tested model available.
- IEC safety I/F model available.*1

[System configuration example]

Drive list

<table>
<thead>
<tr>
<th>Drive power supply</th>
<th>Motor rated output</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 24 V, 48 V C: 24 V, 48 V</td>
<td>1.5 kW to 15 kW</td>
</tr>
<tr>
<td>10 W to 30 W</td>
<td>50 W</td>
</tr>
<tr>
<td>100 W</td>
<td>200 W</td>
</tr>
<tr>
<td>400 W</td>
<td>750 W</td>
</tr>
<tr>
<td>10 kW to 1.5 kW</td>
<td>2 kW</td>
</tr>
<tr>
<td>3 kW</td>
<td></td>
</tr>
<tr>
<td>4 kW to 5 kW</td>
<td></td>
</tr>
<tr>
<td>7.5 kW</td>
<td></td>
</tr>
</tbody>
</table>

*1: Supported by special specification. IEC61800-5-2 STO, IEC61508 SIL2.

Appearance
- Front cover
- LINK LED
  - Indicates connection/disconnection of EtherCAT cable.
- COM LED
  - Indicates condition of EtherCAT.
- Node address setting rotary switch (2-digit)
- Setting range (00 to 31)
- USB connector X1 for connection to PC
  - For PANATERM
- Connector X2A: IN for EtherCAT
  - Connection to TX of upstream node
- Connector X2B: OUT for EtherCAT
  - Connection to RX of downstream node
- Main circuit charge lamp
- Connector X4 for I/O
  - Connection to sensor inputs and alarm outputs
- Connector X5 for feedback scale (not available)
  - For full closed control
- Connector X6 for encoder
  - For Panasonic serial data

Compliance

Device profile
- CoE (CANOpen over EtherCAT)

Control mode
- csp, pp, hm, csv, cat, pv, tq

Nm method (homining mode)
- 1 to 14, 17 to 30, 33, 34, 35, 37

Synchronized mode
- DC (Synch.), SM2 (Synch.), FreeRun (Non-synch.)

Supported cycle time
- 250 μs, 500 μs, 1 ms, 2 ms, 4 ms

Dimensions (mm): W40 × H150 × D136 (A frame)
**EtherCAT® Product Family**

**Features**
EtherCAT® Master Stack software, available for real-time OS as well as Windows
- Ready-to-run implementations for many embedded operating systems
- EC-Win: high performance Windows Real-time extension included to achieve up to 50 μsec cycle time on Windows!
- Use multiple CPU cores on Windows for distributed EtherCAT applications
- CPU architectures: x86, ARM, PowerPC, SH, MIPS
- Reliable and well proven in many customer applications worldwide. Market leading companies in the Semiconductor, Robotics, PLC/Motion, Measurement and other industries rely on this software.

**Application Sample**
- On Windows
- Robotics
- Semiconductor
- CNC
- On Embedded Systems
- Industrial Automation
- CNC
- Test & Measurement

**System Configuration**
- MS Visual Studio
- EtherCAT Configuration
- EtherCAT Master
- EtherCAT Diagnosis
- Remote Gateway
- Remote Diagnosis and Configuration
- TCP/IP
- Real-time Debugging
- Real-time analysis
- Real-time Optimization
- Class A/B Feature Packs
- Example Apps
- Single axis movement

**Sales area and Language**
-  • English
-  • Japanese

**For more information**
URL: http://www.acontis.com/eng/index.php

Contact: acontis technologies GmbH
St.-Konrad-Str.51 88250 Weingarten Germany
E-mail: sales@acontis.com
TEL: +49-751-560-3030

**Specification**
EC-Master according to ETG.1500 Master Classes Directive

<table>
<thead>
<tr>
<th>Class A Core</th>
<th>Class B Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Compare network configuration</td>
<td>- Compare network configuration</td>
</tr>
<tr>
<td>- Cyclic process data exchange</td>
<td>- Cyclic process data exchange</td>
</tr>
<tr>
<td>- All mailbox protocols: CoE, SoE, FoE, AoE, VoE</td>
<td>- Mailbox protocol CoE</td>
</tr>
<tr>
<td>- Slave to slave communication</td>
<td>- Mailbox protocol SoE</td>
</tr>
<tr>
<td>- Distributed Clocks with master synchronization</td>
<td>- Mailbox protocol EoE</td>
</tr>
<tr>
<td>- Slave to slave communication</td>
<td></td>
</tr>
</tbody>
</table>

Feature Pack
- Cable Redundancy
- Hot Connect
- Superset ENI
- Remote Access
- EoE Endpoint
- Master Obj. Dict.

The ETG (EtherCAT Technology Group) has defined EtherCAT Master Classes (ETG.1500) with a well defined set of Master functionalities.

2 Master Classes are defined:
- Class A: Standard EtherCAT Master Device
- Class B: Minimum EtherCAT Master Device

Additional functionality is described by Feature Packs. Acontis supports all Feature Packs in industry proven quality.
EtherCAT Master Controller
Talos-3012

Features
- Powered by ADLINK Softmotion
- Supports IEC 61131-3 compliant programming environment
- Minimal control cycle time as low as 250 μs
- Motion control of up to 64 axes and up to 10000 I/O points of control
- Supports EtherCAT COE, FOE as well as EOE protocols
- Code executable when host Windows system crashed
- Built-in SD socket for logging manufacturing data
- 3 user-defined indicators for CTR diagnostic
- Rugged, compact construction with fanless design at ~20 °C to 60 °C

Specification

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Processor</th>
<th>Controlable Motion Axis</th>
<th>Controllable I/O Points</th>
<th>Control Cycle Time</th>
<th>RAM (Program &amp; Data Memory)</th>
<th>Retain Memory</th>
<th>Storage (Date Usage)</th>
<th>Field Bus Connectivity</th>
<th>Ethernet Connectivity</th>
<th>System Indicators</th>
<th>Programming Environment</th>
<th>Supply Voltage</th>
<th>Operating Temperature</th>
<th>Environment Certificate</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talos-3012</td>
<td>Intel® Atom™ Processor E3845 1.9 GHz</td>
<td>64</td>
<td>Up to 10000 points</td>
<td>250 μs (min.)</td>
<td>2 GB DDR3</td>
<td>Configurable on SD card</td>
<td>16 GB SSD / SD Card</td>
<td>I for EtherCAT</td>
<td>1 GBE</td>
<td>3 User-defined</td>
<td>IEC 61131-3-Compliant</td>
<td>9-32 VDC wide-range DC input</td>
<td>–20 °C to 60 °C</td>
<td>Shock: 50 G, Half Sine 11 ms duration</td>
<td>EMC: EN 55011 class A</td>
</tr>
</tbody>
</table>

Software Support
- IEC-61131-3 compliant Environment
- Support 5 different PLC Programming Languages
- ADLINK Softmotion Inside

Languages
- English
- S/T Chinese

For more information
URL: http://www.adlinktech.com/EtherCAT/index.php

Contact: ADLINK Technology, Inc.
9F, No.166 Jian Yi Road, Zhonghe District, New Taipei City 235, Taiwan
[E-mail: service@adlinktech.com] [TEL: +886-2-8226-5877] [FAX: +886-2-8226-5717]
**PCle EtherCAT Master Motion Controller**

**PCle-8338**

**Features**
- PCI Express® x 1 compliant
- Up to 64-axis motion control & 10000 I/O point control via EtherCAT
- EtherCAT cycle times up to 250 μs
- Broad range of compatible EtherCAT slaves
- Dedicated emergency stop input
- 4CH isolated digital input/4CH isolated digital output
- 1CH pulsar input
- Point-table functions for contouring application
- Support for up to 16D linear interpolation, 3D circular and 3D spiral interpolation
- 8 program tasks downloadable for standalone application
- Card ID selection

**Specification**

<table>
<thead>
<tr>
<th>Model Name</th>
<th>PCle-8338</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EtherCAT Cycle Time</strong></td>
<td>1CH @ 250 μs / 500 μs / 1000 μs / 2000 μs</td>
</tr>
<tr>
<td><strong>Motion I/O Interface Signals</strong></td>
<td></td>
</tr>
<tr>
<td>Emergency Stop In</td>
<td>1CH</td>
</tr>
<tr>
<td>Isolated I/O Signals</td>
<td></td>
</tr>
<tr>
<td>Digital Input</td>
<td>4CH (2CH configured as Pulsar Input)</td>
</tr>
<tr>
<td>Pulsar Input Mode</td>
<td>CW/CCW; 1x2x4x AB Phases</td>
</tr>
<tr>
<td>Pulsar Input Frequency</td>
<td>Up to 1 MHz</td>
</tr>
<tr>
<td>Digital Input Voltage</td>
<td>24 Vdc (typ.) / 5 Vdc for pulsar connection</td>
</tr>
<tr>
<td>Digital Input Type</td>
<td>Sourcing type</td>
</tr>
<tr>
<td>Digital Output</td>
<td>4CH, Isolated</td>
</tr>
<tr>
<td>Digital Output Voltage</td>
<td>24 V (typ.)</td>
</tr>
<tr>
<td>Digital Output Type</td>
<td>90 mA, NPN sinking type</td>
</tr>
<tr>
<td><strong>General Specification</strong></td>
<td></td>
</tr>
<tr>
<td>Operating Temp</td>
<td>0 °C to +60 °C (32 °F to 140 °F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>5 % to 95 %, non-condensing</td>
</tr>
<tr>
<td>Safety compliance</td>
<td>CE/FCC, RoHS</td>
</tr>
</tbody>
</table>

**Application Sample**
- Printing
- Packaging
- Logistics & Material Handling
- Electronic Manufacturing
- Robot ARM Control
- Conveyor Control System

**Software Support**
- Easy-to-Use Utility - MotionCreatorPro2
- ADLINK Softmotion Inside

**Sales area and Language**
- English
- S/T Chinese

**For more information**

Contact: ADLINK Technology, Inc.
9F, No.166 Jian Yi Road, Zhonghe District, New Taipei City 235, Taiwan
[Tel: +886-2-8226-5877 Fax: +886-2-8226-5717](tel:+886-2-8226-5877)
Intelligent EtherCAT® Master Board
Low CPU load EtherCAT® Master Communication

Features

Low CPU load EtherCAT® Master Communication
EtherCAT® environment is enabled typically by implementing the master stack on Ethernet hardware. Advanet provides EtherCAT® master communications on-board by implementing the Xilinx Zynq® with ARM® Cortex®-A9 on a board to minimize the impact for the host CPU as bus master.

Secure Cable Redundancy
The redundant cable configuration adopting ring topology which recovers the communication cable failure in the EtherCAT® system allows the communications to reach any branch even in case of cable fracturing happened at any point.

Hot Connect Responds to Unexpected Replacement
The protocol of the EtherCAT® system utilizing a hot connect capability provides flexible and responsive functionalities to change the system configuration which allows you to connect/disconnect or reconfigure any part of the network “on-the-fly”.

Specification

<table>
<thead>
<tr>
<th>Form Factor</th>
<th>A3pci1571</th>
<th>AdEXP1572</th>
<th>AdXMC1573</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>ARM® Cortex®-A9 Dual-Core (Xilinx: Included in Zynq®-7010)</td>
<td>PCI Express®</td>
<td>XMC</td>
</tr>
<tr>
<td>Main Memory</td>
<td>DDR3 SDRAM 256 MB</td>
<td>DDR3-800 16 MB</td>
<td>DDR3 SDRAM</td>
</tr>
<tr>
<td>Boot ROM1</td>
<td>SPI-FLASH 16 MB</td>
<td>DDR3-800 16 MB</td>
<td>DDR3-800 16 MB</td>
</tr>
<tr>
<td>Boot ROM2</td>
<td>microSD (Spare)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared Memory</td>
<td>256 KB (Included in Zynq® PL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EtherCAT®</td>
<td>Master Class A Compliant / Redundant Cable, Hot Connect / Controllable Cycle 100 μs to 10 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front IO</td>
<td>2x EtherCAT® ports, 100BASE-TX, RJ45 Connector</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Revision 1.0a Compliant</td>
<td>Revision 1.0a Compliant</td>
<td>ANSI/VITA42.3-2006</td>
</tr>
<tr>
<td></td>
<td>PCIM/B 2.0 Compliant</td>
<td>PCIM/B 2.0 Compliant</td>
<td>PCI Express Card</td>
</tr>
<tr>
<td></td>
<td>PCIM/B 2.1 R2.0 Compliant</td>
<td>PCIM/B 2.1 R2.0 Compliant</td>
<td>IEEE1394.1-2001</td>
</tr>
<tr>
<td></td>
<td>Hot Swap Specification Compliant</td>
<td>Hot Swap Specification Compliant</td>
<td>PCI Express Card</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IEEE1394.1-2001</td>
</tr>
<tr>
<td>Power Supply</td>
<td>DC5 V ±5 %</td>
<td>DC12 V ±8 %</td>
<td>DC12 V ±5 %</td>
</tr>
<tr>
<td></td>
<td>DC3.3 V ±8 %</td>
<td>DC3.3 V ±5 %</td>
<td>DC3.3 V ±0.3 V</td>
</tr>
<tr>
<td>Dimension</td>
<td>160 mm x 100 mm</td>
<td>167.5 mm x 68.75 mm</td>
<td>74 mm x 139 mm</td>
</tr>
<tr>
<td></td>
<td>(3U Size CompactPCI® Bus 1 Slot width)</td>
<td>(Low Profile or Standard Height)</td>
<td></td>
</tr>
<tr>
<td>Operating Environment</td>
<td>Operating Temperature Range : 0 °C to 55 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operating Humidity Range : 35 % to 80 %RH (non-condensing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Operating Temperature Range : -10 °C to 70 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Operating Humidity Range : Under 90 %RH (non-condensing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Device Driver</td>
<td>WindRiver® VxWorks® 6.9.x, Microsoft® Windows® 7</td>
<td>(Driver Implementation Document is available)</td>
<td></td>
</tr>
</tbody>
</table>

For more information

URL: http://www.advanet.co.jp/ethercat_en

Contact: Advanet Inc.
616-4 Tanaka, Kita-Ku, Okayama 700-0951, Japan
[Email: sales@advanet.jp]
TEL: 086-245-2861
URL: http://www.advanet.co.jp
EtherCAT Motion Control Master Card
PCI-1203

Features
- Dual EtherCAT ports for high-performance of Motion and I/O applications
- Up to 32 axes support for motion control
- Motion cycle time=500 μs; I/O cycle time=200 μs
- Supports ready-to-use API for rapid application development
- 2/3-axis linear / circular interpolation
- Multi-axis synchronous motion
- Trace logger for fast error diagnostics
- Easy to wire, saving wiring working-hour

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EtherCAT Number of Rings</td>
<td>2 (Motion x 1, I/O x 1)</td>
</tr>
<tr>
<td>Number of Axis</td>
<td>6/10/16/32</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>Motion: 500 μs; I/O: 200 μs</td>
</tr>
</tbody>
</table>

Motion Control

Single-Axis Motion
- JOG Move
- Position/Velocity/Time Planning
- Position/Torque Limit

Motion Trajectory Planning
- 2/3-axis Line Interpolation 1–8 axis Direct Interpolation
- 2/3-axis Circular Interpolation
- Support 6 Path Table (size: 7k points / table)

Master & Slave Synchronized Motion
- Gantry
- E-Gear
- E-CAM
- Tangential Following
- Position Latch

Software

Utility
- Common Motion Utility

Driver
- Windows XP/7/8/10

Example
- VC, VB, VB.NET, C#, BCB, LabVIEW

Application Sample

System Configuration

Sales area and Language

Please contact the following address for details.

For more information
URL: http://www.advantech.com/products/machine-automation/sub_machine_automation
**EtherCAT master**

"All-in-one Controller", based on the Industrial PC equipped with EtherCAT master stack

### Features

All-in-one controller can execute SCADA, synchronous motion control and image processing just by itself.

- International standard (IEC 61131-3) compliant software PLC
- PLCopen compliant positioning/synchronous motion control software
- OpenCV compliant image processing engine (option)
- SCADA-based HMI software

### Specification

- Intel® high-performance processor, Atom E3845 Quad Core 1.91 GHz
- Real time OS (INtime). High-speed 28000 steps/50 µs processing.
- Windows Embedded Standard 7 allows effective utilization of various software
- Top-class ultra-thin compact design and lower power consumption allow for installation in small or space for new, expanded use
- Fanless, diskless and completely spindleless Highly reliable design

### Application Sample

- Free switch off
- 2 storage (m-SATA) slots
- Multi-touch panel
- Multilingual support

### Features/Specification

#### Digital input/output (NPN/PNP)

- 16-point input unit
- 16-point output unit
- 32-point input unit
- 32-point output unit
- 16-point input/16-point output unit

#### Analog input/output

- 4ch analog input unit
- 4ch analog output unit

#### <“Chibimarukun” series>

- e-CON connector
  - 8-point input unit
  - 8-point output unit
  - 4-point input/4-point output unit

- MIL connector terminal block
  - 16-point input unit
  - 16-point output unit
  - 8-point input/8-point output unit

- Relay output (terminal block)
  - 4-point relay output unit

- 4ch SIO Gateway

- Encoder input
- Line receiver input
- Open collector input

- Contract-based Development

- Interface board example

### Sales area and Language

- Japanese
- English

### For more information

URL: [http://www.algosystem.co.jp/](http://www.algosystem.co.jp/)

**Contact:**

ALGO SYSTEM Co.,Ltd.

656 Kobirao Mihara-ku, Sakai, Osaka, 587-0021 Japan

TEL: +81-72-362-5067  FAX: +81-72-362-4856

*Serially controlled devices such as RS-232C and RS-485 devices are converted to EtherCAT. EtherCAT can be installed without putting old assets to waste.*
Software PLC/ NC/ CNC

**TwinCAT 3**

### Features

**PC base automated control**
- One tool for PLC, motion and HMI
- Scalable performance and lower cost by using general-purpose CPU
- Fusion of automation and IT

**Real-time control system in PC base system**

**Software PLC/ NC/ CNC TwinCAT 3**

1) **IEC 61131-3 3rd edition**
   - Integration of Microsoft Visual Studio
   - Support for IEC61131-3 (IL, ST, FBD, LD, SFC) +CFC and object-oriented extension of the 3rd edition

2) **Development environment**
   - Support for C/C++, real-time environment in Matlab®/Simulink®, programming in .NET/C#.

3) **Link to MATLAB®/Simulink®**
   - Link to MATLAB®/Simulink® optimizes development and simulation

4) **Multi-core CPU support**
   - Impressive real-time performance and high level integration by assigning HMI, PLC, NC, CNC tasks to individual CPU cores.

