With multi-axis controller
Simple actuator

SEED+ Picosel

Compact modular motor controller driver

SEED Driver

● Compact size
● Minimal Wiring
● No control box
● Simple operation

THK CO., LTD.
TOKYO, JAPAN

CAT. NO. 394-1E
The RT (Robot Technology) achieves compact size, minimal wiring, no control-box driving, and simple operation.

**Solution**

**Design concept**

The RT (Robot Technology) achieves compact size, minimal wiring, no control-box driving, and simple operation.

- **Compact size**
  - Simple and compact units

- **Minimal Wiring**
  - Only a single cable between each axis

- **No control box required**
  - Small COM controller drivers are dispersively arranged.

- **Simple operation**
  - SEED Editor is easy to use even for beginners.

**Lineup**

**Actuator lineup**

- **Belt drive**
  - PCS9S
    - Short slider type

- **Sliding screw drive**
  - PCS9RD
    - Rod type
  - PCS9SL
    - Slider type
  - PCS9GP
    - Gripper type

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SEED Driver is a motor controlling unit invented during the joint development with JAXA. Although JAXA and THK had been aiming to develop a compact and high power robot hand, it was impossible to achieve by relying on conventional motors and control devices. After much difficulty and effort, the "palm-sized" and "wire-saving" SEED Driver has been developed.
Features

1. Compact size

Pixel employs the LM guide to achieve high rigidity and high precision. Compact size with 25 mm width increases the arrangement and design flexibility. Stepping motor with encoder is also employed.

2. Wire-saving

Employing CAN communication allows for a daisy-chain connection (up to 14 axes), eliminating complicated wiring. Only a single cable (ultrathin 4-core cable) is required.

3. No control box required

With dispersively-arranged small COM controller drivers and multi-master system*, operation is achieved without the use of a control box.

* A system controlled by mutually sending/receiving commands among all connected SEED Drivers, with no master unit defined

4. Simple operation

SEED Editor (PC software) enables easy configuration. The scripts internally saved in SEED Driver allow for stand-alone control of the actuators.
**SEED+Picsel Configuration**

**SEED Editor**

- Communication module
- EH-EH 4P cable
- EH terminating connector
- EH-DC jack
- Switch hub

On PC

- Rewriting scripts
- Setting parameters
- Editing functions

After writing settings, stand-alone control is possible.

**SEED+Picsel Connection Examples**

**I/O connection with PLC**

**SEED Editor**

- Communication module
- EH-EH 4P cable
- EH terminating connector
- EH-DC jack

On PC

- Rewriting scripts
- Setting parameters
- Editing functions

After writing settings, run the operation via the I/O interface.
Protocol conversion

**SEED-SDK/SEED Editor**

- **SEED-MS3A** (small protocol controller) converts to **SEED** commands.
- **SEED-MS3A** is used as a gateway.

**Connectable to various protocols**

*Note* For **SEED-SDK** and **SEED-MS3A**, contact THK.

**Options - Model No. Coding**

**SEED options**

<table>
<thead>
<tr>
<th>Name</th>
<th>Model No.</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication module</td>
<td>SOPT-CMSU</td>
<td>A</td>
</tr>
<tr>
<td>Switch hub</td>
<td>SOPT-SWIB</td>
<td>A : With USB cable</td>
</tr>
<tr>
<td>4-port hub</td>
<td>SOPT-4PHB</td>
<td>B : Without USB cable</td>
</tr>
<tr>
<td>EH terminating connector</td>
<td>SOPT-ETRM</td>
<td>A : Connectors by J.S.T.MFG.</td>
</tr>
<tr>
<td>PH terminating connector</td>
<td>SOPT-PRM</td>
<td>B : Connectors by Phoenix Contact</td>
</tr>
<tr>
<td>External I/O module</td>
<td>SOPT-IO16</td>
<td>C : Connectors by Wago, Co. of Japan</td>
</tr>
<tr>
<td>Relay</td>
<td>SOPT-RLYS-A50</td>
<td></td>
</tr>
</tbody>
</table>

**SEED cables**

<table>
<thead>
<tr>
<th>Name</th>
<th>Model No.</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>EH-EH 4P cable</td>
<td>SCBL-EE4P-A</td>
<td>0100:100mm, 0200:200mm, 0300:300mm, 0400:400mm, 0500:500mm</td>
</tr>
<tr>
<td>PH-PH 4P cable</td>
<td>SCBL-PP4P-A</td>
<td>0100:150mm</td>
</tr>
<tr>
<td>EH-DC jack</td>
<td>SCBL-EP4P-A</td>
<td>0500:500mm, 1000:1000mm</td>
</tr>
<tr>
<td>EH cable (discrete)</td>
<td>SCBL-EHDC-A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCBL-EHNN-A</td>
<td></td>
</tr>
</tbody>
</table>
SEED Editor

- Multi-axis operation can be easily set and executed.
- 14 axes are edited/monitored/controlled on the same window.
- Up to 255 steps × 8 scripts and 255 point data can be edited for each axis.

Main Window

Point Data Window
1. **Connect/disconnect CAN**
   Connects to/disconnects from **SEED Driver**.

2. **Switching axis (ID)**
   Allows for switching the **SEED Driver** (up to 14 axes) connected in a daisy chain manner. The IDs where CAN connection is confirmed are indicated in light blue, and are activated when selected. The activated ID is marked with a blue underline, indicating that the axis can be controlled and the setting can be edited.

3. **Forced Outage/Release Forced Outage**
   Forced termination and its cancellation can be performed via the window. * A stop command is submitted via communication.