### System Configuration

- PC base controller with TwinCAT supporting multi-core maximizes EtherCAT performance
- Compact controller on DIN rail (CX5100 series)
- TwinCAT PLC processes minimum 50 μs real-time task, and controls motion system in minimum 125 μs

**C6015**

### Features

- Intel® Atom™ CPU with up to four cores and integrated graphic adapter
- Fanless entry-level PC
- For industrial use: high temperature range (0…55 °C)
- Flexible mounting mechanism for the free alignment of the connecting area
- Most compact form factor: 82 mm x 82 mm x 40 mm
- EtherCAT compatibility, high resistance to vibration and shocks

### Specification

<table>
<thead>
<tr>
<th>Technical data</th>
<th>C6015</th>
<th>C6015</th>
<th>C6015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Intel® Atom™ E3815 1.46 GHz, 1 core (TC3: 40)</td>
<td>Intel® Atom™ E3827 1.75 GHz, 2 cores (TC3: 40)</td>
<td>Intel® Atom™ E3845 1.91 GHz, 4 cores (TC3: 50)</td>
</tr>
<tr>
<td>Internal main memory</td>
<td>2 GB DDR3 RAM</td>
<td>4 GB DDR3 RAM</td>
<td>4 GB DDR3 RAM</td>
</tr>
<tr>
<td>Flash memory</td>
<td>30 GB M.2 SSD, 3D flash, extended temperature range</td>
<td>30 GB M.2 SSD, 3D flash, extended temperature range</td>
<td>30 GB M.2 SSD, 3D flash, extended temperature range</td>
</tr>
<tr>
<td>Interfaces</td>
<td>2 x RJ-45 Ethernet 100/1000BASE-T/1 x Display-Port/1 x USB 2.0/1 x USB 3.0</td>
<td>2 x RJ-45 Ethernet 100/1000BASE-T/1 x Display-Port/1 x USB 2.0/1 x USB 3.0</td>
<td>2 x RJ-45 Ethernet 100/1000BASE-T/1 x Display-Port/1 x USB 2.0/1 x USB 3.0</td>
</tr>
<tr>
<td>Operating system</td>
<td>Microsoft Windows Embedded Compact 7, English</td>
<td>Microsoft Windows Embedded Compact 7, English</td>
<td>Microsoft Windows Embedded Compact 7, English</td>
</tr>
<tr>
<td>Power supply</td>
<td>24 V DC (-15%/+20%)</td>
<td>24 V DC (-15%/+20%)</td>
<td>24 V DC (-15%/+20%)</td>
</tr>
<tr>
<td>Dimensions (W x H x D)</td>
<td>compact dimensions (W x H x D) 82 mm x 82 mm x 40 mm (3.2” x 3.2” x 1.6”) without mounting plate</td>
<td>compact dimensions (W x H x D) 82 mm x 82 mm x 40 mm (3.2” x 3.2” x 1.6”) without mounting plate</td>
<td>compact dimensions (W x H x D) 82 mm x 82 mm x 40 mm (3.2” x 3.2” x 1.6”) without mounting plate</td>
</tr>
<tr>
<td>Operating/storage temperature</td>
<td>0 °C to +55 °C (operation)/−25 °C to +65 °C (transport/storage)</td>
<td>0 °C to +55 °C (operation)/−25 °C to +65 °C (transport/storage)</td>
<td>0 °C to +55 °C (operation)/−25 °C to +65 °C (transport/storage)</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP20</td>
<td>IP20</td>
<td>IP20</td>
</tr>
</tbody>
</table>

### Application Sample

- Semiconductor manufacturing equipment
- Injection machine
- Cutting / welding equipment
- Industrial robot
- Industrial print machine
- Wind turbine
- Machine tool
- Pressing machine
- Stage equipment

### Sales areas and Languages

Local support: Japan, China, Korea, south-eastern Asia, Europe, the Americas, etc. More than 75 countries

### For more information

URL: [www.beckhoff.com](http://www.beckhoff.com)

Beckhoff worldwide: [https://www.beckhoff.com/english/beckhoff/world.htm](https://www.beckhoff.com/english/beckhoff/world.htm)

Contact: Beckhoff Automation GmbH&Co.KG [E-mail: info@beckhoff.com]
TEL: +49 5246 963-0
**IEC61131-3 Standard Industrial IoT Controller**

**CONPROSYS PAC (Programmable Automation Controller) Solution**

### Features

#### Configurable Type
- EtherCAT Module
  - CPS-PCS341EC-DS1-9201
  - CPS-PCS341EMB-DS1-9201

#### Integrated Type
- EtherCAT Module
  - CPS-PCS341EC1-9201
  - CPS-PCS341EMB1-AD5C1-9201

### CODESYS Programming

**Equipped with the PLC engine “CODESYS,” which continues to be used more and more commonly in the global market.** Applications can be developed in programming languages, such as Ladder/SFC/Function Block etc., that comply with international standard IEC 61131-3.

**Integrated Development Environment Provided free of charge.**

An integrated development environment for developing applications is provided free of charge. This makes it possible to seamlessly perform all the required development such as control logic and field bus I/O.

**Supported integrated development environment: V3.5 SP7 Patch 2 or later**

**Supported languages: LD / SFC / FBD / ST / IL / CFC**

### Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>EtherCAT Module</th>
<th>Modbus Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODESYS Function</td>
<td>V3.5 SP7 Patch2 or later version</td>
<td>Modbus TCP Master / Slave</td>
</tr>
<tr>
<td>Languages</td>
<td>LD, SFC, FBD, ST, IL, CFC (IEC61131-3 compliant)</td>
<td></td>
</tr>
<tr>
<td>Field Bus</td>
<td>EtherCAT Master</td>
<td>Modbus TCP Master / Slave</td>
</tr>
<tr>
<td>Communication Protocol</td>
<td>OPC-UA Server</td>
<td></td>
</tr>
<tr>
<td>Program size</td>
<td>1 MB</td>
<td></td>
</tr>
<tr>
<td>Maximum Steps</td>
<td>250 K Steps</td>
<td></td>
</tr>
<tr>
<td>Basic Instruction Execution Speed (LD)</td>
<td>1.6 ns</td>
<td></td>
</tr>
<tr>
<td>Application Instruction Execution Speed (ST)</td>
<td>5.8 ns</td>
<td></td>
</tr>
<tr>
<td>Variance</td>
<td>Maximum 320 µs</td>
<td></td>
</tr>
<tr>
<td>Scan Time</td>
<td>74 µs (20000 steps)</td>
<td></td>
</tr>
<tr>
<td>Processing Time (LD)</td>
<td>144 ns</td>
<td></td>
</tr>
<tr>
<td>Processing Time (ST)</td>
<td>138 ns</td>
<td></td>
</tr>
<tr>
<td>Scan time</td>
<td>166 µs (64 Input and 64 Outputs)</td>
<td></td>
</tr>
</tbody>
</table>

### System Configuration

**Application Sample**

- Electronic Component Mounting Machine
- Semiconductor Manufacturing Equipment
- LCD/FPD Manufacturing Equipment
- Machine Tools and Processing Machine

**SCADA / MES / ERP Linking**

**Built-in OPC-UA Server**

OPC-UA is essential for the MODBUS communication. The controller has a built-in server function. This enables the safe and stable exchange of data with SCADA software and MES/ERP systems.

**Web Monitor Function**

The controller has a built-in web server function and tools for creating screens for use on the web. This makes it possible to easily view equipment information without using a cloud server or a similar device.

**Sales areas and Languages**

- Japan
- China
- Korea
- Malaysia
- Southeast Asia
- India
- English

**For more information**

URL: https://www.contec.com

**Contact:** CONTEC CO., LTD.

3-9-31 Himesato, Nishiyodogawa-ku, Osaka 555-0025 JAPAN

TEL: +81-6-6477-5219

URL: http://www.contec.com

[E-mail: intsales@contec.jp]
**CODESYS**

**IEC 61131-3 Engineering / Software PLC / Motion / CNC / HMI**

**Features**

CODESYS is the number one hardware-independent IEC 61131-3 software suite for the automation industry. The tool is used to develop application software for compatible hardware and software PLCs, professional HMI screens and motion control projects with CNC or robotics for example using EtherCAT.

More than 400 device manufacturers worldwide use the tool to engineer their intelligent devices. Well over one million such devices are used to operate different industrial machines and plants every year.

**System Configuration**

- Logic, motion and HMI applications, as well as EtherCAT configurations can easily be engineered using the CODESYS Development System.
- Depending on the requirements of the application, such as the number of control axes and motion cycles, compatible controllers and drives can be combined.

---

**Specifi cation**

Fully integrated: Realize PLC, Motion and HMI functions on a single device with CODESYS.

- **PLC Programming**
  - IEC 61131-3-compliant, all languages (ST, Ladder, FBD, SFC, CFC) supported, plus real object oriented programming

- **SoftMotion**
  - For single axis control, electric cam and gear, using the integrated FBs (PLCopen Motion Control part 1, 2 compliant)

- **SoftMotion CNC+Robotics**
  - For complex coordinated motion control tasks such as robotics/CNC applications using the integrated FBs (PLCopen Motion Control part 4); linear / circular interpolation, various kinematics, G-code programming, comfortable axis configuration etc.

- **HMI, Visualization**
  - Integrated visualization editor in the CODESYS Development System: easy creation of modern operation screens and linking to IEC 61131-3 variables; display of the generated screens on IPCs, on panel PLCs with CODESYS TargetVisu, on standard Web browsers with CODESYS WebVisu (via HTML5) or in the engineering tool

- **Fieldbus**
  - Integrated fieldbus configurators and protocol stacks as CODESYS libraries seamlessly integrated in the CODESYS Development System for numerous fieldbus systems, such as EtherCAT, PROFINET, Ethernet/IP

---

**Sales areas and Languages**

- Japanese
- English
- Chinese
- German
- Italian
- Russian
- Spanish
- French

**For more information**

URL: [https://www.codesys.com](https://www.codesys.com)

Contact: 3S-Smart Software Solutions GmbH
Memminger Str. 151, 87439 Kempten, Germany
Tel: +49-831-54031-0  Fax: -50

[Email: info@codesys.com](mailto:info@codesys.com)
Stand-alone Motion Computer Power-PMAC series
Power-PMAC-Clipper

Features
Compact embedded EtherCAT master solution packed with the power of the cutting edge Power PMAC

- Real-time motion computer equipped Dual-Core PowerPC processor
  The Power PMAC is a general-purpose embedded computer running under a hard real-time Linux OS with a sophisticated motion and machine control application built in. Users can program in the easy-to-use Script language as well as standard C language, leveraging its sophistication and flexibility.

- Real All-In-One package with on-board GPIO, Pulse-counter and Analog I/O
  Not like any other EtherCAT master solution, Power-PMAC-Clipper can interface directly with encoders, sensors and I/Os which allows you the integration of any kind of industrial motion control application.

- Power PMAC Integrated Development Environment (IDE)
  Power PMAC IDE software is based on the Visual Studio programming environment. It is used to develop, debug and test Power PMAC programs as well as setting up, detect, configure and diagnose Power PMAC hardware. MATLAB/Simulink Power PMAC Target is also included for user-servo ANSI C code generation.

Specification

<table>
<thead>
<tr>
<th>Hardware specification</th>
<th>Software specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Processor</td>
<td>PowerPC EP405SEX (Dual-Core) Standard 1.0 GHz (option 1.2 GHz)</td>
</tr>
<tr>
<td>Memory</td>
<td>1 GB DDRAM3 (option 2 GB)</td>
</tr>
<tr>
<td>Backup</td>
<td>1 GB Flash-RAM (Max. 4 GB)</td>
</tr>
<tr>
<td>Communication interface</td>
<td>100 Mbps Ethernet, RS232C, USB2.0 EtherCAT Master (option)</td>
</tr>
<tr>
<td>Power supply</td>
<td>DCS V5/3.5 A, DC15 V@0.3 A, DC-15 V@0.25 A</td>
</tr>
<tr>
<td>Output command</td>
<td>Analog +/-10 V Torque/Velcity Pulse and Direction</td>
</tr>
<tr>
<td>EtherCAT Master</td>
<td>Up to 64 axes (option) C8P/C8V/C8ST mode</td>
</tr>
<tr>
<td>Encoder input</td>
<td>Quadrature, Halls, EnDat2.2, Mitsubishi, SSI, Mitutoyo, Tamagawa, Yaskawa, Panasonic</td>
</tr>
<tr>
<td>AUX Pulse input</td>
<td>2 Quadrature</td>
</tr>
<tr>
<td>Flag input</td>
<td>HM, +/-LIM, USER, FAULT AUX Flag LUV (TTL)</td>
</tr>
<tr>
<td>Flag output</td>
<td>AENA, Automatic Brake control</td>
</tr>
<tr>
<td>Universal Inputs/Outputs</td>
<td>32 DIO (5 V CMOS), 4 A/D and 1 D/A (option)</td>
</tr>
<tr>
<td>Dimension (mm)</td>
<td>W241 x D115 x H25</td>
</tr>
</tbody>
</table>

| No. of control axes    | Up to 256 axes |
| Controlling method     | Point to Point, Continuous Pass |
| Control period         | Up to 60 kHz/1 axis |
| Trajectory generation  | Linear, Circular, Rapid, PVT, Spline, Helical |
| Unit of control        | Any industrial unit |
| Accel/Decel method     | Trapezoid, S curve accel/decel, Vibration suppression filter |
| Accel/Decel time unit  | Sub-millisecond |
| Positioning range      | 53 bit (signed) |
| Position compensation  | Ball screw pitch, 1D, 2D or 3D, 1°/3° order interpolation, Torque, Backlash, Tool radius |
| PLC function           | C-PLC (ANSI C), PMAC Script PLC |
| User algorithm         | Custom-written servo/phase routines (Matlab/Simulink friendly) |
| Synchronous control    | Electronic Gearing and Cams, Time base control, EQU |
| Advanced features      | Spectral Decomposition, Lookahead, Forward/Inverse kinematics |

System Configuration

Application Sample
From the Simplest Application, to the Most Complex and EVERYTHING in Between...
For details, please check out our Video Center for more information.
URL: http://www.deltatau.com/DT_Resources/VideoCenter.aspx

System Configuration

Power-PMAC-Clipper

- Quadrature Input
- Pulse Output
- Analog Input
- Filtered PWM DAC Output
- GP I/O

Ethernet/Modbus

Touch Panel
PC
Pendant

MINAS A5B (up to 32 Axes)

EtherCAT

Rotary/Linear Servo motor (up to 8 Axes)

Linear Scale (ABS)

Sales area and Language

- English
- Chinese
- Korean
- Japanese

Please contact the following URL for details:
URL: http://www.deltatau.com/DT_About/aboutCorporateOffices.aspx

For more information
URL: http://www.deltatau.com

Contact: Delta Tau Data Systems, Inc. USA West Coast Headquarters
E-mail: sales@deltatau.com
21314 Lassen Street Chatsworth, CA 91311, United States

Contact: Delta Tau Data Systems, Inc. USA East Coast Headquarters
E-mail: sales@deltatau.com
TEL: +1-617-256-6240 FAX: +1-617-256-6242
1155 Summer Street Woburn, MA 01801, United States

Contact: Delta Tau Data Systems, Inc. European Headquarters
E-mail: sales@deltatau.com
TEL: +44-1284-702-200 FAX: +44-1284-702-201
17 Brookside, Stowmarket, Suffolk, UK IP14 4LS
**Features**
- Configurable controller for up to 8 axes of EtherCAT Master with any of the first 4 axes for local control or EtherCAT Master
- 10/100BASE-T Ethernet port; (1) EtherCAT Port; (2) RS232 ports up to 115 kbaud
- Available with internal, multi-axis servo or stepper drives. Or, connect to conventional external drives (only first four axes)
- For local axes, accepts up to 22 million counts per second for quadrature encoder for servos; Outputs up to 6 MHz for steppers; EtherCAT command speed up to 1 billion counts per second
- Sample times as low as 375 microseconds for 1-4 axes and 750 microseconds for 5-8 axes
- First four axes, advanced PID compensation with velocity and acceleration feedforward, integration limits, notch filter and low-pass filter
- Modes of motion include jogging, point-to-point positioning, position tracking, contouring, linear and circular interpolation, electronic gearing, ECAM and PVT
- Ellipse scaling, slow-down around corners, infinite segment feed and feed rate override
- Multitasking for concurrent execution of up to eight application programs
- Non-volatile memory for application programs (4000 Lines), variables and arrays (2400)
- Dual encoders for every local servo axis
- Optically isolated home input and forward and reverse limits for every local axis; Uses EtherCAT drive for home and limit switches
- Uncommitted, I/O: • 8 optically isolated inputs and 8 optically isolated outputs • Isolated, high-power outputs for driving brakes or relays (local axis only) • 8 uncommitted analog inputs • High speed position latch and output compare • 32 additional 3.3 V TTL I/O (5 V option) • More I/O available with RIO PLC
- 2 line x 8 character LCD
- Accepts single 20 - 80 VDC input
- Communication drivers for Windows and Linux
- Custom hardware and firmware options available

**System Configuration**
- Local
  - Up to 4 axes
  - Stepper
  - Brushed & Brushless
  - Ethernet
- EtherCAT
  - Up to 8 axes
- PC
- DMC-500x0 EtherCAT 1-8 axis Master
- DMC-574x0 EtherCAT I/O
- MINAS A5B

**Application Sample**

**System Configuration**
- PC
- USB
- DMC-52xx0 EtherCAT Master
- MINAS A5B
- Up to 32 axes

**Sales areas and Languages**
- Galil Headquarters in California
- World-wide sales network
- English

Please see our rep finder tool or contact us for more details.

**For more information**
URL: [http://www.galil.com/](http://www.galil.com/)

Contact: Galil Motion Control, Inc.
270 Technology Way, Rocklin, CA 95765, United States
TEL: +1-916-626-0101 or 800-377-6329 (US Only)
E-mail: support@galil.com
### Features

**HLS-ECMC/RSI**
- EtherCAT multi-axis positioning software module
- EtherCAT that can be developed with VC++, VC #, VB

- The software module that performs motion control on real-time OS
- Controls servo driver with EtherCAT communication (CiA 402 profile)
- Control axes will be from 6 up to 64 axes (can be handled in by 1 axis unit)
- The program is written in C language
- API functions conforming to international standard specifications
- Development environment: Visual Studio + InTime SDK
- The cycle time will depend on the PC (PDC cycle: 125 µs possible)

**HLS-ECAT/Win**
- EtherCAT motion control software by Windows PC
- Execute real-time processing on the RTOS with Windows as the interface. Easy developing the EtherCAT system
- Control axes will be 32 axes
- Motion control can be embedded into Windows application development
- Development environment: Visual Studio 2008 or later (VC++, VC6, VB)
- The cycle time will depend on the PC (PDC cycle: 125 µs possible)

### API Function List (not all)

- **MC_InitAxisSetting**
  - Initializes axis setting

- **MC_GetAxisSetting**
  - Acquires axis setting

- **MC_MoveAbsolute**
  - Absolute positioning

- **MC_MoveRelative**
  - Relative positioning

- **MC_Reset**
  - Resets errors

- **MC_ReadActualPosition**
  - Reads current position

- **MC_ReadActualVelocity**
  - Reads current velocity

- **MC_ReadStatus**
  - Reads motion state machine

- **MC_GetAxisError**
  - Acquires absolute error

- **MC_ResetAxis**
  - Resets axis

- **MC_MoveAdditive**
  - Additive interpolation

- **MC_MoveLinear**
  - Linear interpolation

- **MC_TouchProve**
  - Latches with trigger input

- **MC_GroupStop**
  - Group stop

- **MC_GroupPath**
  - Group interpolation

- **MC_Home**
  - Home

- **MC_MovePath**
  - Curving interpolation

**Common Spec.**
- Acquire slave information
- Homing
- Continuous feed
- Relative/absolute Positioning
- Velocity override etc.
- Aquire current position, velocity
- Aquire axis sensor information

**Below is only for "HLS-ECAT/Win"**
- Relative/absolute Linear Interpolation
- Interpolation (by specified passing points)
- Aquire Diagnosis message
- Various parameter input/output via SDO communication
- Data input/output to peripheral devices (analogue devices, Digital input/output devices, etc.) etc.

### Specification

- **API Function List (not all)**

### Sales area and Language

**Sales area**
- Japan
- English

**Language**
- Japanese
- English

**For more information**

URL: http://www.hivertec.co.jp/

**Contact:**
Mitsuseimei Shin-ohashi Blvd. 1-8-11 Shin-ohashi Koto-ku, Tokyo, 135-0007, Japan
TEL: +81-3-3846-3801  FAX: +81-3-3846-3773

**IPC base PAC (Programmable Automation Controller)**

**Hkos series**

- **Easy to use**
  - The open international standard IEC 61131-3
- **Stable supply**
  - Cooperated with IPC manufacturers
- **Benefits of using a PC**
  - Huge memory, storage, connectivity with the network, Windows
- **Real time**
  - PLC operating on RTOS

Programmable Automation Controller to realize the above

**Platforms that can be chosen**

**IPC**
A variety of platforms that can be chosen, such as BOX PC, 19 inch rack, Wall mount, Panel PCs etc. Customizable for such as CPU, Memory, Storage, External interface (Such as RS-232C, USB, Expansion slot etc.), Response to standards etc.

**EtherCAT Specification**
EtherCAT Master Class A + Cable Redundancy + Motion Control

**PLC Specification**
- **Task**
  - Task type: Cyclic task, Event task, Freewheeling, Status task
  - Number of Task: up to 100
  - Task Priority: 32 Levels
  - Period of cyclic task: Minimum 50 µs
- **Development Language**
  - Corresponds to 6 development languages, such as IL, LD, FBD, SFC, CFC

**Debugging**
- Capability of Writing during operation, Editing online, Tracing

**Motion Functions**
These functions are possible such as Continuous feed, Relative/absolute positioning, Velocity override, Acquisition of current position/velocity, Acquisition of axis sensor information and others. Fuctions such as Interpolation including kinematics are to be added sequentially

**Hivertec Control System**

**Hivertec Control System**

**Hivertec Control System**

**Hivertec Control System**
Software CNC
COSTANTINO CNC

Features
Costantino is a SoftCNC that can be completely customized by OEM customer to create their own CNC solution, using proven and robust components.

Costantino runs on any IPC so you can choose your favorite brand that can guarantee international support on hardware components. It runs completely independent on Windows using its dedicated CPU processors in a multicores environment using its dedicated memory amount and its Ethernet controller.

Costantino connects with servo and IO devices of any brand using its integrated EtherCAT master and configurator. If customer wishes to use different fieldbus such as Mechatrolink or CANopen, Costantino can interface an ISAC-provided EtherCAT slave device that provides compatibility with all of these interfaces, and more. In addition to the natively supported fieldbuses, OEM customers can add support to any other fieldbus using an SDK that allow to easily develop by themselves or using ISAC engineering help.

Costantino comes with a PLC environment that is compatible IEC61131-3, so you can program it with any of the languages that are part of the standard: ST, IL, LD, FBD, SCD. In addition, you can create FBs in C language and thus reuse components written for different hardware solutions.

Costantino CNC interprets G-codes (ISO6983) with some features that are important in many application; with 25000 blocks/sec and more than 250 blocks of look ahead, it is one of the fastest CNC in the market.

All movements are under Jerk control for tooltip and joints, this guarantees the best mechanics lifetime and performance;

It runs up to 8 different interpolation programs at the same time, and handle auxiliary axes for clamps, loaders and unloaders, or tool change, for a total of 128 axes;

It supports High Speed Machining, that keeps cutting feedrate constant, reduces machining timing, and reduces machine vibrations;

It comes with high accurate vibration suppression algorithms, following error compensation, velocity feed forward and many other tools to achieve the best cutting results;

It compensates tool length and radius;

It can handle online tool measures, tool wearing and life, and complex tool change procedure;

It includes 5 axis machining interpolator to program tool tip in machines equipped with bi-rotative heads, tilting tables, and even robots.

It comes with a powerful simulation engine capable of showing results on the material before machining takes part.

Application Sample
- Stone Cutting
- Metal Milling
- Thermal Cutting (Plasma, Laser, Oxi)
- Wood Working
- Dental Applications

System Configuration
- Software CNC Costantino
- Panel PC or Industrial PC
- EtherCAT Bridge for connecting servodrivers and I/Os

Sales areas and Languages
- Sales areas: Europe, North America, Asia and the Middle East
- Sales Languages: English, Italian, Turkish, Chinese, Portuguese

For more information
URL: www.costantinocnc.com

Contact:
ISAC s.r.l.
Via Maestri del Lavoro, 30, 56021 CASCINA (PI) - Italy
TEL: +39 (0)50 711131  FAX: +39 (0)50 711472
E-mail: info@isacrl.com
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AMU, LLC
Mr. Andrew Urda, Chicago, IL, USA
TEL: +1 224 830 0240
E-mail: aurda@amu-llc.com
URL: www.amu-llc.com

GTT co. LTD (Stone Market representative for China)
Mr. Jason Ou
TEL: +86 139 5951 0697
E-mail: jason@gttchina.com
URL: www.gttchina.com

Seromsys
#304 Engineering P-Block, 237 Sangidahak-ro, Siheung-si, Gyeonggi-do 429-793 - Korea
TEL: +82 (0)31 434-9048  FAX: +82 (0)31 434-9049
E-mail: jeongyong.kim@seromsys.com
URL: www.seromsys.com
Programmable Automation Control

**PAC Ilium**

**Features**

Ilium is a newly developed PAC (Programmable Automation Controller) based on more than 10 years of ISAC experience in the field. It includes all main functionalities needed to build an Industrial Automation application, all in one device: PLC Logic Execution + Motion Control + Communication and integration with other software components + HMI.

Those functionalities do not interfere between each other, as it is possible to use more than one core of the processor, all of the tasks are executed with high precision and with defined execution times.

Ilium interfaces with other devices through an Ethernet port that supports EtherCAT or Powerlink. Using the ISAC Bridge, Ilium supports many other fieldbus (CANopen, Mechatrolink, Analog interface with position reading through Encoder, SSI or ENDAT, Pulse/Direction or Stepper interface). Ilium offers complete diagnostic tools for faults and anomalies detected on the I/Os peripherals and on the servo drivers. All of the errors are stored, allowing to analyze them at a later time, even in the case of unattended operation.

Ilium is available in two formats: the application is portable between different formats, the development tools are the same, as well as the application libraries.

**IIUM Embedded** is a compact device, powerful enough to drive up to 11 EtherCAT axes. It is available with touch screen, it supports USB, COM ports, external HDMI video, one Ethernet port for programming and Web interfaces.

It does not contain moving parts, all of the components are non-removable, few Watts are enough to allow it to run.

**IIUM soft-Motion** is a real-time software that runs on an IPC; it uses exclusively a part of the hardware resources: one or more cores of the CPU, a portion of RAM, one Ethernet port; communication and HMI is managed by Windows. You can choose the PC: choose the ISAC model that suits your needs, or your preferred IPC supplier.

Ilium soft-Motion comes with no performance compromises, and offers the flexibility and the power of the PC to realize a customized user interface, using ISAC tools or alternative ones.

Ilium offers powerful and integrated development tools in order to make easier the PLC logic development and its debug, the start-up of the machine or of the plant, and its maintenance. You can develop the application in the IEC61131 standard languages (ST, IL, LD, FBD, SCD). Program the PLC logic with Multiprog, from Phoenix Contact Software. You can also use ANSI C, and compile in native code, in order to obtain the maximum performance and reliability, to create whole tasks with this language, or to create FBs to be used inside Multiprog. Ilium supports PLCopen MC part 1 and 2, version 2.0. The supplied FBs includes Cams (programmable from PLC logic or to be created from sampling), Gears, Electric Shafts, Phasing, Slave Synchronous Movement (referred on more Masters), all movements based on space or speed control, with speed, acceleration and Jerk control to assure fluid movements and the dampening of the resonances. The servo drivers can be tuned using the integrated diagnostic tools, as the oscilloscope, and all of the parameters will be stored and sent to the servo drivers by Ilium itself, making the replacing of servo drivers very easy.

ISAC Ilium: TRY TO STOP IT!

**System Configuration**

**x86 version**

- Software PAC Ilium x86
- Panel PC or Industrial PC
- EtherCAT Bridge for connecting servo drivers and I/Os

**EMBEDDED version**

- ISAC Ilium Carrier Board
- Software PAC Ilium Embedded
- Optional EtherCAT Bridge for connecting servo drivers and I/Os

**Sales areas and Languages**

Please contact us for details.

**For more information**

URL: [www.isacsrl.it](http://www.isacsrl.it)

**Contact:**

- ISAC s.r.l.
  [Via Maestri del Lavoro, 30, 56021 CASCINA (PI) - Italy](mailto:isacsrl@isacsrl.eu)
  [TEL: +39 (0)50 711472 FAX: +39 (0)50 71131]
- AMU, LLC
  [Mr. Andrew Urda, Chicago, IL, USA](mailto:contact@amu-llc.com)
  [TEL: +1 224 830 0240]
- GTT co. LTD (Stone Market representative for China)
  [Mr. Jason Ou](mailto:46092872@qq.com)
  [TEL: +86 139 5951 0697]
- Seromsyys
  [#304 Engineering P-Block, 237 Sangidaehak-ro, Siheung-si, Gyeonggi-do 429-793 - Korea](mailto:jaeyeongyong.kim@seromsyys.com)
  [TEL: +82 (0)31 434-9048 FAX: +82 (0)31 434-9049]
PC Based Controller

RT-C Language Controller

Features

- RT-C Language Controller for Windows can give determinism to ensure predictable behaviors and can support real-time tasks to standard Windows platforms. Though Windows is a global standard on human machine interfaces (HMI) and on other general purpose operating system (GPOS) functions, but only Windows cannot provide deterministic supports for real-time application needs.

- Complete RTOS for Windows platforms
  RT-C Language Controller is a controller which can achieve 100 μs period high-speed real time control.
  You can realize both real time instrument control function and multi-purpose Windows function on 1 PC platform, since it can also run on Windows.

- Machine control by RT-C Language Controller
  RT-C Language Controller which makes use of PC platform can offer unmatched performance since it uses latest Intel CPU.
  In developing control program, since it adopts the integrated development environment “Visual Studio” which is the most popular all over the world, if you have experienced Windows programs with C# language, you can smoothly introduce it to your systems.

System Configuration

- User Application
- Motion Library
- MINAS A6B series

Specification

<table>
<thead>
<tr>
<th>Priority Scheduling</th>
<th>0 (highest) - 16 (lowest) 16 levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Scan Time</td>
<td>More than 0.1 ms</td>
</tr>
<tr>
<td>Number of Maximum Tasks</td>
<td>16</td>
</tr>
<tr>
<td>Data Area Size</td>
<td>64 MB</td>
</tr>
<tr>
<td>Supported OS</td>
<td>Windows10, Windows8.1, Windows8, Windows7 [32 bit/64 bit]</td>
</tr>
</tbody>
</table>

PC Based Controller

INplc PLC based on IEC61131-3

Features

- INplc-Controller with “INplc Runtime License”
  The most advantageous point of INplc is that it can be used with Windows together.
  It is a multifunctional controller equipped with not only PLC applications but also C language applications / HMI applications. You can use add-in boards or field buses as I/O interfaces of INplc.
  EtherCAT is also contained in the field bus category which INplc supports.

- You can develop and maintain PLC programs on standard Windows PC platforms using it. The created PLC programs can be downloaded to PLC controllers via network.
  • INplc has corresponded to 5 languages in accordance with IEC61131-3 that IEC (International-Electrotechnical Commission) provides.
  • You can code different languages together in INplc-SDK environment.
  • INplc-SDK also allows you to convert across languages.

INplc is a real software-PLC in accordance with IEC61131-3.
INplc adopts MULTIPROG & ProConOS (by PHOENIX CONTACT Software, Germany) which have achieved a lot of satisfactory results in the world. And INplc-Controller adopts INtime and a standard Windows computer as its basic structure. Therefore,
  • No specialized hardware is needed.
  • Efficient hardware can be selected from among marketed commodities. From high-end systems to embedded-systems, you can construct various systems with a high-flexibility.

Priority Scheduling | 0 (highest) - 16 (lowest) 16 levels |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant Scan Time</td>
<td>More than 0.1 ms</td>
</tr>
<tr>
<td>Number of Maximum Tasks</td>
<td>16</td>
</tr>
<tr>
<td>Data Area Size</td>
<td>64 MB</td>
</tr>
<tr>
<td>Supported OS</td>
<td>Windows10, Windows8.1, Windows8, Windows7 [32 bit/64 bit]</td>
</tr>
<tr>
<td>Development languages and Environments</td>
<td>IEC61131-3 Language (IL, ST, LD, FBD, SFC), C#</td>
</tr>
</tbody>
</table>

Sales area and Language

- English
- Japanese

For more information

URL : http://www.mnc.co.jp/index_E.htm

Contact: Micronet Company
TMY Building 9F,17-13, Hacchobori 3-chome, Cyuouku, Tokyo, Japan (Zip 104-0032) [E-mail : bcd@mnc.co.jp]
TEL: +81-3-6909-3371  FAX: +81-3-6909-3373

Some diagrams and images are not fully transcribed due to their complexity and high resolution.
Teach Worker Intelligent Robot Controller for Any Robot
The World’s First Robot Controller with Motion Planning

**Features**

**Industrial Robots for Everyone**

- **Sensor**
- **PLC**
- **Other Machines**
- **Ethernet**
- **Robot Controller**

**ALL IN MUJIN**

- Teaching System UI
- Kinetics Analysis
- Motion Planning
- Communication Interface

**MUJIN Controller (Teach Worker)**

**Motor Amplifier**
Panasonic MINAS A6B

**Any Robot**

**Panasonic “AC Servo Motor”**
Integration of Mujin’s Teach Worker with “AF Series” or “SHA-P Series” gearbox equipped Panasonic servo motors can be completed within 1 month.

**Custom robots only require 1 month or less to integrate**

**Specifications**

**Innovative User Interface (UI)**

“Teach Worker” removes the burden of traditional complex task programming by presenting an interactive user interface with 3D graphics and support for Mujin’s optimized programming language ITL.

**Less Teaching (Autonomous Collision Avoidance)**

Mujin’s motion planning technology with advanced collision avoidance logic can be configured easily, enabling robotics systems to operate in small footprint and complex environments without risk of collision.

**CAD/CAM**

Welding, laser cutting, and deburring related data can be imported using standard CAD formats to easily produce production-ready tasks.

**3D Simulator**

A simulator is included that can be used to validate tasks before deployment in real-world environments, reducing overall time to deployment and manual tuning on-site.

**Remote Maintenance**

You can support robots within your facility remotely regardless of robots location via Mujin’s Teach Worker.

**Sales areas and Languages**

- English
- Japanese
- Chinese

**For more information**

URL: http://www.mujin.co.jp

Contact: Mujin, Inc.
1-1-9 Narihira, Sumida, Tokyo, 130-0002, JAPAN
[Tel: +81-3-4577-7638][E-mail: info@mujin.co.jp]
Rugged, Reconfigurable Smart Machine Controller
CompactRIO Performance Controller (cRIO-9034, cRIO-9039)

Features
- Motion, Vision, signal-conditioned I/O, and HMI integration on one platform
- High Performance Real-Time processor
- User-Programmable FPGA
- Over 100 signal-conditioned I/O modules to customize your application
- EtherCAT, Ethernet/IP, Profinet, Modbus, OPC-UA, and other common buses supported
- Pre-written motion control and vision analysis libraries for real-time and FPGA

Specification

<table>
<thead>
<tr>
<th></th>
<th>4-slot Performance</th>
<th>8-slot Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Up to Quad-Core Intel Atom E3845, 1.91 GHz</td>
<td></td>
</tr>
<tr>
<td>Modular C Series I/O Slots</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Control Cycle Time</td>
<td>250 µs (min.) over EtherCAT</td>
<td></td>
</tr>
<tr>
<td>RAM</td>
<td>Up to 2 GB DDR3 + 128 MB DDR3 for FPGA</td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>Up to 16 GB + SDHC Card Slot</td>
<td></td>
</tr>
<tr>
<td>Programming Environments</td>
<td>LabVIEW, C/C++, IEC 61131-3</td>
<td></td>
</tr>
<tr>
<td>Shock/Vibration Ratings</td>
<td>50 G Operational shock, 10 Hz – 500 Hz Random Vibration</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>–20 °C to 55 °C (–40 °C to 70 °C extended temp models available)</td>
<td></td>
</tr>
<tr>
<td>Operating System</td>
<td>NI Linux Real-Time, 64-bit</td>
<td></td>
</tr>
<tr>
<td>FPGA Type</td>
<td>Up to Kintex-7 325T</td>
<td></td>
</tr>
<tr>
<td>Certifications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Application Sample
- Machine control systems
- Manufacturing machines
- Pick-and-place machines
- Industrial robotics and automation
- CNC machines
- Vision-guided motion
- Material handling machines
- Hydraulic control
- Power conversion equipment
- Mining and drilling equipment
- Multi-axis motion control
- Machine tools
- Condition Monitoring

System Configuration
Simplify system complexity by eliminating the need for separate subsystems.
Integrate motion, vision, HMI, and I/O on a single controller

Analog, digital, and specialty I/O
MINAS A5B

Sales areas and Languages
- Operations in over 50 countries
- Support for dozens of languages
- Global training and support

Please contact us for details.

For more information
URL: http://www.ni.com/motion

Contact: National Instruments Corporation
11500 N. Mopac Expy. Austin, TX 78759
E-mail: support@ni.com
TEL: +1-866-275-6964
EtherCAT General Motion Controller
NET200-GMC

Features
● Standardized EtherCAT master
● Built-in integrated development environment: NexMotion Studio
● Master control cycle: 1ms

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axis No.</td>
<td>8 Axes</td>
</tr>
<tr>
<td>Cycle Time</td>
<td>1 ms</td>
</tr>
<tr>
<td>Single Axis Control Functions</td>
<td>PTP/ Jog/ Halt/ Stop</td>
</tr>
<tr>
<td>Single Axis Blending Motion</td>
<td>Aborting/ Buffered/ Blending</td>
</tr>
<tr>
<td>Single Axis Command Override</td>
<td>Position/ Velocity/ Acceleration/ Deceleration</td>
</tr>
<tr>
<td>Axes Group Types</td>
<td>Cartesian Coordinated</td>
</tr>
<tr>
<td>Axes Group Control Functions</td>
<td>PTP/ Linear/ 2D Arc/3D Arc</td>
</tr>
<tr>
<td>Axes Group Blending Motion</td>
<td>Aborting/ Buffered/ Blending</td>
</tr>
<tr>
<td>Platform Specifications</td>
<td></td>
</tr>
<tr>
<td>CPU</td>
<td>Intel® Celeron® processor J1900 Quad Cord 2.0 GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>4 GB RAM (2 x DDR3L)</td>
</tr>
<tr>
<td>Display</td>
<td>Dual independent display: DVI-I and DP</td>
</tr>
<tr>
<td>I/O Interface-Front</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ATX power on/off switch LEDs for HDD LED, Balty LEDs, Power LED, COM port Tx/Rx, 5 programmable GPO LEDs</td>
</tr>
<tr>
<td></td>
<td>1 x External SD Card</td>
</tr>
<tr>
<td></td>
<td>1 x SIM card holder</td>
</tr>
<tr>
<td></td>
<td>2 x Intel® i210AT GbE LAN ports, support WoL, Teaming and PXE</td>
</tr>
<tr>
<td></td>
<td>1 x DP display output</td>
</tr>
<tr>
<td></td>
<td>1 x DVI-I display output</td>
</tr>
<tr>
<td></td>
<td>1 x USB 3.0 (900 mA per each)</td>
</tr>
<tr>
<td></td>
<td>3 x USB 2.0 (500 mA per each)</td>
</tr>
<tr>
<td></td>
<td>2 x RS232/422/485 support auto flow control</td>
</tr>
<tr>
<td></td>
<td>Jumper-free setting on RS232/422/485</td>
</tr>
<tr>
<td></td>
<td>Support 2.5 K isolation protection on COM1</td>
</tr>
<tr>
<td></td>
<td>1 x 3-pin DC input, Typical 24 V DC input with +/-20 % range</td>
</tr>
<tr>
<td>Dimensions</td>
<td>85 mm (W) x 157 mm (D) x 214 mm (H)</td>
</tr>
<tr>
<td>Certifications</td>
<td>CE/FCC Class A</td>
</tr>
<tr>
<td>Operation Environment</td>
<td>Operating system: Windows Embedded Standard 7</td>
</tr>
<tr>
<td></td>
<td>Real-time extension: RTX</td>
</tr>
</tbody>
</table>

For more information

Contact:
NEXCOM International Co., Ltd. / Headquarters
9F, No.920, Chung-Cheng Road, Zhonghe Dist., New Taipei City, Taiwan 23586, R.O.C.

NEXCOM Intelligent Systems / Taipei Office
13F, No.920, Chung-Cheng Road, Zhonghe Dist., New Taipei City, Taiwan 23586, R.O.C.
PLC Motion Control Unit
FP7 series AFP7MC64EC, etc.

Features
- A single FP7 Motion Control Unit can control 64 axes of MINAS A5B, A6B and 32 virtual axes.
- Up to 32 synchronous groups (32 groups of 2 axes to 2 groups of 32 axes)
- Control system: Cyclic position control
- Equipped with SD memory card. Communications log can be analyzed at startup which makes debugging easy.
- Through use of Web server function on FP7 CPU unit, remote monitoring is possible of things such as torque, speed and position of the motor.

Specifications
- **Motion Control Unit**
  - **Product name**: Motion Control Unit EtherCAT type
  - **Number of axis**: Real axis 16, Virtual axis 8, Part No. AFP7MC16EC
  - **Number of axis**: Real axis 32, Virtual axis 16, Part No. AFP7MC32EC
  - **Number of axis**: Real axis 64, Virtual axis 32, Part No. AFP7MC64EC

- **Motion Control Setting Tool**
  - **Product name**: Motion control setting tool
    - **Description**: Windows version. Downloadable free of charge from our website. Please purchase Key unit separately.
    - **Part No.**: AFP5MTEN
  - **Product name**: Control Motion Integrator
    - **Description**: License key for Control Motion Integrator. 1 license. For USB port.
    - **Part No.**: AFP5MTKEY

Application Sample
- Semiconductor manufacturing system, LCD/FPD manufacturing device, electronic component manufacturing device, industrial machine, food processing machine, automatic warehouse system, physical distribution conveyance system

System Configuration
- A single FP7 Motion Control Unit can control 64 axes of MINAS A5B, A6B and 32 virtual axes. Through use of Web server function on FP7 CPU unit, remote monitoring is possible of things such as torque, speed and position of the motor.

Sales areas and Languages
- Japanese
- English

For more information
- **FP7 URL**: http://www3.panasonic.biz/ac/efasys/plc/plc/fp7/index.jsp
- **URL**: http://panasonic.net/id/pidx/global

Contact: Panasonic Industrial Devices SUNX Co., Ltd.
2431-1, Ushiyama-cho, Kasugai-shi, Aichi, 486-0901, Japan
TEL: +81-568-33-7861   FAX: +81-568-33-8591
PC-Based, Advanced Soft Motion Controller

**WMX2 for EtherCAT**

### Features
- Connects all servo drives and I/O modules from a single LAN port - no additional motion board required. Fully synchronized control of 64 axes in 0.5 ms cycle time can be realized with a commercially available PC.
- Over 500 API functions for C/C++ and .NET. functions for EtherCAT communication, motion control, and I/O control are available to develop original user motion applications.
- Advanced features such as gantry control, acceleration/deceleration profiles, etc. can be used easily.

### All in One package

<table>
<thead>
<tr>
<th></th>
<th>EtherCAT Master</th>
<th>Real-time OS</th>
<th>Motion Control API</th>
<th>Network API</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMX Manager</td>
<td>Simple GUI</td>
<td>IEC61131-3 Software PLC</td>
<td>Robot Control API</td>
<td></td>
</tr>
</tbody>
</table>

**EtherCAT Servos Max 64 axes**

**MINAS A5B/A6B**

**Utility Tools**

- WMX Manager
  - Device (user application, thread, etc.) management tool
  - Device management; monitors and logs EtherCAT connection status
- General Operator
  - Basic motion command and status confirmation, I/O operation
  - Motion parameters can be freely set with intuitive and easy operation
  - Loads the I/O output setting file and reflects it on the output
- EzConfigurator
  - Communication setting, status monitoring tool
  - Parameter upload / download via network
  - Network topology display function
  - Network diagnosis function
- Profile Analyzer
  - Tool for displaying multi-axis motion in real time or from log data graphically
  - Timing control by trigger setting is possible
  - Trajectory analysis for multi-axis interpolation

### Specification

- **Number of Axes**: Maximum 64 axes (CP, PTP) + Profile mode n axes
- **Interpolation Types**: Linear (Maximum 64 axes), Arc (2 axes), 3D Arc (3 axes), Helical (3 axes)
- **Interpolation / Communication Cycle**: 0.25ms (16 axes), 0.5ms (64 axes)
- **Command Modes**: Position, Velocity, Torque, Profile mode
- **Motion Functions**: Positioning (PTP), JOG, Homing, Buffered API Execution, List Motion, Cubic-Spline, Path Interpolation, Soft Landing
- **Dynamic change of target position / speed / acceleration / deceleration profile during operation is possible**
- **Execution time simulation function of API buffer**
- **Acceleration / Deceleration Profiles**: Trapezoidal, S-Curve, Jerk (Jerk-limited or Jerk ratio), Sinusoidal, Parabolic, Trapezoidal moving average, Other Profiles: Two-Velocity, PVT, Profile Specification by Acceleration/Deceleration
- **Gantry Control**: Complete synchronous gantry control (Synchronization by position synchronization control + speed of gantry)
- **Synchronization Control**: Max 32 pairs, One-to-many axis combination, dynamic synchronization axis can be set, changed, released
- **Motion command execution based on axis-position and input events, etc., I/O control, Event with output to Windows**
- **Compensation Functions**: Pitch error, Backlash, Straightness correction
- **API Supported Language**: C (C++, .NET Languages (C#, VB)), .NET Framework: 4.0 or later
- **Recommended CPU**: Windows 7, Windows 10
- **Operating Environment**: OS: Windows 7, Windows 10

### Soft PLC Package

- Integration of WMX2 with Soft PLC developed by Phoenix Contact Software (formerly known as KW Software).
- IEC 61131-3 standard programming languages (LD, FBD, ST, IL, SFC) are available. Not only various motion functions of the PLCopen standard but also a wide variety of unique motion functions of WMX2 are offered as FB.
- Also included is an HMI creation tool based on Microsoft Visual Studio. It also integrates with the API library of WMX2, enabling flexible and powerful programming with C/C++, .NET/C#, and PLC languages.

### Application Sample

- FPD Manufacturing Equipment: FPD Exposure Apparatus, LCD Inspection Equipment, Mask defect repair system
- Industrial Robots / Processing machines: Wafer Transfer Robot, Pipe Bender, Various smartphone related automated equipment, Various battery related automated equipment

### Sales area and Language

<table>
<thead>
<tr>
<th>Country</th>
<th>Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>Japanese</td>
</tr>
<tr>
<td>Korea</td>
<td>Korean</td>
</tr>
<tr>
<td>China</td>
<td>Chinese</td>
</tr>
</tbody>
</table>

**For more information**


**Contact**: Soft Servo Systems, Inc.

3-1-13 AS Building 2F, Nishiki-cho, Tachikawa, Tokyo 190-0022, Japan


[Email: sales@softservo.com]
**Industrial Robot Controller Software**

**RMX for EtherCAT**

**Features**

- With specialized software running on a commercially available PC, simultaneously controls industrial robots’ axes and eight auxiliary axes at 1ms (Soft Motion Technology).
- Supports forward kinematics and inverse kinematics of various robots (6 axis vertical articulated, SCARA, Delta, etc.) as well as closed link mechanisms and link offset.
- By a simple and flexible original robot language “RBC”, can program robot motions and control peripheral devices such as I/O and CCD cameras.
- With various APIs for communication, robot control, and auxiliary axis control, original robot controller development is possible.

**Specification**

- **Maximum Number of Axes**: Max. 6 axes for a robot and Max. 8 axes for auxiliary axes
- **Interpolation / Communication Cycle**: 1ms
- **Supported Robots**: Vertical articulated (up to 7 axes, closed link and link offset supported), SCARA robots, Delta robots, Orthogonal robots
- **Robot Operations**: Positioning (PTP), Continuous Path Control (line, arc, spline), Jog, Homing, Inching, Teaching Playback, Robot Language Execution
- **Teaching Function**: Workspace Coordinate Management, Tool Offset Management, Acquisition Operating Point
- **Other Functions**: Logging (1ms cycle data of each axis and tip coordinates)
- **Recommended Operating Environment**: OS: Windows 7 32 bit (CPU: Min. Atom 2 GHz (E3845, etc.) 2 cores or more, Memory: 2 GB or more)

**Hardware Options**

- **IPC**: TERA17
  - Intel’s 4 core high performance CPU installed (Bay Trail-D J1900)
  - Memory: DDR3L 4 GB / Storage: SSD 120 GB
  - W: 145 mm, H: 56.5 mm (Compact size)
  - Onboard NIC used for EtherCAT communication
  - With this one IPC, EtherCAT master controller is available.

- **Teaching Pendant**: DTP7-D
  - By connecting to RMX-installed PC, various buttons, keyboard, touch panel can be used for robot teaching.
  - Waterproof / dustproof, 900 g (lightweight)
  - Low noise screen with VGA.
  - 800×480 resolution (1024×600 coming soon)

**Application Sample**

- Cutting, Transportation, Welding, Assembly, Pipe Bender, etc. Other Robots in General

**Sales area and Language**

- English
- Japanese
- Korean
- Chinese

**For more information**

URL: RMX for EtherCAT : http://www.en.softservo.co.jp/products/rmx/
### PC Based Fine Motion

**RTMC64-EC**

#### Features
- **PC Based Fine Motion** is a controller software for EtherCAT.
  - Your PC becomes a high performance motion controller. PC Based Fine Motion whose ability is several fold higher than that of a general NC or a robot controller controls at most eight precise machines by one PC.
  - The reliability of your controller can be improved by “INtime” and FAPC(Factroy Automation PC).

#### Specification
- **High-speed**: 0.25 msec/32-Axis 0.5 msec/64-Axis
- **Reliability**: Not dependent on Windows
- **Multi Axis Control**: 64-Axis / 8 task
- **8 task controlled simultaneously**: One PC controls 8 machines

#### Application Sample
- Precision cutting
- Robot
- Laser cutting
- Injection Molding
- Winding machine

#### System Configuration
- FAPC (Factory Automation PC)
  - PC applications
  - C Language
  - Software PLC
  - ProConOS

### PC Based Motion Library

**RTPL-EC**

#### Features
- **PC Based Motion Library** is a motion development software for EtherCAT user.
  - Function group for various motion.
  - In-house development of motion controller by C language with Visual Studio.
  - Sample sources are prepared.
  - High-speed operation with an efficient CPU (0.25 msec/32-axis 0.5 msec/64-axis)
  - High reliability by INtime, not depending on Windows / High reliability by FAPC(Fanless/SSD)
  - Easily operate from an application software on Windows.
  - Easily cooperate with software such as image processing.

#### Specification
- **Example of Function Call Flow**
  - Library Initialization (RTPLECInitLib();)
  - Library Close (RTPLCLOpenLib();)
  - Execute command (RTPLCExecActive();)
  - Wait for Response (RTPLCRespWait();)
  - Monitor Status (RTPLCMonStatus();)
  - SDO Write (RTPLCSDOWrite();)
  - PDO Write (RTPLCPDOWrite();)
  - Servo ON (RTPLCServoON();)
  - Servo OFF (RTPLCServoOFF();)
  - Servo Alarm Clear (RTPLCServoAlarm();)
  - Positioning (RTPLецPos();)
  - Linear Interpolation (RTPLCLineInterpolate();)
  - Circular arc Interpolation (RTPLC CircInterpolate();)
  - Jog Stop (RTPLCJogStop();)

#### Application Sample
- Semiconductor-fabrication equipment
- Electronic equipment production line
- Printing System
- Other multi axis control devices

#### System Configuration
- **FAPC**
  - EC-CEC Module
  - Techno DLL
  - User control software
  - In-House development for motion

- **PC Based Motion Library**
  - Techno DLL
  - User control software
  - In-House development for motion

#### Sales area and Language
- **Japanese**
- **English**

**For more information**
- PC Based Fine Motion URL: http://www.open-mc.com/products/pdt05.html
- PC Based Motion Library URL: http://www.open-mc.com/products/pdt06.html
- INtime URL: http://www.mnc.co.jp/INtime/

**Contact**
- TECHNO Co., Ltd.
  - 1304-5, Shimo-fujisawa, Itzuma-shi, Saitama, 358-0011, Japan
  - E-mail: mail@open-mc.com
  - TEL: +81-4-2964-3677
  - FAX: +81-4-2964-3322
Programmable Automation Controllers

Power Family

Features

All controllers of the **Power family** are equipped with 32 bit RISC (Reduced Instruction Set Computer) CPU to allow use of a sole **Real Time Multitasking Operative System (OS)** to manage PLC, CNC, HMI and IT tasks. The **scale** between the different models depends on:

- CPU with different clock (132 or 264 MHz) and cores (1 or 2)
- Memory architectures with different parallelism (16 or 32 bit)

The **compiler**, which generates the executable code, is integrated in the firmware of the controller so the system becomes completely autonomous and independent from the evolutions of the consumer world (PC) and unaffected by computer viruses.

There are two main executors, each one with its set of instructions:

- **PLC executor** which cycles continuously between the first and the last instruction of the PLC program
- **CNC executor** which starts only on request, it can be put on hold or deleted and it ends after the last instruction of the CNC program

CNC executor can process up to **5 CNC task** at the same time. Their execution are transferred in a buffer (**Look Ahead**) where they are processed to obtain effective trajectories of the interpolated axes. The commands inserted in ISO editor (the user program written in **G-code**) are interpreted and executed launching the execution of different blocks present in the BLC editor.

The OS manages many types of communication ports:

- **Ethernet** with the support of TCP/IP, FTP and ModbusTCP protocols; **OPC server** and **WEB server** are also available
- **RS232/RS485** serials with **Modbus** protocol (ASCII and RTU)
- **USB** which can connect **MSD** (Mass Storage Device) of different types and with more memory volumes, **HID** (Human Interface Device) like keypads / mouse and tracking devices like Gamepad

It can manage up to **28 axes** in point to point, gearing, camming and interpolation mode. Their trajectory can be shaped via many different levels of **Jerk** in order to reduce the inertial effect of load without great loses in performances.

Application Sample

- Plane cutting machines (Plasma, Laser, Oxy, Waterjet, Diamond disk)
- Stone working machines (Bridge saws, Polishing, CNC contouring)
- Woodworking machines (CNC for drilling, routing, tenoning, sawing)
- Metal machining (3-5 axes milling, parallel & automatic lathe turning)
- Textile (Cutting, Sawing, Labelling, Finishing & Washing)
- Pick & Place with Articulated, Cartesian, SCARA or DELTA robots
- Packaging and all sort of automatic machines

System Configuration

Sales area and Language

Please contact us for details.

For more Information

URL: www.texcomputer.com
Motion Coordinator and EtherCAT Interface Module

Motion Coordinator MC664 / MC664-X Panasonic EtherCAT Interface Module

Features
- Up to 128 Axes
- Servo period 50 μsec minimum (8 axes)
- Precise 64 Bit Motion Calculations with Quad Core Cortex A9 + 1 GHz Processor (P862)
- Dedicated Communications Core (P862)
- Built-in EtherCAT Port
- EtherCAT, Sercos, SLM and RTEX Digital Drive Interfaces
- Linear, Circular, Helical and Spherical Interpolation
- Flexible CAM shapes, Linked Motion
- EnDat, BISS and SSI Absolute Encoder Supported
- Hardware Linked Outputs for Camera / Laser Control
- Ethernet-IP / Modbus TCP / Ethernet Interface Built-In
- Anybus-CC Module for Flexible Factory Comms Including Profinet/Proibus
- IEC 61131-3 Programming
- Multi-tasking BASIC Programming
- Text File Handling
- Robotic Transformations
- SD Memory Card Slot
- CANopen + EtherCAT I/O Expansion
- Backlit LCD Display
- RoHS and CE Approved

Application Sample
URL: Sample applications
http://www.triomotion.uk/public/applications/applications.php
Please refer to the sample and typical applications for the MC664 with A6B as shown above URL.

System Configuration

Sales area and Language

Contact: Trio Motion Technology Ltd.
Shannon Way, Tewkesbury, Gloucestershire, GL20 8ND, United Kingdom  TEL: +44-1684-292333  FAX: +44-1684-297929

For more information
URL: Specification for the MC664 / MC664-X

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Item Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Axis 0 Encoder / Pulse out</td>
</tr>
<tr>
<td>Encoder Ports</td>
<td>Feedback input Option</td>
</tr>
<tr>
<td>Axes</td>
<td>Max axis 128</td>
</tr>
<tr>
<td>Max discrete wired axes</td>
<td>24</td>
</tr>
<tr>
<td>Max Networked axes</td>
<td>128 (P862) 64 (P861)</td>
</tr>
<tr>
<td>Max virtual axes</td>
<td>128</td>
</tr>
<tr>
<td>Processor</td>
<td>ARM Alt (Quad)</td>
</tr>
<tr>
<td>Clock frequency</td>
<td>1000 MHz (Max)</td>
</tr>
<tr>
<td>Servo update rate</td>
<td>2 ms (4 ms x MC664 - 50 μs (8 axes at 50 μs)</td>
</tr>
<tr>
<td>Encoder input frequency</td>
<td>6 MHz</td>
</tr>
<tr>
<td>Encoder output frequency</td>
<td>3 MHz</td>
</tr>
<tr>
<td>User memory</td>
<td>8 Mbyte</td>
</tr>
<tr>
<td>Max data table size</td>
<td>512000</td>
</tr>
<tr>
<td>Flash data memory</td>
<td>32 x 16000</td>
</tr>
<tr>
<td>VR</td>
<td>65536</td>
</tr>
<tr>
<td>Position register precision</td>
<td>64 bit</td>
</tr>
<tr>
<td>Maths precision</td>
<td>Double FP</td>
</tr>
<tr>
<td>Drive Interfaces</td>
<td>Stepper (Stop &amp; Direction) Option</td>
</tr>
<tr>
<td>Encoder (5 V &amp; Encoder) Option</td>
<td>Panasonic RXTE Option</td>
</tr>
<tr>
<td>REX</td>
<td>Option</td>
</tr>
<tr>
<td>EtherCAT</td>
<td>Yes/Option</td>
</tr>
<tr>
<td>Profibus</td>
<td>Option</td>
</tr>
<tr>
<td>DeviceNet</td>
<td>Yes (slave)</td>
</tr>
<tr>
<td>CANopen</td>
<td>Yes (server)</td>
</tr>
<tr>
<td>Ethernet (10/100) base-T</td>
<td>Yes</td>
</tr>
<tr>
<td>Ethernet IP</td>
<td>Yes (server)</td>
</tr>
<tr>
<td>MODBUS-RTU</td>
<td>Yes</td>
</tr>
<tr>
<td>RS233/RS485</td>
<td>Yes</td>
</tr>
<tr>
<td>CAN-Link</td>
<td>Option</td>
</tr>
<tr>
<td>Profibus</td>
<td>Option</td>
</tr>
<tr>
<td>Bluetooth</td>
<td>Option</td>
</tr>
<tr>
<td>Anybus support</td>
<td>Option</td>
</tr>
<tr>
<td>Processor</td>
<td>Yes</td>
</tr>
<tr>
<td>Certification</td>
<td>CE approval Yes</td>
</tr>
<tr>
<td></td>
<td>RoHS Compliant Yes</td>
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<tr>
<td>System Configuration</td>
<td>UNIPLAY HMI</td>
</tr>
<tr>
<td>Motion Coordinator Module</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Up to 128 Axes</td>
</tr>
<tr>
<td></td>
<td>MINAS A6B</td>
</tr>
<tr>
<td></td>
<td>English</td>
</tr>
<tr>
<td></td>
<td>Please contact the following address for details.</td>
</tr>
<tr>
<td></td>
<td>For more information</td>
</tr>
<tr>
<td></td>
<td>URL: Specification for the MC664 / MC664-X</td>
</tr>
</tbody>
</table>
**Motion Coordinator and EtherCAT Interface Module**

**Motion Coordinator MC4N-ECAT**

**Features**
- Up to 32 EtherCAT Digital Drive Axes
- Supports Position, Speed and Torque Drive Modes
- Up to 2048 EtherCAT I/O
- EtherCAT CoE, SoE, FoE
- Linear, Circular, Helical and Spherical Interpolation
- Flexible CAM shapes, Linked Motion
- Isolated Encoder Port
- EnDat and SSI Absolute Encoder Supported
- Hardware Linked Output for Camera / Laser Control
- Ethernet-IP / Modbus TCP / Trio ActiveX / TCIP / Uniplay HMI / UDP / Ethernet Interface Built-In
- Precise 64 Bit Motion Calculations with 532 MHz ARM 11 Processor
- IEC 61131-3 Programming
- Multi-tasking BASIC Programming
- Text File Handling
- Robotic Transformations
- 4 high speed registration inputs
- Isolated RS232 and RS485 ports
- SD Memory Card Slot
- EtherCAT I/O Expansion
- CANopen I/O Expansion
- Backlit LCD Display
- RoHS and CE Approved

**Specification**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td></td>
</tr>
<tr>
<td>Axis 0</td>
<td>Extended</td>
</tr>
<tr>
<td>Max axes</td>
<td>32</td>
</tr>
<tr>
<td>Networked axes</td>
<td>32</td>
</tr>
<tr>
<td>Max virtual axes</td>
<td>32</td>
</tr>
<tr>
<td>Processor</td>
<td>ARM11</td>
</tr>
<tr>
<td>Clock frequency</td>
<td>532 MHz</td>
</tr>
<tr>
<td>Servo update rate</td>
<td>2 ms-125 μs</td>
</tr>
<tr>
<td>Encoder input frequency</td>
<td>6 MHz</td>
</tr>
<tr>
<td>Stepper output frequency</td>
<td>2 MHz</td>
</tr>
<tr>
<td>User memory</td>
<td>8 MByte</td>
</tr>
<tr>
<td>Flash data memory</td>
<td>512000</td>
</tr>
<tr>
<td>VR</td>
<td>4096</td>
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<tr>
<td>Position register precision</td>
<td>64 bit</td>
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<tr>
<td>Math precision</td>
<td>Double FP</td>
</tr>
<tr>
<td>Real time clock</td>
<td>Yes</td>
</tr>
<tr>
<td>EtherCAT</td>
<td>Yes</td>
</tr>
<tr>
<td>Auxiliary Axis</td>
<td>Yes</td>
</tr>
<tr>
<td>Devicenet</td>
<td>Yes (slave)</td>
</tr>
<tr>
<td>CANopen</td>
<td>Yes (master)</td>
</tr>
<tr>
<td>Ethernet (10/100) base-T</td>
<td>Yes</td>
</tr>
<tr>
<td>Ethernet IP</td>
<td>Yes (server)</td>
</tr>
<tr>
<td>MCDUSB-RTU</td>
<td>Yes</td>
</tr>
<tr>
<td>MCDUSB-TCP/IP Client</td>
<td>Yes</td>
</tr>
<tr>
<td>Hostlink</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference input</td>
<td>Yes</td>
</tr>
<tr>
<td>Pulse + direction output</td>
<td>Yes</td>
</tr>
<tr>
<td>Incremental (A+B) output</td>
<td>Yes</td>
</tr>
<tr>
<td>SSI Absolute</td>
<td>Yes</td>
</tr>
<tr>
<td>EnDat Abs</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Performance**
- Expansion I/O
  - Digital I/O points: 1024
  - 12 bit ±10 V analogue inputs: 32
  - 12 bit ±10 V analogue outputs: 16
- TriBASIC: Yes
- # programs: 32
- # tasks: 22
- IEC61131 Runtime: Yes
- Kinematic Runtime: Option
- G-Code: Application option
- HPGL: Application option
- DFA import: PC Application

**Drive Interfaces**
- EtherCAT: Yes
- Auxiliary Axis: Yes
- DeviceNet: Yes (slave)
- CANopen: Yes (master)
- Ethernet (10/100) base-T: Yes
- Ethernet IP: Yes (server)
- MCDUSB-RTU: Yes
- MCDUSB-TCP/IP Client: Yes
- Hostlink: Yes
- Reference input: Yes
- Pulse + direction output: Yes
- Incremental (A+B) output: Yes
- SSI Absolute: Yes
- EnDat Abs: Yes

**Software**
- Motion Perfect v4: Yes
- All Support Software: Yes

**Communication**
- Memory slot card: SD 16 GB max
- Width x Height x Depth (mm): 40 x 157 x 120
- Weight: 432 g
- Mounting: Panel
- Operating Temp: 0 - 45 °C
- Supply Voltage DC: 24 V
- Consumption (exc. I/O): 350 mA
- UL Listed: Yes
- CE approval: Yes
- RoHS Compliant: Yes

**Application Sample**
URL: Sample applications
http://www.triomotion.uk/public/applications/applications.php

**System Configuration**

**Sales area and Language**
- English

Please contact the following address for details.

**For more information**
URL: Specification for the MC4-N EtherCAT Mini Master

**Contact:** Trio Motion Technology Ltd.
Shannon Way, Tewkesbury, Gloucestershire, GL20 8ND, United Kingdom
TEL: +44-1684-292333  FAX: +44-1684-297929
**Features**

- Motion + PC Solution for Automation Machinery
- Fanless compact PC with E3845 Quad Core Atom Processor at 1.91 GHz
- Powerful up to 64 Axis EtherCAT Based Trio Motion Coordinator
- RTX64 Real Time Extension to allow Motion + Windows Running Directly on Their Own Processor Cores
- Plug and Play EtherCAT Configuration Expandable Support for Servo Drives, I/O and Devices From Over 100 Manufacturers
- Programmable In Easy Trio BASIC, built-in IEC 61131 or PC based Programming Languages Such As ‘C’
- 4 GByte RAM + 64 GByte Upgradable SSD
- Windows Operating System
- Built-in Additional GBit Ethernet Port For Vision Cameras

**Specification**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC-MCAT</td>
<td></td>
</tr>
<tr>
<td>Motion Axes</td>
<td>2 / 4 / 8 / 16 / 32 / 64</td>
</tr>
<tr>
<td>Servo Cycle</td>
<td>250 / 500 / 1000 / 2000 μsec</td>
</tr>
<tr>
<td>Drive Modes</td>
<td>Position / Speed / Torque</td>
</tr>
<tr>
<td>Interpolation</td>
<td>Linear / Circular / Helical / Spherical / Transition Curves / Tangential</td>
</tr>
<tr>
<td>Linked Modes</td>
<td>Cam, Cambox, Flexlink, MoveLink, Camlink</td>
</tr>
<tr>
<td>EtherCAT Specification</td>
<td></td>
</tr>
<tr>
<td>Speed</td>
<td>100 Mbps</td>
</tr>
<tr>
<td>Physical Layer</td>
<td>100 Base-TX full duplex (IEEE 802.3)</td>
</tr>
<tr>
<td>Cable</td>
<td>Shielded Twisted Pair (TIA/EIA-568B CAT5e)</td>
</tr>
<tr>
<td>Topology</td>
<td>Tree, star</td>
</tr>
<tr>
<td>Isolation</td>
<td>Pulse transformer with common-mode choke</td>
</tr>
<tr>
<td>Connector</td>
<td>RJ45</td>
</tr>
<tr>
<td>Cable Length</td>
<td>100 m max between nodes</td>
</tr>
<tr>
<td>Cyclic period</td>
<td>250 μsec, 500 μsec, 1000 μsec or 2000 μsec</td>
</tr>
<tr>
<td>Synchronization</td>
<td>Distributed Clocks technology, jitter &lt;1 μsec</td>
</tr>
<tr>
<td>Protocol</td>
<td>CoE, SoE</td>
</tr>
<tr>
<td>Number of Axes</td>
<td>64</td>
</tr>
<tr>
<td>Number of Nodes</td>
<td>128 slave nodes maximum</td>
</tr>
<tr>
<td>Motion modes</td>
<td>Cyclic Synchronous Position, Cyclic Synchronous Velocity, Cyclic Synchronous Torque</td>
</tr>
<tr>
<td>Parameter transfer</td>
<td>CoE Object read/write, SoE I/DN read/write</td>
</tr>
<tr>
<td>In put/Out put</td>
<td>Up to 8192</td>
</tr>
<tr>
<td>PC Specification</td>
<td></td>
</tr>
<tr>
<td>Processor</td>
<td>Intel® Atom™ E3845 Quad Core 1.91 GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>4 GBytes DDR3</td>
</tr>
<tr>
<td>Ethernet</td>
<td>2 x Gbit Ethernet + EtherCAT port</td>
</tr>
<tr>
<td>HDMI</td>
<td>2560 x 1600 @ 60 Hz Max</td>
</tr>
<tr>
<td>Audio</td>
<td>Via HDMI</td>
</tr>
<tr>
<td>USB</td>
<td>5 USB ports</td>
</tr>
<tr>
<td>Battery</td>
<td>8 Year life PLC compatible type, Replaceable without opening case</td>
</tr>
<tr>
<td>Power Supply</td>
<td>24 V 91-20 % isolated Power Supply</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>0 deg to +55 deg C</td>
</tr>
<tr>
<td>Cooling</td>
<td>Fanless</td>
</tr>
<tr>
<td>Operating System</td>
<td>Windows with RTX64 Real Time Extension</td>
</tr>
</tbody>
</table>

**Application Sample**

URL: Sample applications  
http://www.triomotion.uk/public/applications/applications.php

**System Configuration**

- PC-MCAT EtherCAT
- UNIPLAY HMI
- PC Monitor
- Up to 64 Axes

**Sales area and Language**

- English

Please contact the following address for details.

**For more information**

URL: Specification for the PC-MCAT Ethercat Master  

Contact: Trio Motion Technology Ltd.  
Shannon Way, Tewkesbury, Gloucestershire, GL20 8ND, United Kingdom  
TEL: +44-1684-292333  FAX: +44-1684-297929
## EtherCAT partner products

<table>
<thead>
<tr>
<th>Partner</th>
<th>Master</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Software</td>
</tr>
<tr>
<td>acontis technologies GmbH</td>
<td>●</td>
</tr>
<tr>
<td>ADLINK Technology, Inc.</td>
<td></td>
</tr>
<tr>
<td>Advanet Inc.</td>
<td>●</td>
</tr>
<tr>
<td>Advantech Co., Ltd.</td>
<td>●</td>
</tr>
<tr>
<td>ALGO System Co. Ltd</td>
<td></td>
</tr>
<tr>
<td>Beckhoff Automation GmbH &amp; Co.KG</td>
<td>●</td>
</tr>
<tr>
<td>CODESYS</td>
<td>●</td>
</tr>
<tr>
<td>CONTEC Co., Ltd.</td>
<td></td>
</tr>
<tr>
<td>Delta Tau Data Systems, inc.</td>
<td></td>
</tr>
<tr>
<td>Galil Motion Control, Inc.</td>
<td>●</td>
</tr>
<tr>
<td>Hivertec, Inc.</td>
<td></td>
</tr>
<tr>
<td>ISAC</td>
<td>●</td>
</tr>
<tr>
<td>Micronet Company</td>
<td>●</td>
</tr>
<tr>
<td>Mujin, Inc.</td>
<td></td>
</tr>
<tr>
<td>National Instruments Corporation</td>
<td></td>
</tr>
<tr>
<td>NEXCOM International Co., Ltd.</td>
<td></td>
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<tr>
<td>Panasonic Industrial Devices SUNX Co., Ltd.</td>
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</tr>
<tr>
<td>Soft Servo Systems, Inc.</td>
<td>●</td>
</tr>
<tr>
<td>TECHNO Co., Ltd.</td>
<td></td>
</tr>
<tr>
<td>Tex Computer srl</td>
<td></td>
</tr>
<tr>
<td>Trio Motion Technology Ltd.</td>
<td></td>
</tr>
</tbody>
</table>
Linear and direct drive (DD) motor control

MINAS A6L

A6SL, A6SM

High precision and high speed advancement of linear and DD control drive

Motor

- Various motors such as 3-phase cored/coreless, shaft motor and DD motor

Scale

- Serial communication incremental/absolute and A/B/Z phase pulse scale

Magnetic pole detection

- Both with and without hole sensor signal (automatic detection)

Setup

- Automatic setup of magnetic pole, scale direction, gain, etc.

[Typical system configuration]

Motor wiring U, V, W, E

Controller

A6L

CS1 to 3’(Magnetic pole position signal)

Linear motor

Feedback scale

Serial or A/B/Z phase pulse

Automatic Setup

- Automatically sets various parameters such as magnetic pole, scale orientation and gain accordingly to the motor specification.

Automatic Magnetic Pole Detection

- When CS signal is not available, the automatic magnetic pole detection function will detect the magnetic pole position of the linear motor.

Simple setup for easy and speedy adjustment

- Input specifications of the linear motor.
- Current gain, scale installation conditions, etc. are automatically detected.
- Driving parameters are automatically set.

Drive List

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Drive Part No. (Note 1)</th>
<th>Motor rated current [Arms] (Note 2)</th>
<th>Motor max. current [Arms]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-phase 100 to 120 VAC</td>
<td>MADL □ 01 △△</td>
<td>1.1</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>MADL □ 11 △△</td>
<td>1.6</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>MBDL □ 21 △△</td>
<td>2.5</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>MCDL □ 31 △△</td>
<td>4.6</td>
<td>14.4</td>
</tr>
<tr>
<td>1-phase or 3-phase 200 to 240 VAC</td>
<td>MADL □ 05 △△</td>
<td>1.1</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>MADL □ 15 △△</td>
<td>1.5</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>MBDL □ 25 △△</td>
<td>2.4</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>MCDL □ 35 △△</td>
<td>4.1</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>MDDL □ 45 △△</td>
<td>5.9</td>
<td>17.1</td>
</tr>
<tr>
<td>3-phase 200 to 240 VAC</td>
<td>MDDL □ 55 △△</td>
<td>9.3</td>
<td>26.2</td>
</tr>
<tr>
<td></td>
<td>MEDL □ 83 △△</td>
<td>12.5</td>
<td>37.5</td>
</tr>
<tr>
<td></td>
<td>MEDL □ 93 △△</td>
<td>16.0</td>
<td>48.1</td>
</tr>
<tr>
<td></td>
<td>MFDL □ A3 △△</td>
<td>19.3</td>
<td>56.6</td>
</tr>
<tr>
<td></td>
<td>MFDL □ B3 △△</td>
<td>27.1</td>
<td>72.1</td>
</tr>
</tbody>
</table>

Note 1: Please refer to *□* and *△△* as per below :

- □: Common: N (Without Safety)
- △△: T (With Safety STO)

Note 2: According to the setting value of carrier frequency, we have the possibility of derating.

In detail, please refer to the A6L driver specification.
Linear and Direct Drive (DD) motor control

MINAS A5L, A5ML, A5MNL, A5MBL

### A5L, A5ML

**High precision and high speed advancement of linear and DD control drive**

**Motor**
- Various motors such as 3-phase cored/coreless, shaft motor and DD motor

**Scale**
- Serial communication incremental/absolute and A/B/Z phase pulse scale

**Magnetic pole detection**
- Both with and without hole sensor signal (automatic detection)

**Setup**
- Automatic setup of magnetic pole, scale direction, gain, etc.

**Typical system configuration**

- Simple setup for easy and speedy adjustment
- Automatic setup of magnetic pole, scale direction, gain, etc.
- Both with and without hole sensor signal (automatic detection)
- Serial communication incremental/absolute and A/B/Z phase pulse scale

**Drive List (Common to A5L and A5INL)**

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Drive Part No.</th>
<th>Motor max. current (A)</th>
<th>Motor min. current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC48 V</td>
<td>MMDHT2200L**</td>
<td>2.2</td>
<td>6.5</td>
</tr>
<tr>
<td>DC48 V</td>
<td>MMDHT2400L**</td>
<td>2.5</td>
<td>6.5</td>
</tr>
<tr>
<td>1-phase</td>
<td>L01</td>
<td>1.7</td>
<td>9.1</td>
</tr>
<tr>
<td>1 or 3-phase</td>
<td>L02</td>
<td>1.5</td>
<td>7.5</td>
</tr>
<tr>
<td>3-phase</td>
<td>L03</td>
<td>2.6</td>
<td>13.8</td>
</tr>
<tr>
<td>3-phase</td>
<td>L04</td>
<td>3.6</td>
<td>22.0</td>
</tr>
</tbody>
</table>

**Note:**
- Trailing *** in the part number is replaced with the following symbol:
  - A5L: L01: Standard
  - A5ML: L02: Standard
  - A5INL: L03: Standard
  - A5B: L04: Standard
  - A5MNL: L05: Standard
  - A5MBL: L06: Standard

**LA1:**
- Pulse control only

**LA4:**
- Pulse control only (2DOF)**

### A5INL

**RTEX / Linear and DD Control Drive**

- This product is specific for customers. Please contact us about details.

**Typical system configuration**

- For linear motor

**Drive List**

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Drive Part No.</th>
<th>Motor max. current (A)</th>
<th>Motor min. current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC48 V</td>
<td>MMDHT2200L**</td>
<td>2.2</td>
<td>6.5</td>
</tr>
<tr>
<td>DC48 V</td>
<td>MMDHT2400L**</td>
<td>2.5</td>
<td>6.5</td>
</tr>
<tr>
<td>1-phase</td>
<td>L01</td>
<td>1.7</td>
<td>9.1</td>
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<td>1 or 3-phase</td>
<td>L02</td>
<td>1.5</td>
<td>7.5</td>
</tr>
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<td>3-phase</td>
<td>L03</td>
<td>2.6</td>
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<tr>
<td>3-phase</td>
<td>L04</td>
<td>3.6</td>
<td>22.0</td>
</tr>
</tbody>
</table>

**Note:**
- Trailing *** in the part number is replaced with the following symbol:
  - A5INL: L01: Standard
  - A5BL: L02: Standard
  - A5MNL: L03: Standard
  - A5MBL: L04: Standard

**LA1:**
- Pulse control only

**LA4:**
- Pulse control only (2DOF)**

**LA5:**
- Pulse control only (2DOF)**

**LA6:**
- Pulse control only (2DOF)**

**LA7:**
- Pulse control only (2DOF)**

**LA8:**
- Pulse control only (2DOF)**

**LA9:**
- Pulse control only (2DOF)**

**LA10:**
- Pulse control only (2DOF)**

### A5BL

**EtherCAT / Linear and DD Control Drive**

- This product is specific for customers. Please contact us about details.

**Typical system configuration**

- For linear motor

**Drive List**

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Drive Part No.</th>
<th>Motor max. current (A)</th>
<th>Motor min. current (A)</th>
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<tbody>
<tr>
<td>DC48 V</td>
<td>MMDHT2200L**</td>
<td>2.2</td>
<td>6.5</td>
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<tr>
<td>DC48 V</td>
<td>MMDHT2400L**</td>
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<td>9.1</td>
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<tr>
<td>1 or 3-phase</td>
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<td>7.5</td>
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<td>3-phase</td>
<td>L04</td>
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<td>22.0</td>
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</tbody>
</table>

**Note:**
- Trailing *** in the part number is replaced with the following symbol:
  - A5BL: L01: Standard
  - A5MNL: L02: Standard
  - A5MBL: L03: Standard
  - A5MNL: L04: Standard
  - A5MBL: L05: Standard

**LA1:**
- Pulse control only

**LA4:**
- Pulse control only (2DOF)**

**LA5:**
- Pulse control only (2DOF)**

**LA6:**
- Pulse control only (2DOF)**

**LA7:**
- Pulse control only (2DOF)**

**LA8:**
- Pulse control only (2DOF)**

**LA9:**
- Pulse control only (2DOF)**

**LA10:**
- Pulse control only (2DOF)**

**†1** 2DOF: Two-degree-of-freedom control
Ironless Brushless Linear Motor
AUM Series

**Features**
- Ironless technology
- Zero cogging force
- Patented technology
- Ironless linear motors with the highest motor constant and shortest coils lengths
- Large continuous force and peak force

**Specification**

### Performance Parameters

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>Unit</th>
<th>S-S1</th>
<th>P-S2</th>
<th>P-S4</th>
<th>P-S6</th>
<th>S-S1</th>
<th>P-S2</th>
<th>P-S4</th>
<th>P-S6</th>
<th>P-S8</th>
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<tr>
<td>Continuous Force, coil @100 °C</td>
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<td>Magnetic Attraction</td>
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<td>18.4</td>
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<td>18.4</td>
<td>9.2</td>
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<td>9.2</td>
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</table>

### System Configuration

- **Ironless-AUM**
- **Compartment-ACM**
- **Granite Stages**

### Application Sample

- **Single-Axis Module**
- **XY Module**
- **Bellow-Covered Module**
- **Granite Stages**

### Contact Information

Akribis Systems Pte Ltd
5012 Tecthaill Pte Ltd
5012 Techplace II Ang Mo Kio Ave 5 #01-05 Singapore 569876

### Sales area and Language

- English
- Chinese
- Korean
- Thai

Please contact the following address for details.

For more information

Linear motor

Direct Drive Rotary Motor
ADR-A Series

Features
- Direct drive, brushless motor fully integrated with encoder and bearing
- Low cogging torque
- Low speed and high speed windings
- High Continuous and Peak Torque

Features

- **Direct drive, brushless motor fully integrated with encoder and bearing**
- **Low cogging torque**
- **Low speed and high speed windings**
- **High Continuous and Peak Torque**

**Specification**

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>Units</th>
<th>ADR110</th>
<th>ADR115</th>
<th>ADR135</th>
<th>ADR175</th>
<th>ADR220</th>
<th>ADR360</th>
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<td>Peak torque</td>
<td>Nm</td>
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<td>15.5</td>
<td>32.9</td>
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<td>Max. continuous torque (peak to peak)</td>
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<td>0.0049</td>
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<td>0.022</td>
<td>0.084</td>
<td>0.197</td>
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<td>Torque constant</td>
<td>Nm/Ams</td>
<td>0.32</td>
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<td>1.97</td>
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<td>Back EMF constant</td>
<td>Vpeak/rpm</td>
<td>0.028</td>
<td>0.060</td>
<td>0.094</td>
<td>0.116</td>
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<td>Motor constant</td>
<td>Nm/SuR(W)</td>
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<td>0.67</td>
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<tr>
<td>Mass</td>
<td>Kg</td>
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<td>Rec. max speed @230V AC (SINCOS)</td>
<td>rpm</td>
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<td>2000</td>
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<td>Rec. max speed @415V AC (SINCOS)</td>
<td>rpm</td>
<td>15 (10, 5)</td>
<td>20 (10, 5)</td>
<td>25 (10)</td>
<td>49 (15)</td>
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<tr>
<td>Torque constant</td>
<td>N</td>
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<td>2860</td>
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<td>Moment load</td>
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<td>35</td>
<td>53</td>
<td>72</td>
<td>245</td>
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</tbody>
</table>

1. Terminal to terminal, at 25 Deg C.
2. Optional.
3. Limit by Bus Voltage and Encoder Output Frequency

Application Sample

- AXD Type
- Ironless Type
- Frameless Type
- IronCore Type

System Configuration

- Rotor-back iron
- Magnets
- Stator
- Inner coils
- Magnetic circuit
- Outer coils
- Inner stator
- Motor
- Magnetic circuit
- Conventional Design
- ATR Design

Recommended Drivers:
- MCDHT3520***, MDDHT3530***, MDDHT5540***, MEDHT7364***, MFDHTA390***

Sales area and Language

- English
- Chinese
- Korean
- Thai

Please contact the following address for details.

For more information


Contact:

Akribis Systems Pte Ltd
5012 Techplace II Ang Mo Kio Ave 5 #01-05 Singapore 569876

E-mail: cust-service@akribis-sys.com

Direct Drive Rotary Motor

### Features
- High precision indexing rotary table
- Minimal cogging design
- High resolution and high torque
- Flexibility in division of angles and control of rotating direction and speed

### Specification

#### PERFORMANCES

<table>
<thead>
<tr>
<th>UNIT</th>
<th>JTR157</th>
<th>JTR110E</th>
<th>JTR111</th>
<th>JTR1510E</th>
<th>JTR112</th>
<th>JTR1510E</th>
<th>JTR1610E</th>
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<tbody>
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<td>Thermal Resistance, °C/W</td>
<td>0.3</td>
<td>0.3</td>
<td>2.3</td>
<td>1.6</td>
<td>2.2</td>
<td>1.4</td>
<td>1.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Max. Speed, rps</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4.5</td>
<td>8</td>
</tr>
<tr>
<td>Resolution, ppr</td>
<td>65,360</td>
<td>65,360</td>
<td>65,360</td>
<td>32,768</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy, arcsec</td>
<td>±30</td>
<td>±30</td>
<td>±30</td>
<td>±30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability, arcsec</td>
<td>±2</td>
<td>±2.5</td>
<td>±2</td>
<td>±4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial Run-out (no-load), μm</td>
<td>20/10/5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Application Sample
- Alignment and indexing equipment
- Semiconductor test handler
- Glass titler
- Machine tools
- Loader / unloader
- Die bonder, LED handler

### Sales area and Language
- Chinese
- Japanese
- English
- Korean

### For more information
URL: [http://www.justek.com](http://www.justek.com)
**Tubular Linear Motor**
**Series P10-54**

**Features**
- Controlled by standard third-party servo drives
- 230 VAC and 3x400 VAC Technology
- Forces up to 900 N
- Speed up to 11 m/s
- Stroke range up to 2'000 mm
- A/B incremental encoder 1 μm
- Extremely high dynamics
- Rotating push-pull TWIN connector for power and encoder cables
- One-piece clamping flange

**Specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum stroke (mm)</th>
<th>Peak force (N)</th>
<th>Continuous force (N)</th>
<th>Peak velocity (m/s)</th>
<th>Peak acceleration (m/s²)</th>
<th>Force constant (N/A·m)</th>
<th>Nominal DC-Link voltage (Vdc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS10-54x120U</td>
<td>2240</td>
<td>357</td>
<td>70 / 102</td>
<td>8.5</td>
<td>245</td>
<td>65</td>
<td>560</td>
</tr>
<tr>
<td>PS10-54x180U</td>
<td>2180</td>
<td>535</td>
<td>105 / 153</td>
<td>11.1</td>
<td>366</td>
<td>50</td>
<td>A5BL / A6BL, 1- to 3 phase, 2DOF</td>
</tr>
<tr>
<td>PS10-54x240U</td>
<td>2120</td>
<td>714</td>
<td>140 / 204</td>
<td>8.4</td>
<td>410</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>PS10-54x330U</td>
<td>2060</td>
<td>892</td>
<td>175 / 255</td>
<td>8.7</td>
<td>413</td>
<td>64</td>
<td></td>
</tr>
</tbody>
</table>

1) Real time calculation of motor winding temperature required (including temperature sensor monitoring)
2) Motor with flange @ 25 °C ambient temperature
3) Motor with flange and fan cooling @ 25 °C ambient temperature
4) Rating (voltage and current) act on application requirements. Please contact us with application details to evaluate appropriate model.

**For more information**

NTI AG  
URL: [www.linmot.com](http://www.linmot.com)

LinMot USA, Inc.  
URL: [www.linmot-usa.com](http://www.linmot-usa.com)

**Contact:**

NTI AG  
Bodenaekerstrasse 2 CH-8957 Spreitenbach Switzerland  
TEL: +41 (0)56 419 91 91  
FAX: +41 (0)56 419 91 92  
[E-mail: office@linmot.com](mailto:office@linmot.com)

LinMot USA, Inc.  
204 E Morrissey Dr. Elkhorn, WI 53121 USA  
TEL: 877 546 3270  
FAX: 800 463 8708  
[E-mail: usasales@linmot.com](mailto:usasales@linmot.com)
Mirae Linear Motor Technology

Coreless and Core Linear Motor
U-Coreless/T-Core/Platen-Core Type

Features

- No Cogging
- No Magnetic Attraction Force
- Fast Setting-time Response
- Easy to install

- Cogging Optimization
- High-density Force & Attraction Force
- Most economic design solution

- No normal Force
- Easy to install

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Moving Stroke</th>
<th>Force (N Arms)</th>
<th>Vel. (mm/sec)</th>
<th>Load (kN)</th>
<th>I (A)</th>
<th>Collector Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coreless</td>
<td>U-Coreless Type</td>
<td>189(L)×55(W)×45(H)</td>
<td>129</td>
<td>1.44</td>
<td>387</td>
<td>4.32</td>
<td>43.8</td>
<td>89.3</td>
<td>576.0</td>
<td>10.1</td>
</tr>
<tr>
<td>Coreless</td>
<td>U-Coreless (Medium)</td>
<td>210(L)×47.4(W)×121.5(H)</td>
<td>169</td>
<td>3.00</td>
<td>507</td>
<td>9.00</td>
<td>19.6</td>
<td>56.4</td>
<td>0</td>
<td>1.70</td>
</tr>
<tr>
<td>Coreless</td>
<td>U-Coreless (X-Large)</td>
<td>461(L)×72.3(W)×135H)</td>
<td>1375</td>
<td>11</td>
<td>4125</td>
<td>34</td>
<td>37.76</td>
<td>113.3</td>
<td>0</td>
<td>0.8</td>
</tr>
<tr>
<td>Coreless</td>
<td>U-Coreless</td>
<td>281(L)×38.7(W)×67.5(H)</td>
<td>236</td>
<td>2.6</td>
<td>708</td>
<td>7.8</td>
<td>30.7</td>
<td>92.1</td>
<td>0</td>
<td>8.7</td>
</tr>
<tr>
<td>T-Core</td>
<td>T-Coreless Type</td>
<td>249(L)×55(W)×45(H)</td>
<td>172</td>
<td>2.88</td>
<td>516</td>
<td>8.64</td>
<td>29.2</td>
<td>59.5</td>
<td>768.0</td>
<td>3.4</td>
</tr>
<tr>
<td>T-Core</td>
<td>T-Coreless (Medium)</td>
<td>371(L)×133(W)×58(H)</td>
<td>1000</td>
<td>9.29</td>
<td>3000</td>
<td>27.87</td>
<td>37</td>
<td>111</td>
<td>4800.0</td>
<td>0.8</td>
</tr>
<tr>
<td>T-Core</td>
<td>T-Coreless (X-Large)</td>
<td>636(L)×66.6(W)×224(H)</td>
<td>1542</td>
<td>14.80</td>
<td>4626</td>
<td>44.40</td>
<td>36.2</td>
<td>104.2</td>
<td>0</td>
<td>0.7</td>
</tr>
<tr>
<td>T-Core</td>
<td>T-Coreless</td>
<td>191(L)×38.7(W)×67.5(H)</td>
<td>236</td>
<td>2.6</td>
<td>708</td>
<td>7.8</td>
<td>30.7</td>
<td>92.1</td>
<td>0</td>
<td>8.7</td>
</tr>
<tr>
<td>Platen</td>
<td>T-Coreless Type</td>
<td>249(L)×55(W)×45(H)</td>
<td>172</td>
<td>2.88</td>
<td>516</td>
<td>8.64</td>
<td>29.2</td>
<td>59.5</td>
<td>768.0</td>
<td>3.4</td>
</tr>
<tr>
<td>Platen</td>
<td>T-Coreless (Medium)</td>
<td>371(L)×133(W)×58(H)</td>
<td>1000</td>
<td>9.29</td>
<td>3000</td>
<td>27.87</td>
<td>37</td>
<td>111</td>
<td>4800.0</td>
<td>0.8</td>
</tr>
<tr>
<td>Platen</td>
<td>T-Coreless (X-Large)</td>
<td>636(L)×66.6(W)×224(H)</td>
<td>1542</td>
<td>14.80</td>
<td>4626</td>
<td>44.40</td>
<td>36.2</td>
<td>104.2</td>
<td>0</td>
<td>0.7</td>
</tr>
<tr>
<td>Platen</td>
<td>T-Coreless</td>
<td>191(L)×38.7(W)×67.5(H)</td>
<td>236</td>
<td>2.6</td>
<td>708</td>
<td>7.8</td>
<td>30.7</td>
<td>92.1</td>
<td>0</td>
<td>8.7</td>
</tr>
</tbody>
</table>

Application Sample

- X-Y Gantry
- Compact X-Y Table
- High Precision Air-Bearing Stage
- Multi-Mover Linear Stage

Selection Guide

<table>
<thead>
<tr>
<th>Mover</th>
<th>Model</th>
<th>Shape</th>
<th>Core</th>
<th>Magnet size</th>
<th>Number of Serial Coil</th>
<th>Number of Parallel Coil</th>
<th>Design order</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML - PCL - 252PE</td>
<td>T 1S T2P 3S 1T 2P 3P</td>
<td>U : U shape</td>
<td>T : T shape</td>
<td>C : Core type</td>
<td>L : Core-less</td>
<td>S : Small</td>
<td>M : Medium</td>
</tr>
</tbody>
</table>

Stators

- The fixed parts are made up of the Magnet and the Back Iron

Stator Specification

<table>
<thead>
<tr>
<th>Model</th>
<th>Model</th>
<th>Shape</th>
<th>Core</th>
<th>Magnet size</th>
<th>Starter Design Order</th>
<th>Stator Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML-TCM-SA-270</td>
<td>ML-TCM-SA-495</td>
<td>U-Shape Core Type</td>
<td>T : T Shape</td>
<td>L : Core-less</td>
<td>SA, AB, BC, ...</td>
<td>270 to 270 mm</td>
</tr>
<tr>
<td>ML-TCM-SA-360</td>
<td>ML-TCM-SA-450</td>
<td>U-Shape Core Type</td>
<td>T : T Shape</td>
<td>L : Core-less</td>
<td>SA, AB, BC, ...</td>
<td>330 to 330 mm</td>
</tr>
<tr>
<td>ML-TCM-SA-540</td>
<td>ML-PCG-SA-600</td>
<td>T-Shape Core Type</td>
<td>T : T Shape</td>
<td>L : Core-less</td>
<td>SA, AB, BC, ...</td>
<td>540 to 540 mm</td>
</tr>
</tbody>
</table>

Sales area and Language

- Korean: +82-41-559-8749
- English: +82-41-529-1033
- Chinese: +86-186-2221-7474

For more information

URL: http://www.miraelmt.co.kr

Contact: Mirae Linear Motor Technology
E-mail: lmsales@miraelm.com
65, Baeksseongdan 7-ro, Cheonan-si Seobuk-gu, Chungcheongnam-Do, 331-220 Korea
TEL: +82-41-621-5070
### Features
- Coreless Technology
- Zero Cogging
- High Force and High Precision
- Energy Efficient
- Simple Design and Easy Integration

### Specification

<table>
<thead>
<tr>
<th>MINAS A5L Model</th>
<th>MINAS A5L Model</th>
<th>MINAS A6L Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Current A rms</td>
<td>Peak Force N</td>
<td>Continuous Force N</td>
</tr>
<tr>
<td>0.3 0.3 0.3 0.84 0.84 0.84 0.4 0.4 0.4 0.62 0.62 0.62 0.59 0.59 0.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90 90 90 120 120 120 120 120 120 180 180 180 180 180 180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>180 180 180 240 240 90 90 90 120 120 120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.8 5.8 7.7 8.6 8.6 1.3 1.3 1.3 1.3 1.3 1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3 0.3 0.3 0.3 0.3 0.3 0.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sales area and Language

- English
- Japanese
- Chinese

Please contact the following address for details.


**Contact:**
Nippon Pulse America, Inc.
4 Corporate Drive, Radford, Virginia 24141 U.S.A.

[E-mail: info@nipponpulse.com]
TEL: +1-540-633-1677 / +1-540-633-1674

---

*In case you drive around the motor maximum current value, please let us know so that we will select an appropriate driver.*
## Linear Motor and Direct Drive Motor

### Linear Shaft Motor Stage

#### SLP series / SCR series

**Features**

<table>
<thead>
<tr>
<th>SLP-series</th>
<th>SCR-series</th>
</tr>
</thead>
<tbody>
<tr>
<td>● High Force</td>
<td>● High Force</td>
</tr>
<tr>
<td>● High Speed</td>
<td>● Low Ripple at Low Speed</td>
</tr>
<tr>
<td>● High Precision</td>
<td>● High Repeatability</td>
</tr>
</tbody>
</table>

#### Specification

<table>
<thead>
<tr>
<th>Units</th>
<th>SLP series</th>
<th>SCR series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SLP series</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution μm</td>
<td>1 (Hidenhain LIDA279)</td>
<td>1, 0.5, 0.1, 0.05, 0.01 (Renishaw Tonic)</td>
</tr>
<tr>
<td>Stroke/Single Slider mm</td>
<td>100 to 1200 (100 interval)</td>
<td>50 to 300 (50 interval)</td>
</tr>
<tr>
<td>Strike/Double Slider mm</td>
<td>200 to 1200 (100 interval)</td>
<td>60 to 300 (50 interval)</td>
</tr>
<tr>
<td>Continuous Force N</td>
<td>17</td>
<td>0.58</td>
</tr>
<tr>
<td>Continuous Current A rms</td>
<td>0.51</td>
<td>3.5</td>
</tr>
<tr>
<td>Peak Force N</td>
<td>90</td>
<td>0.5</td>
</tr>
<tr>
<td>Peak Current A rms</td>
<td>2.7</td>
<td>0.84</td>
</tr>
<tr>
<td>Max. Velocity m/sec</td>
<td>3.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Resistance Ω</td>
<td>56</td>
<td>1.1</td>
</tr>
<tr>
<td>Inductance mH</td>
<td>24</td>
<td>1.1</td>
</tr>
<tr>
<td>Magnet Pitch N-N mm</td>
<td>60</td>
<td>22.4</td>
</tr>
<tr>
<td>Load Capacity kg</td>
<td>5</td>
<td>1.0</td>
</tr>
<tr>
<td>MINAS A5L Model 200 V</td>
<td>—</td>
<td>MADHT1505L △△</td>
</tr>
<tr>
<td>100 V</td>
<td>—</td>
<td>MADHT1105L △△</td>
</tr>
<tr>
<td>MINAS A6L Model 200 V</td>
<td>—</td>
<td>MADL □ 05 △△</td>
</tr>
<tr>
<td>100 V</td>
<td>—</td>
<td>MADL □ 01 △△</td>
</tr>
<tr>
<td>MINAS A5ML Model 200 V</td>
<td>—</td>
<td>MMDHT2C09LA</td>
</tr>
<tr>
<td><strong>SCR series</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor part number</td>
<td>SCR050</td>
<td>SCR075</td>
</tr>
<tr>
<td>Resolution μm</td>
<td>1, 0.5, 0.1, 0.05, 0.01</td>
<td>1, 0.5, 0.1, 0.05, 0.01</td>
</tr>
<tr>
<td>Stroke mm</td>
<td>20, 40</td>
<td>50, 100, 150</td>
</tr>
<tr>
<td>Continuous Force N</td>
<td>0.58</td>
<td>0.3</td>
</tr>
<tr>
<td>Continuous Current A rms</td>
<td>0.84</td>
<td>3.4</td>
</tr>
<tr>
<td>Peak Force N</td>
<td>3.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Peak Current A rms</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Max. Velocity m/sec</td>
<td>1.1 to 1.5 m/sec</td>
<td>0.9 to 1.3 m/sec</td>
</tr>
<tr>
<td>Resistance Ω</td>
<td>9.9</td>
<td>9.9</td>
</tr>
<tr>
<td>Inductance mH</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Magnet Pitch N-N mm</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Load Capacity kg</td>
<td>10</td>
<td>45.5</td>
</tr>
<tr>
<td>MINAS A5L Model 200 V</td>
<td>—</td>
<td>MADHT1505L △△</td>
</tr>
<tr>
<td>100 V</td>
<td>—</td>
<td>MADHT1105L △△</td>
</tr>
<tr>
<td>MINAS A6L Model 200 V</td>
<td>—</td>
<td>MADL □ 05 △△</td>
</tr>
<tr>
<td>100 V</td>
<td>—</td>
<td>MADL □ 01 △△</td>
</tr>
<tr>
<td>MINAS A5ML Model 24 V</td>
<td>—</td>
<td>MMDHT2C09LA</td>
</tr>
</tbody>
</table>

1. In case you drive around the motor maximum current value, please let us know so that we will select an appropriate driver.

2. The encoder resolution is 1μm and with no load condition.

### Contact

Nippon Pulse America, Inc.
4 Corporate Drive, Radford, Virginia 24141 U.S.A.

E-mail: info@nipponpulse.com

TEL: +1-540-633-1677 / +1-540-633-1674
Linear stages with integrated linear motors

**MLE-, MLL- and MLU-Series**

**Features**
- Compact and smart design
- Low carriage weight for high dynamic
- High force density
- High resolution encoder
- Long axis up to 10000 mm stroke
- Big range of sizes and options

Competent partner in electromechanical solutions
Standard Plug & Play linear units
Customized and flexible solutions

**Specification**

**Ironcore MLE, MLL Series**

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>MLE3, MLL20, MLL30</th>
<th>MLE5, MLL5</th>
<th>MLE7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Force (N)</td>
<td>55 - 210</td>
<td>200 - 800</td>
<td>400 - 1000</td>
</tr>
<tr>
<td>Peak Force (N)</td>
<td>105 - 420</td>
<td>400 - 1600</td>
<td>1600 - 4000</td>
</tr>
<tr>
<td>Thermal Resistance (°C/W)</td>
<td>1.5 - 0.38</td>
<td>0.48 - 0.12</td>
<td>0.15 - 0.06</td>
</tr>
<tr>
<td>Coil Unit Mass (kg)</td>
<td>0.6 - 1.6</td>
<td>1.5 - 5.2</td>
<td>4.9 - 11.6</td>
</tr>
<tr>
<td>Weight of carriage with coil (kg)</td>
<td>2.2 - 4.7</td>
<td>4.5 - 14.0</td>
<td>10.5 - 21.5</td>
</tr>
<tr>
<td>Attraction Force (N)</td>
<td>300 - 900</td>
<td>950 - 3400</td>
<td>3400 - 8300</td>
</tr>
<tr>
<td>Recommended Drivers (230 V)</td>
<td>MADHT1507L**</td>
<td>MDDHT3530L**</td>
<td>MDDHT3530L**</td>
</tr>
<tr>
<td>Recommended Drivers (400 V)</td>
<td>MDDHT2407L**</td>
<td>MDDHT24430L**</td>
<td>MDDHT34430L**</td>
</tr>
</tbody>
</table>

Notes: MLE linear motor stages with incr. encoder SIN/COS 40 μm
MLL linear motor stages with incr. encoder SIN/COS 24000 μm

**Ironless MLU Series**

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>MLU30100</th>
<th>MLU30200</th>
<th>MLU30300</th>
<th>MLU30400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Force (N)</td>
<td>29</td>
<td>58</td>
<td>87</td>
<td>116</td>
</tr>
<tr>
<td>Peak Force (N)</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
</tr>
<tr>
<td>Thermal Resistance (°C/W)</td>
<td>1.8</td>
<td>0.9</td>
<td>0.6</td>
<td>0.45</td>
</tr>
<tr>
<td>Coil Unit Mass (kg)</td>
<td>0.084</td>
<td>0.162</td>
<td>0.240</td>
<td>0.318</td>
</tr>
<tr>
<td>Weight of carriage with coil (kg)</td>
<td>0.6</td>
<td>0.7</td>
<td>1.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Recommended Drivers (230 V)</td>
<td>MADHT1507L**</td>
<td>MCDHT3520L**</td>
<td>MDDHT3530L**</td>
<td>MDDHT5540L**</td>
</tr>
</tbody>
</table>

**Sales area and Language**

- English
- German
- Spanish
- Russian

For more information

URL: [http://www.sinadrives.com/](http://www.sinadrives.com/)

Contact:
SINADRIVES
SINADRIVES Spanien, Bescano/Spain
[E-mail: info@sinadrives.com] TEL: +34 972 442 452
For German-speaking countries (DACH):
SINADRIVES Deutschland, Munich/Germany
[E-mail: info@sinadrives.com] TEL: +49 89 255 575 898
Servo actuator

**DD Motor (ZMD series)**

**Features**

- **Realizing outstanding high speed and precision performances thanks to its small and compact design**
  - **Outer rotor mechanism**
    - The outer diameter’s compact design enables to drive directly the roller, making it suitable for indexing rotation
  - **High-resistance bearings**
    - Simple and rigid structure for a higher load resistance
  - **Hollow diameter ø50mm**
    - Wiring and piping can be easily stored in the hollow space of the motor, reducing the installation space.
  - **Low price**
    - Model’s size reduction leads to a more competitive price matching today’s markets needs
  - **Short lead time/quick delivery**
    - The reduction of the components and a smarter stock arrangement critically reduce the production lead time

- **What is a Direct Drive Motor?**
  - A DD Motor can transmit the torque of the electric motor directly to the driving objects, without the use of any reductions such as belts, pulleys or reduction drives.

- **High efficiency**
- **Low noise**
- **Outstanding precision**
- **High reliability**
- **Maintenance-free**

**Specification**

<table>
<thead>
<tr>
<th>Model</th>
<th>ZMD-1003</th>
<th>ZMD-1007</th>
<th>ZMD-1010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum torque N·m</td>
<td>30</td>
<td>65</td>
<td>100</td>
</tr>
<tr>
<td>Continuous torque N·m</td>
<td>10</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>Maximum current A</td>
<td>3.5</td>
<td>7.1</td>
<td>8.8</td>
</tr>
<tr>
<td>Rated current A</td>
<td>1.2</td>
<td>2.4</td>
<td>2.9</td>
</tr>
<tr>
<td>Maximum rotation speed s⁻¹</td>
<td>5</td>
<td>4.5</td>
<td>4</td>
</tr>
<tr>
<td>Sensor resolution ppr</td>
<td>1310720⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability positioning precision Second</td>
<td>±3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowed axial load N</td>
<td>3500⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowed moment load N·m</td>
<td>150⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial rigidity mm/N</td>
<td>2 × 10⁻⁴⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moment rigidity rad/N·m</td>
<td>2 × 10⁻⁵⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotor inertia kg·m²</td>
<td>0.014</td>
<td>0.017</td>
<td>0.02</td>
</tr>
<tr>
<td>Axial run-out/side run-out accuracy μm</td>
<td>70⁻¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight kg</td>
<td>8.2</td>
<td>11.5</td>
<td>14.5</td>
</tr>
</tbody>
</table>

**MINAS AIL Model**

- MBDHT2510L²
- MBDL255²

**MINAS AIL Model**

- MBDT2510L²
- MBDL255²
- MCDL35S²

**<Other possible applications>**

- Printing equipment
- Coating machines
- Film manufacturing machinery
- Roll-feeders

**Application Sample**

- **Roller-drive application e.g.**

- **Indexing rotation application e.g.**

**Dimensional out drawing**

**Sales area and Language**

- Japanese
- English
- Chinese

**For more information**

URL: [http://www.sinfo-t.jp/servo](http://www.sinfo-t.jp/servo)
Coreless Linear Motor, Ironcore Linear Motor, Special Sodick V series

Features

In linear motors that will be assembled at the internal of machine tools, the generated heat must not influence the machine. Sodick linear motors have special cooling structure internal. And, in servo motors that will be assembled at the side of machine tools, the generated heat influence the machine a little.

Coreless Linear Motors

- Core SERIES 144N-576N
- CB SERIES 1200N-2133N
- CG SERIES 3432N-4800N

Ironcore Linear Motors

- CM SERIES 190N-1172N
- CE (M) 800N-1600N
- CE (L) 1600N-6400N
- CE (W) 4800N-7200N
- CE (W2) 6400N-9600N

Special Motors

Sodick performs the design of a special motor according to a customer’s demand.

- Circular Arc Motors
- DD motor and the circular arc motor of ironcore and coreless motors are designed by Sodick.

Ultra Vacuum Linear Motors

The linear motor corresponding to the vacuum of Sodick is equipped with the system which can be efficiently cooled also in a vacuum.

The configuration example of a linear motor system

Network Servo System by Panasonic MINAS A5E NL

Pulse or Analog I/F by MINAS ASL, A6L

Sales area and Language

- English
- Chinese
- Japanese

Please contact the following address for details.

For more information

URL: http://www.sodick.jp/

Contact:
Sodick Co., Ltd.
3-12-1 Nakamachidai, Tsuzuki-ku, Yokohama-city, Kanagawa Pref. 224-8522, Japan
TEL: +81-45-948-1403
FAX: +81-45-941-5271
Ironcore and ironless linear motors
T- and U-Series

Features
- High force density
  More force in a smaller packing means lowering footprint
- Low thermal resistance
  Allowing good heat transfer
- Ironcore linear motors:
  Low cogging for smooth motion and position accuracy
  Approved for CSA, CE, and RoHS
  Optional watercooling for TL- and TBW-series
- Ironless linear motors:
  High acceleration and dynamics
  No cogging, extremely low force ripple
  Approved for CE and RoHS
  Also available as vacuum-rated motors

Specification

Ironcore T-Series

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>TM (N)</th>
<th>TL (N)</th>
<th>TB (N)</th>
<th>TBW (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Force (N)</td>
<td>60-240</td>
<td>200-840</td>
<td>760-1900</td>
<td>1200-3000</td>
</tr>
<tr>
<td>Peak Force (N)</td>
<td>120-480</td>
<td>450-1800</td>
<td>1800-4500</td>
<td>2700-6750</td>
</tr>
<tr>
<td>Thermal Resistance (°C/W)</td>
<td>1.5-0.38</td>
<td>0.48-0.12</td>
<td>0.15-0.06</td>
<td>0.10-0.04</td>
</tr>
<tr>
<td>Coil Unit Mass (kg)</td>
<td>0.6-1.6</td>
<td>1.5-5.2</td>
<td>4.9-11.6</td>
<td>7.3-18.2</td>
</tr>
<tr>
<td>Attraction Force (N)</td>
<td>300-900</td>
<td>950-3400</td>
<td>3400-8300</td>
<td>4900-12450</td>
</tr>
<tr>
<td>Recommended Drivers (230 V)</td>
<td>MADHT1507L** to MDDHTT3530L**</td>
<td>MBDHT2510L** to MFDHTA390L**</td>
<td>MCDHT3520L** to MFDHTA390L**</td>
<td>MDDHT3530L** to MFDHTB3A2L**</td>
</tr>
<tr>
<td>Recommended Drives (400 V)</td>
<td>MDDHT2407L** to MEDHT4430L**</td>
<td>MDDHT2412L** to MFDHTA464L**</td>
<td>MDDHT3420L** to MGDHTB4A2L**</td>
<td>MDDHT4430L** to MHDHTB4A2L**</td>
</tr>
</tbody>
</table>

Ironless U-Series

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>UM3</th>
<th>UM6</th>
<th>UM9</th>
<th>UM12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Force (N)</td>
<td>29</td>
<td>58</td>
<td>87</td>
<td>116</td>
</tr>
<tr>
<td>Peak Force (N)</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
</tr>
<tr>
<td>Thermal Resistance (°C/W)</td>
<td>1.8</td>
<td>0.9</td>
<td>0.6</td>
<td>0.45</td>
</tr>
<tr>
<td>Coil Unit Mass (kg)</td>
<td>0.084</td>
<td>0.162</td>
<td>0.240</td>
<td>0.318</td>
</tr>
<tr>
<td>Recommended Drivers (230 V)</td>
<td>MADHT1507L**</td>
<td>MCDHT3520L**</td>
<td>MDDHT3530L**</td>
<td>MDDHT5540L**</td>
</tr>
</tbody>
</table>

Sales area and Language

Tecnotion has worldwide subsidiaries and representatives:
Please contact the following addresses for details.

For more information

URL: http://www.tecnotion.com/
Absolute Encoder

Linear / Non-contact linear / Angular Encoder

Features

● Extremely robust optoelectronic linear encoders.
● Connectivity to MINAS series drives.
● Longest absolute measuring length available up to 60 m.
● Great accuracy at high speeds.
● Advanced diagnosis tool, via PC connection.

Absolute glass
S2AP, SV2AP and G2AP series
(MINAS A5, A5L, A6 and A6L)

Absolute steel tape
LAP series
(MINAS A5, A5L, A6 and A6L)

Application Sample

● Milling machines
● Machining centres
● Turning machines
● Grinding machines
● Gear hobbing machines
● Special purpose machines

Sales area and Language

• Japanese
• English
• Chinese
• Spanish

Please contact the following address for details.

For more information

URL: http://www.fagorautomation.com/en/

Contact: Fagor Automation, S. Coop.
Bo San Andrés No19 E-20500 – Arrasate/Mondragón, Spain
[E-mail: Jmvniegra@fagorautomation.es]
TEL: +34-943-719200  FAX: +34-943-791712
Absolute Exposed Linear Encoder
LIC 2100 Series

Features
- Absolute linear encoder for measuring lengths up to 6 m
- Compact and light scanning head (scanning head weight 20 g without connecting cable)
- High traversing speed and high resolution (10 m/sec, 50 nm)
- Robust to contamination and wide mounting tolerances (nominal gap ± 0.5 mm: LIC 2199P)

LIC 2197P:
Steel scale tape is drawn into aluminum extrusions and fixed at center

LIC 2199P:
Steel scale tape cemented on mounting surface

Speciﬁcation

<table>
<thead>
<tr>
<th>LIC 2197P</th>
<th>LIC 2199P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring standard</td>
<td>Steel scale tape with absolute track</td>
</tr>
<tr>
<td>Coefficient of linear expansion</td>
<td>= 10 ppm/K</td>
</tr>
<tr>
<td>Accuracy grade</td>
<td>± 15 μm</td>
</tr>
<tr>
<td>Resolution</td>
<td>100 nm or 50 nm</td>
</tr>
<tr>
<td>Measuring Length ML (mm)</td>
<td>120 320 520 770 1020 1220 1520 2020 2420 3020</td>
</tr>
<tr>
<td>Larger measuring lengths up to 6020 mm available on request</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>Panasonic serial interface (Pana01)</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>DC 3.6 V ~ 14 V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>−10 °C ~ 70 °C</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IEC60529</td>
</tr>
<tr>
<td>Mounting method</td>
<td>IP67 Only for scanning head</td>
</tr>
</tbody>
</table>

Absolute Exposed Linear Encoder
LIC 4100 Series

Features
- Absolute linear encoder for measuring lengths up to 28 m (in case of LIC 4195P)
- Compact and light scanning head (scanning head weight 20 g without connecting cable)
- High traversing speed and high resolution (10 m/sec; 1 nm)
- Very small interpolation error
- Contains two tracks: absolute and incremental
- Robust to contamination and wide mounting tolerances (nominal gap ± 0.25 mm: LIC 4199P)
- Glass scale with low thermal expansion co-efficiency available.

LIC 4195P:
Steel scale tape is drawn into the aluminum extrusions and tensioned

LIC 4197P:
Steel scale tape is drawn into the aluminum extrusions and fixed at center

LIC 4193P/4199P:
Steel scale tape cemented on mounting surface

Speciﬁcation

<table>
<thead>
<tr>
<th>LIC 4195P</th>
<th>LIC 4197P</th>
<th>LIC 4199P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring standard</td>
<td>Glass or Glass ceramic</td>
<td></td>
</tr>
<tr>
<td>Coefficient of linear expansion</td>
<td>= 6 ppm/K</td>
<td></td>
</tr>
<tr>
<td>Steel tape</td>
<td>Depends on the mounting surface</td>
<td></td>
</tr>
<tr>
<td>Steel tape</td>
<td>= 10 ppm/K</td>
<td></td>
</tr>
<tr>
<td>Steel tape</td>
<td>= 10 ppm/K</td>
<td></td>
</tr>
<tr>
<td>Accuracy grade (depends on ML)</td>
<td>± 1 μm/± 3 μm/± 5 μm ± 15 μm</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>1 mm, 5 mm, 10 mm</td>
<td></td>
</tr>
<tr>
<td>Measuring Length ML (mm)</td>
<td>240 ~ 3040 140 ~ 28840 240 ~ 6040 70 ~ 1020</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>Panasonic serial interface (Pana01)</td>
<td></td>
</tr>
<tr>
<td>Voltage supply</td>
<td>DC 3.6 V ~ 14 V</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>−10 °C ~ 70 °C</td>
<td></td>
</tr>
<tr>
<td>Protection degree</td>
<td>IEC60529</td>
<td></td>
</tr>
<tr>
<td>Mounting method</td>
<td>cemented on mounting surface</td>
<td></td>
</tr>
<tr>
<td>Aluminum extrusion and tensioned</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum extrusion and fixed at center</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cemented on mounting surface</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sales area and Language

- English
- German
- Japanese
- Chinese

For more information

URL: http://www.heidenhain.de

Contact: DR. JOHANNES HEIDENHAIN GmbH
Dr. Johannes-Heidenhain-Straße 5 83301 Traunreut, Germany
E-mail: info@heidenhain.de
TEL: +49 8669 31-0 FAX: +49 8669 5061
**FEED BACK SCALE**

### Absolute Linear Encoder with Scale Housing
**LC series**

**Features**
- Optical absolute linear encoder up to 4.2 m
- High vibration resistance
- High traversing speed with high resolution (3 m/sec, 1 nm /10 nm)
- High reliability through double sealing lips (LC 195P)

**Specification**

<table>
<thead>
<tr>
<th>Measuring standard CTE</th>
<th>LC 195P</th>
<th>LC 495P</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIADUR glass scale with absolute and incremental track</td>
<td>≈ 8 ppm/K</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accuracy grade</th>
<th>LC 195P</th>
<th>LC 495P</th>
</tr>
</thead>
<tbody>
<tr>
<td>± 3 µm (up to 3040 mm) or ± 5 µm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution</th>
<th>LC 195P</th>
<th>LC 495P</th>
</tr>
</thead>
<tbody>
<tr>
<td>± 3 µm : 1 nm ± 5 µm : 10 nm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring Length ML (mm)</th>
<th>LC 195P</th>
<th>LC 495P</th>
</tr>
</thead>
<tbody>
<tr>
<td>140 mm ~ 4240 mm</td>
<td>70 mm ~ 2040 mm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interface</th>
<th>LC 195P</th>
<th>LC 495P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panasonic serial interface (Pana01)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage supply</th>
<th>LC 195P</th>
<th>LC 495P</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 3.6 V ~ 14 V</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>LC 195P</th>
<th>LC 495P</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 °C ~ 50 °C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection degree IEC60529</th>
<th>LC 195P</th>
<th>LC 495P</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP53 or IP64 (with compressed air)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Absolute Angle Encoder without Integral Bearing
**ECA 4490 series**

**Features**
- Absolute angle encoder with high accuracy
- Steel scale drum with three-point centering
- Integrated large hollow shaft

**Specification**

<table>
<thead>
<tr>
<th>Measuring standard CTE</th>
<th>ECA 4490P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel drum with absolute and incremental track</td>
<td>≈ 10.5 ppm/K</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accuracy grade</th>
<th>ECA 4490P</th>
</tr>
</thead>
<tbody>
<tr>
<td>± 1.5” ~ ±3.0” depends on drum size</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resolution</th>
<th>ECA 4490P</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 bits ~ 29 bits depends on drum size</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring Length ML (mm)</th>
<th>ECA 4490P</th>
</tr>
</thead>
<tbody>
<tr>
<td>140 mm ~ 4240 mm</td>
<td>70 mm ~ 2040 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interface</th>
<th>ECA 4490P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panasonic serial interface (Pana01)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage supply</th>
<th>ECA 4490P</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 3.6 V ~ 14 V</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>ECA 4490P</th>
</tr>
</thead>
<tbody>
<tr>
<td>–10 °C ~ 70 °C</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection degree IEC60529</th>
<th>ECA 4490P</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP67 only for scanning head</td>
<td></td>
</tr>
</tbody>
</table>

**Sales area and Language**

- English
- German
- Japanese
- Chinese

**For more information**

URL : [http://www.heidenhain.de](http://www.heidenhain.de)

**Contact:**

DR. JOHANNES HEIDENHAIN GmbH
Dr.-Johannes-Heidenhain-Straße 5 83301 Traunreut, Germany
E-mail: info@heidenhain.de
TEL: +49 8669 31-0 FAX: +49 8669 5061
**Absolute Angle Encoder with Integral Bearing**

**Features**
- Absolute angle encoder with high accuracy
- Large hollow shaft up to Φ100mm
- Integrated stator coupling
- Fault exclusion for loosening of the mechanical connection is possible

**RCN series**

**Specification**

<table>
<thead>
<tr>
<th>RCN 2590P</th>
<th>RCN 2390P</th>
<th>RCN 5590P</th>
<th>RCN 5390P</th>
<th>RCN 8900P</th>
<th>RCN 8390P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring standard</td>
<td>DIADUR circular scale with absolute and incremental track</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy grade</td>
<td>±2.5”</td>
<td>±5”</td>
<td>±2.5”</td>
<td>±5”</td>
<td>±1”</td>
</tr>
<tr>
<td>Position error per signal period</td>
<td>±0.4”</td>
<td>±0.4”</td>
<td>±0.4”</td>
<td>±0.4”</td>
<td>±0.4”</td>
</tr>
<tr>
<td>Position values/Revolution</td>
<td>28 bits</td>
<td>26 bits</td>
<td>28 bits</td>
<td>26 bits</td>
<td>29 bits</td>
</tr>
<tr>
<td>Hollow shaft</td>
<td>ø20</td>
<td>ø35</td>
<td>ø60</td>
<td>ø60 or ø100</td>
<td></td>
</tr>
<tr>
<td>Electrical permissible speed *1</td>
<td>≤3000 min⁻¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical permissible speed</td>
<td>≤1500 min⁻¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>Panasonic serial interface (Pana01)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage supply</td>
<td>DC 3.6V ~ 14V</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0 °C ~ 50 °C</td>
<td>-20 °C ~ 60 °C</td>
<td>0 °C ~ 50 °C</td>
<td>-20 °C ~ 60 °C</td>
<td>0 °C ~ 50 °C</td>
</tr>
<tr>
<td>Protection degree</td>
<td>IEC60529</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: in case of continuous position value requires

**Sales area and Language**

- English
- German
- Japanese
- Chinese

For more information

URL: [http://www.heidenhain.de](http://www.heidenhain.de)

**Contact:**
DR. JOHANNES HEIDENHAIN GmbH
Dr.-Johannes-Heidenhain-Straße 5
83301 Traunreut, Germany
TEL: +49 8669 31-0 FAX: +49 8669 5061

**Absolute Exposed Linear encoder**

**MC 15 series**

**Features**
- Absolute linear encoder for measuring lengths up to 6 m (upon request)
- Very compact (36 x 13.5 x 14.8) and light scanning head (scanning head mass <18 g without connecting cable)
- High traversing speed and high resolution (10 m/sec, 50 nm)
- Wide mounting tolerances (nominal gap ± 0.25 mm)

**MC 15P MP:**
- Steel scale tape is drawn into the aluminum extrusions and fixed at center

**MC 15P MK:**
- Steel scale tape cemented on mounting surface

**Specification**

<table>
<thead>
<tr>
<th>MC 15P MP</th>
<th>MC 15P MK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring standard</td>
<td>Steel scale tape with absolute track</td>
</tr>
<tr>
<td>Coefficient of linear expansion</td>
<td>±10 ppm/K</td>
</tr>
<tr>
<td>Accuracy grade</td>
<td>±15 μm</td>
</tr>
<tr>
<td>Resolution</td>
<td>50 nm, 100 nm</td>
</tr>
<tr>
<td>Measuring Length ML (mm)</td>
<td>Up to 3000 mm</td>
</tr>
<tr>
<td>Longer lengths on request</td>
<td></td>
</tr>
<tr>
<td>Interface</td>
<td>Panasonic Serial Interface (Pana01)</td>
</tr>
<tr>
<td>Voltage supply</td>
<td>DC 3.6 V ~ 14 V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–10 °C ~ 50 °C</td>
</tr>
<tr>
<td>Mounting method</td>
<td>Aluminum extrusion and fixed at center</td>
</tr>
<tr>
<td>Protection degree</td>
<td>Cemented on mounting surface</td>
</tr>
</tbody>
</table>

**Sales area and Language**

- English
- German
- Japanese
- Chinese

For more information

URL: [http://www.heidenhain.de](http://www.heidenhain.de)

**Contact:**
REF Elektronik Ges. m.b.H
A-5121 Tarsdorf 93, Austria
TEL: +43-6278-8192-0 FAX: +43-6278-8192-79
**Feedback Scale**
**SR70/SR80/SL700/BF1 series**

**Features**
- High speed response with serial interfaces for MINAS series
- Direct connection with servo drive
- Excellent durability in harsh environment (Dirt, Oil and Vibration except BF1)
- Magnetic absolute scales (SR77/SR87) up to 10 mm resolution with 200 mm/min response speed.
- High-resolution reflective Laserscale with signal wavelength of 250 nm (BF1)

**Configuration**
- SL700 + PL101RP/RHP
- SR77 series (A4NL, A4NL, A5, A6 family)
- SR75 series (A4NL, A5, A6 family)
- SR87 series (A4NL, A5, A6 family)
- BF1 series (A5, A6 family)

**Features**
- Incremental type
- 80 mm to 10000 mm
- 70 mm to 2040 mm
- 140 mm to 3040 mm
- 30 mm to 1400 mm

**Property**
- Servo drive
  - A4NL/A5/A6 family
- Dedicated to MINAS series, serial output
- Output signal
  - None 1 point
- Origin signal
  - None 1 point

**Design**
- Protective design grade
  - IP65

**Specifications**
- Signal type
  - Incremental
- Resolution
  - 0.05 μm/0.1 μm/0.5 μm/1 μm
- Response speed
  - 20 mm to 3800 mm
- Accuracy
  - ±10 μm (when effective length is 3 m or less)
- Resolution
  - ±5 μm (when effective length is less than 1 m)
- ±10 μm (when effective length is 1 m to 3 m)
- ±15 μm (when effective length is more than 3 m)
- Signal type
  - Incremental
- Response speed
  - 0.05 μm/0.1 μm/0.5 μm/1 μm
- Type
  - SR70/SR80/SL700/BF1 series

**Specifications**
- **Part No.**
  - SL700 + PL101RP
  - SL70 + PL101RP
  - SR77
  - SR75
  - SR87
  - SR85
  - BF1

**Part No.**
- Compatible servo drive
  - A4NL/A5/A6 family
- Effective length
  - 50 mm to 10000 mm
- Accuracy
  - ±5 μm (when effective length is less than 1 m)
  - ±10 μm (when effective length is 1 m to 3 m)
  - ±15 μm (when effective length is more than 3 m)
- Resolution
  - ±0.5 μm (30 to 170 mm)
  - ±1 μm (220 to 370 mm)
  - ±3 μm (420 to 520 mm)
  - ±5 μm (970 to 990 mm)
  - ±10 μm (1070 to 1400 mm)
- Signal type
  - Incremental
- Output signal
  - Dedicated to MINAS series, serial output
- Signal LED display for ease of installation
- Protective design grade
  - IP65

**Sales and Language**
- **Manufacturer:** Magnescale Co., Ltd.
  - **Contact:** Magnescale Co., Ltd.
    - **E-mail:** info-mgs-eng@magnescale.com

**Contact Information**
- To identify local distributors, please contact Magnescale Co., Ltd.
- International Sales Division, Isehara Headquarters
  - 45 Suzukawa, Isehara, Kanagawa 259-1146, Japan
  - **Tel:** +81-463-92-7971
  - **Fax:** +81-463-92-7978

**Feature**
- Provide high speed, high response, high reliability are secured through serial communications
- Compatible with STB-185 conversion cable when connecting to A5, A6 family

**Feedback Scale SmartSCALE**

**Features**
- Maximum response speed 3 m/s, maximum resolution 50 nm, and ±5 μm accuracy (1000 mm or less)
- Individual non-contact component design
- IP65 protection grade against liquid and solid containates
- Space-saving small head (W33 mm×D16 mm×H8 mm)
- Signal LED display for ease of installation

**Specification**
- Type
  - Separate type magnetic principle
    - Incremental type
  - Incremental type
- Effective length
  - 20 mm to 3800 mm
- Resolution
  - 0.05 μm/0.1 μm/0.5 μm/1 μm
- Signal type
  - Incremental
- Response speed
  - 20 mm to 3800 mm
- Accuracy
  - ±5 μm (when effective length is less than 1 m)
  - ±10 μm (when effective length is 1 m to 3 m)
  - ±15 μm (when effective length is more than 3 m)
- Output signal
  - Dedicated to MINAS series, serial output
- Signal LED display for ease of installation
- Protective design grade
  - IP65

**Additional Information**
- Please contact Panasonic for the combination of A6 series driver and feedback scale.
- For more information

* Please contact Panasonic for the combination of A6 series driver and feedback scale.
FEED BACK SCALE

Linear Scale
ABS AT500 series /ST700 series/ST1300 series

Features
- Many years of experience that has opened up the absolute system solution in the world with collaboration of MINAS series originally.
- By changing from the Incremental scale system to the absolute scale, machine homing becomes unnecessary for AT500 and ST700 series.
- Absolute use, Photoelectric, Electromagnetic detection method, High resolution, High accuracy, non-contact type and so on support various applications widely.

ABS AT500 series
- High Rigid SC type
- High Resolution H type

<table>
<thead>
<tr>
<th>Specification</th>
<th>AT573-SC</th>
<th>AT573-H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. effective range</td>
<td>2200 mm</td>
<td>1000 mm</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.05 µm</td>
<td>0.05 µm</td>
</tr>
<tr>
<td>Max. response rate</td>
<td>2.5 m/sec</td>
<td>2.5 m/sec</td>
</tr>
<tr>
<td>Accuracy (µm) : 20 ℃</td>
<td>3 x 3 L/1000 µm *</td>
<td>3 x 3 L/1000 µm *</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>20 G</td>
<td>15 G</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>35 G</td>
<td>20 G</td>
</tr>
<tr>
<td>Max. current consumption</td>
<td>270 mA</td>
<td>270 mA</td>
</tr>
<tr>
<td>Operation temperature</td>
<td>0 ℃ ~ 45 ℃</td>
<td>0 ℃ ~ 45 ℃</td>
</tr>
</tbody>
</table>

* Please refer to the catalog an manual issued by Mitutoyo.

Application Sample
- Machining Center
- Lathe Machine
- Grinding Machine

ST700 series/ ST1300 series

ABS ST700 series
Electromagnetic induction type

ABS ST1300 series
Photoelectric type

<table>
<thead>
<tr>
<th>Specification</th>
<th>ABS ST700</th>
<th>ABS ST1300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection system</td>
<td>Electromagnetic induction type</td>
<td>Photoelectric type</td>
</tr>
<tr>
<td>Scale type</td>
<td>Scale base</td>
<td>Glass Scale</td>
</tr>
<tr>
<td>Metal tape</td>
<td>Fixed at both ends</td>
<td>Double-sided tape</td>
</tr>
<tr>
<td>Max. effective range</td>
<td>6 m</td>
<td>1.1 m</td>
</tr>
<tr>
<td>Position accuracy (20 ℃)</td>
<td>5 ± 5 L/1000 µm *</td>
<td>3 ± 3 L/1000 µm *</td>
</tr>
<tr>
<td>Min. resolution</td>
<td>0.1 µm</td>
<td>5 µm/m (1 m)</td>
</tr>
<tr>
<td>Max. response speed</td>
<td>5 m/s</td>
<td>8 m/s</td>
</tr>
<tr>
<td>Coefficient of thermal expansion</td>
<td>= 12 x 10^-6/K</td>
<td>= 8 x 10^-6/K</td>
</tr>
</tbody>
</table>

* Please refer to the catalog an manual issued by Mitutoyo.

Application Sample
- Semiconductor machine
- LCD manufacturing machine

Sales area and Language
North America area: Mitutoyo America Corporation
965 Corporate Blvd., Aurora, IL 60502, U.S.A.
TEL: +1-630-820-9666    Toll Free No.: +1-888-648-8869
Europe area: Mitutoyo Europe GmbH
Borsigstrasse 8-10, 41469 Neuss, GERMANY    TEL: +49-2137-102-0
Other area: Please contact the following address for details. Or Please contact Mitutoyo JAPAN.

For more information
URL: http://www.mitutoyo.co.jp/eng/

Contact: Mitutoyo Corporation Overseas Custom Equipment Sales Promotion Section
E-mail: kaigaitokuhan3@mitutoyo.co.jp
20-1, Sakado 1-Chome, Takatsu-ku, Kawasaki-shi, Kanagawa 213-8533, Japan    TEL: +81-44-813-8234
Optical Absolute Linear/Rotary Encoder

**RESOLUTE®** series (Panasonic serial output)

**Features**
- True absolute encoder
- Resolution: 0.1 μm, 50 nm, 1 nm
- Velocity
  - Panasonic A5 series
  - Panasonic A6 series
  - Range of scales for a variety of applications
  - Low Sub-Divisional Error (SDE) and Jitter
- The industry’s first unique signal-track scale
- Determines absolute position upon power-up
- Range of scales for a variety of applications
- Low SDE for smooth velocity control
- Worldwide subsidiary support network

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Panasonic A5 series</th>
<th>Panasonic A6 series</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 nm</td>
<td>40 m/s</td>
<td>100 m/s</td>
</tr>
<tr>
<td>50 nm</td>
<td>20 m/s</td>
<td>100 m/s</td>
</tr>
<tr>
<td>1 nm</td>
<td>0.4 m/s</td>
<td>4 m/s</td>
</tr>
</tbody>
</table>

**Specification**

<table>
<thead>
<tr>
<th>Series</th>
<th>Feature</th>
<th>RESOLUTE RELA, RSLA</th>
<th>RESOLUTE RSLA-S</th>
<th>RESOLUTE FASTTRACK/RTLA</th>
<th>RESOLUTE RTLA-S</th>
<th>RESOLUTE RESA/REXA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td></td>
<td>High accuracy and low thermal expansion</td>
<td>World’s most accurate long scales</td>
<td>Easiest installation</td>
<td>Quick and easy scale replacement</td>
<td>Rotary encoder</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stainless steel</td>
<td>Stainless steel tape</td>
<td>Stainless steel tape</td>
<td>Stainless steel tape</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Thermal expansion coefficient @ 20 °C</td>
<td>0.75 ±0.35 μm/m°C</td>
<td>10.1 ±0.2 μm/m°C</td>
<td>10.1 ±0.2 μm/m°C</td>
<td>10.1 ±0.2 μm/m°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale accuracy @ 20 °C</td>
<td>±1 μm up to 1 m, ±1 μm/m for lengths &gt;1 m</td>
<td>±1.5 μm up to 1 m, ±2.5 μm/m from 1 m to 2 m, ±3 μm from 2 m to 3 m, ±4 μm from 3 m to 5 m</td>
<td>±5 μm/m</td>
<td>±5 μm/m</td>
<td>±0.52 to ±5.49 arc second</td>
<td></td>
</tr>
<tr>
<td>Scale length</td>
<td>80 mm to 1500 mm</td>
<td>80 mm to 5000 mm</td>
<td>100 mm to 21000 mm</td>
<td>100 mm to 21000 mm</td>
<td>52 mm to 550 mm diameter</td>
<td></td>
</tr>
<tr>
<td>Scale mounting options</td>
<td>Self-adhesive or Clip/Clamp</td>
<td>Self-adhesive or Clip/Clamp</td>
<td>Self-adhesive</td>
<td>Track (carrier) mounting</td>
<td>Tape/flange mount</td>
<td></td>
</tr>
<tr>
<td>Read head size</td>
<td>H × L × W</td>
<td>18 mm × 36 mm × 16.5 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale size</td>
<td>H × W</td>
<td>1.6 mm × 15 mm (clip/clamp)</td>
<td>1.5 mm × 15 mm (clip/clamp)</td>
<td>1.7 mm × 15 mm (clip/clamp)</td>
<td>0.4 mm × 8 mm</td>
<td>0.4 mm × 18 mm</td>
</tr>
</tbody>
</table>

Optical Incremental linear/Ring(Rotary) Encoder

**TONiC, VIONiC & ATOM series (Digital & Analogue output signal)**

**Features**
- Range of linear and rotary (ring or disc) scales for a variety of applications
- Easy installation and diagnostics using set-up LEDs
- Low Sub-Divisional Error (SDE) and Jitter
- IN-TRAC optical reference mark (TONiC)
- Auto-phased optical reference mark (ATOM)
- Resolution: 5 μm to 1 nm (TONiC)
  - 5 μm to 2.5 nm (VIONiC)
  - 10 μm to 1 nm (ATOM)
- Velocity:
  - 6.48 m/sec @ 1 μm
  - 0.648 m/sec @ 0.1 μm
  (For clocked input frequency of 8 MHz)

**Application Sample**

Our encoder are suitable to use in a variety of applications that require high positioning accuracy and speed stability.

- Semiconductor
- Flat Panel Display
- Motion Control
- Medical
- Precision Measurements
- Machine Tool
- Industrial Robot
- Science

**Sales area and Language**

Please contact the following address for details.

**For more information**

URL: [http://www.renishaw.jp/](http://www.renishaw.jp/) (Japanese)
[http://www.renishaw.com/](http://www.renishaw.com/) (English)

Contact: Renishaw plc
New Mills Wotton-under-Edge Gloucestershire GL12 8JR, United Kingdom
E-mail: international@renishaw.com
TEL: +44-1453-524524
The incremental linear encoder of a magnetic type
SENSOR / PSLH Series, SCALE / PSLG Series

Features
This encoder has achieved an excellent total performance.
- It is high-speed serial communications corresponding to the MINAS series.
- This encoder is strong in the environment of the magnetic noise, oil, and dust.
- A miniaturization and an excellent cost performance are achieved by the internal manufacturing of the MR element.
- Accuracy is improved by an original magnetization pattern.
- It is a tough encoder structure in the extrinsic noise.

Specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model number</td>
<td>sensor PSLH040 + scale PSLG040</td>
</tr>
<tr>
<td>Resolution (R)</td>
<td>0.1 μm</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>4.6 Vdc to 5.5 Vdc</td>
</tr>
<tr>
<td>Power consumption</td>
<td>250 mA max</td>
</tr>
<tr>
<td>Gap of detection</td>
<td>0.25 mm ±0.1 mm</td>
</tr>
<tr>
<td>Maximum response speed</td>
<td>6 m/sec</td>
</tr>
<tr>
<td>IP code</td>
<td>Correspond to IP50</td>
</tr>
<tr>
<td>Position accuracy</td>
<td>±(5x5μm/L×1000 μm) L=Measuring length (mm) at 20 °C</td>
</tr>
<tr>
<td>Measuring length (L)</td>
<td>2400 mm MAX</td>
</tr>
<tr>
<td>Thermal expansion coefficient</td>
<td>11.8×10^-6 °C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>0 °C to 50 °C</td>
</tr>
<tr>
<td>Preservation temperature range</td>
<td>-15 °C to 70 °C</td>
</tr>
</tbody>
</table>

Another specifications of resolution, the size of the detection head, and the ABZ output, etc. can correspond.

Sales area and Language

Please contact the following address for details.

For more information
URL: http://www.nidec-sankyo.co.jp/

Feed back scale selection

Feed back scale table for serial communication

<table>
<thead>
<tr>
<th>Scale Type</th>
<th>Partner</th>
<th>Series</th>
<th>Resolution*1 [μm]</th>
<th>Max. rate*1 [m/s]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel Type (A/B/Z phase)</td>
<td>General</td>
<td></td>
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<tr>
<td>Serial communication (Absolute)</td>
<td>FAGOR AUTOMATION</td>
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<td></td>
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<tr>
<td>Serial communication (Incremental)</td>
<td>HEIDENHAIN</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Serial communication (Incremental)</td>
<td>Magnescale Co., Ltd.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Serial communication (Incremental)</td>
<td>Renishaw plc</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Feed back scale application example

Full Closed Control Linear type

Linear Motor Control Linear type

Full Closed Control Rotary type

6D Motor Control Rotary type

Contact: NIDEC SANKYO CORPORATION
Tokyo Office, Nidec Tokyo Bldg., 1-20-13, Osaki, Shinagawa-ku, Tokyo 141-0032, Japan
TEL: +81-3-5740-3006 FAX: +81-3-6843-3123

*1 There is the difference of resolution and maximum rate from the specification by original supplier as per the servo driver limitation of maximum pulse frequency. The maximum pulse frequency is 400 Mpps for A5 family and 4 Gpps for A6 series. We show the value of A6 family on this table.

Please contact us when you study the system with a scale because the driver and the scale combination has restriction as per the feedback system between full closed control system and linear system.
**AC Servo Actuator SHA-P Series SHA25P/SHA32P/SHA40P/SHA58P/SHA65P**

### Features
- The AC servo actuator incorporates the precise control speed reducer (HarmonicDrive® reducer) to the flat AC servo motor.
- The design of the actuator is flat and has hollow shaft structure. Piping, wiring, laser light, etc., can be passed through the through-hole in the center.
- Precise one-way positioning accuracy: Gear Ratio 50:1 = 40 arc-sec (0.011 degrees) Gear Ratio 80:1 and higher = 30 arc-sec (0.008 degrees) (for SHA25P/40P/CG types)
- Torque-volume ratio is 5 times or more than that of direct drive motor.
- There are two types of options; SHA-SG type that has compact shape feature or SHA-CG type that has improved output flange runout accuracy.

### Max. torque mapping

<table>
<thead>
<tr>
<th>Encoder Type</th>
<th>Pulse/Rotation</th>
<th>Continuous Torque*1</th>
<th>Maximum Moment Load</th>
<th>Maximum Torque*1</th>
<th>One-way Positioning Accuracy</th>
<th>Bi-directional Positioning Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse/Rotation</td>
<td>40 40 40 40 40 40 40 40</td>
<td>258 580 849</td>
<td>40 40 40 40 40 40 40 40</td>
<td>2180 2740</td>
<td>±5 ±4 ±4</td>
<td>±4 ±4</td>
</tr>
</tbody>
</table>

### Specification

#### SHA-CG Type

<table>
<thead>
<tr>
<th>Item</th>
<th>SHA25P</th>
<th>SHA32P</th>
<th>SHA40P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended Driver</td>
<td>MFDHTA390N21 / MFDHTA390ND1</td>
<td>MFDHTA390N21 / MFDHTA390ND1</td>
<td>MFDHTA390N21 / MFDHTA390ND1</td>
</tr>
<tr>
<td>Mass(without brake)</td>
<td>3.95</td>
<td>7.7</td>
<td>13</td>
</tr>
<tr>
<td>Mass(with brake)</td>
<td>4.1</td>
<td>8</td>
<td>13.8</td>
</tr>
</tbody>
</table>

The values in the table above are typical values when used with recommended drivers (driven with the ideal sine wave).

1: Typical values when used with recommended drivers (driven with the ideal sine wave).
3: M*DHT****BD: The position-control-only type, non-applicable for the safety standard.
4: M*DHT****N21: Applicable to the safety standard.
5: M*DHT****BD1: Applicable to the safety standard.
6: M*DHT****BD1: Non-applicable to the safety standard.

**Application Sample**


Please refer to the sample and typical applications for the SHA-P Series with Panasonic Servo as shown above.

**Sales area and Language**

- English
- Japanese

Please refer to the following address for details.

**For more information**

Product URL: [http://www.hds.co.jp/english/](http://www.hds.co.jp/english/)
Contact URL: [https://www.hds.co.jp/english/contact/index.php](https://www.hds.co.jp/english/contact/index.php)

Contact: Harmonic Drive Systems Inc. Overseas Division
1856-1 Hotakamaki, Azumino-shi, Nagano, 399-8305, Japan
TEL: +81-263-83-6935 FAX: +81-263-83-6901
# Compact Actuator AF series

## AF017N/042N/080N/125N/380N/500N/050C/120C/200C/320C

### Features
- **High precision, stiffness, quality**: Integrating Panasonic servo motors with global industrial robot market leader Precision Reduction Gear RV
- **Compact**: Compact drive unit is made possible by machining gear directly onto motor
- **High versatility**: Compatible with the MINAS-A5/A6 family of standard servo drivers

### Specification
- **Motor series: MINAS A6**
  - **Model**
    - AF042N
    - AF125N
    - AF380N
    - AF500N
    - AF200C
    - AF320C
  - **Solid type**
    - AF-N
  - **Hollow shaft type**
    - AF-C

### Application Sample
- **Pick & Place Robot**
- **Positioner**
- **Gantry Robot**
- **Index Table**

### Sales area and Language
- **Japanese**
- **Chinese**
- **English**

### Contact Information
- **Nabtesco Corporation**
  - Europe and Africa: [E-mail: info@nabtesco.de]
  - North and South America: [E-mail: engineer@nabtesco-motioncontrol.com]
  - China: [E-mail: info@nabtesco-motion.com]
  - India: —
  - Asia and others: [E-mail: P_information@nabtesco.com]
- TEL: +49-211-173790
- TEL: +1-248-553-3020
- TEL: +91-80-4123-4901
- TEL: +86-21-3363-2200
- TEL: +49-211-173800

### URL
- [http://precision.nabtesco.com](http://precision.nabtesco.com)
IoT Solution
A6 series + FP7, FP0R

① Remote monitoring & control System by WebServer and E-Mail function

Solutions
- Remote monitoring not go the site
- Quick check of machine abnormal condition
- Not sure when trouble occurs in any time
- Remote trouble shooting when trouble occurs after installation at factory
- To collect the data or change parameters when the person cannot touch or reach the machine directly
- Need a guide message for each predetermined period of time in order to judge the exchange timing

System Configuration
- Relay and Data are linked to the program.
- Web screen creating tool for customer Web
- To access the homepage, to push the button on the page and to input the data via Internet
- 1. To control the PLC via Internet when the data and switch on the page is linked to the program in advance.
- 3. To read the servo data via network

Another Proposals
- FP7 RS485 UNIT + (Modbus-RTU) A6 SERVO (Max31axes)

Sales area and Language
- Japanese
- English

For more information
Contact: Panasonic Industrial Devices SUNX Co.,Ltd.
2431-1, Ushiyama-cho, Kasugai-shi, Aichi, 486-0901, Japan
TEL: +81-568-33-7861 FAX: +81-568-33-8591

URL: http://www3.panasonic.biz/ac/e/fasys/plc/index.jsp

② Simple Smart Modbus SYSTEM: FP0R(RS485) + A6 SERVO

Solutions
- Less wiring
- To control a trouble by the data of load ratio and torque and so on
- To save the cost of positioning unit
- Improve the roughness of input pulse resolution due to the restriction of command pulse output frequency

Simple Smart Low COST System
- FP0R (with RS485) + (Modbus RTU) A6 SERVO (Max31axes)
- 115 kbps/PTP (5 to 6-axis)
- Simple Smart Wireless System
- FP0R (with RS485) + (Modbus RTU) A6 SERVO + ENR Wireless unit
- Max 1000 m

③ High-COST Performance SYSTEM: FPΣ + RTEX UNIT + A6N SERVO

Solutions
- To realize the reasonable high speed synchronized operation
- Less wiring
- To read a real time data of load ration and torque value
- To write and change the servo parameters

FPΣ RTEX UNIT + (RTEX) A6N SERVO (Max8axes/1unit)
FPΣ RTEX High-Performance System
100 Mbps CP/PTP

FP2SH RTEX UNIT + (RTEX) A6N SERVO (Max8axes/1unit)
FP2SH RTEX High-Performance System
100 Mbps CP/PTP