4. **Script operation**
   Allows for selecting script number, as well as for writing, reading, executing, and pausing the script.

5. **Monitoring executed scripts**
   Displays the number of executed scripts and the step number.

6. **Editing operation scripts**
   Simply selecting operation type and the parameters achieves multi-axis control up to 14 axes. 255 steps × 8 scripts can be registered to each axis. Various controls, such as startup of the other axis scripts, point specification, as well as control with internal variables are available.

   ![Example of script editing window]

7. **Motor ON/Motor OFF**
   Turns the motor ON/OFF.

8. **Monitoring motor status**
   Displays the motor information of the active **SEED Driver**.

9. **Manual operation**
   The unit movement can be controlled by specifying a relative/absolute value or speed manually.

10. **Monitoring I/O**
    Displays the I/O information of the active **SEED Driver**.

11. **Editing and executing point data**
    Multiple axes can be edited/driven simultaneously. The reach time and the target absolute position can be specified up to 255 points for each axis. Operation via scripts is also available. The target absolute position can be specified via POS SET, a teaching function registering the current position as point data.

Various settings including motor parameters, error detection, etc.
   The user can set the motor parameters such as the maximum current and velocity, as well as the error detection parameters.

13. **Switching languages**
   Japanese and English are available.

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**Note**
Communication module is required for using **SEED Editor**.

**Note**
For the operation procedure of **SEED Editor**, refer to "**SEED Editor** Operation Manual".
Short slider type (Belt drive)

### Specifications

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
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<tr>
<td>PCS9S</td>
<td>130</td>
<td>12.73</td>
<td>400</td>
<td>1</td>
<td>12.5</td>
<td>±0.1</td>
<td>±0.1</td>
</tr>
<tr>
<td></td>
<td>230</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>330</td>
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<td></td>
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</table>
**Picsel**

Long slider type (Belt drive)

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</tr>
</thead>
<tbody>
<tr>
<td>PCS9D</td>
<td>100</td>
<td></td>
<td>12.73</td>
<td>400</td>
<td>12.5</td>
<td>±0.1</td>
<td>±0.1</td>
</tr>
</tbody>
</table>
**Picsel Rod**
Rod type (Sliding screw drive)

---

**Bottom mounting face dimensions**

**Stroke code: 100**

**Stroke code: 050**

---

**Table:**

<table>
<thead>
<tr>
<th>Stroke [mm]</th>
<th>L₁ [mm]</th>
<th>L₂ [mm]</th>
<th>L₃ [mm]</th>
<th>Weight [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>155.6</td>
<td>81</td>
<td>86.2</td>
<td>260</td>
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<tr>
<td>100</td>
<td>205.6</td>
<td>131</td>
<td>136.2</td>
<td>290</td>
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</table>

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<thead>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PCS9RD</td>
<td>50</td>
<td>4</td>
<td>80</td>
<td>0.5 (0.08G)</td>
<td>1.25</td>
<td>±0.1</td>
<td>±0.1</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Picsel Slider**  
Slider type (Sliding screw drive)

### Bottom mounting face dimensions

**Stroke code: 120**

- Stroke: 120 mm
- Origin: ±0.02 mm
- Stroke: ±0.02 mm
- Eff depth: 5.5 mm
- 2Ø3H7 through
- 4-M3 through

**Stroke code: 080**

- Stroke: 80 mm
- Origin: ±0.02 mm
- Stroke: ±0.02 mm
- Eff depth: 5.5 mm
- 3Ø3H7 through
- 2Ø3H7 through

**Stroke code: 040**

- Stroke: 40 mm
- Origin: ±0.02 mm
- Stroke: ±0.02 mm
- Eff depth: 5.5 mm
- 2M2.5 through

---

<table>
<thead>
<tr>
<th>Stroke [mm]</th>
<th>L₀ [mm]</th>
<th>L₁ [mm]</th>
<th>Weight [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>126.6</td>
<td>73</td>
<td>185</td>
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<tr>
<td>80</td>
<td>166.6</td>
<td>113</td>
<td>210</td>
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<tr>
<td>120</td>
<td>206.6</td>
<td>153</td>
<td>235</td>
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**Model No.**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>80</td>
<td>4</td>
<td>80</td>
<td>1 (0.08G)</td>
<td>1.25</td>
<td>±0.1</td>
<td>±0.1</td>
</tr>
<tr>
<td>80</td>
<td>120</td>
<td>80</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
**Picsel Gripper**  
Gripper type (R/L sliding screw drive)

![Diagram of Gripper Type]

**Bottom mounting face dimensions**

**Stroke code: 100**

- 2-Ø3H7 through (eff depth 4)
- 8-M2.5 through (eff depth 5.5)

**Stroke code: 060**

- 3-Ø3H7 through (eff depth 5.5)
- 6-M2.5 through (eff depth 5.5)

**Stroke code: 020**

- 3-Ø3H7 through (eff depth 5.5)
- 2-M2.5 through (eff depth 5.5)

---

**Table: Model No. Specifications**

<table>
<thead>
<tr>
<th>Stroke [mm]</th>
<th>L₀ [mm]</th>
<th>L₁ [mm]</th>
<th>Weight [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>126.6</td>
<td>73</td>
<td>200</td>
</tr>
<tr>
<td>60</td>
<td>166.6</td>
<td>113</td>
<td>225</td>
</tr>
<tr>
<td>100</td>
<td>206.6</td>
<td>153</td>
<td>250</td>
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</table>

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PCS9GP</td>
<td>20</td>
<td>4</td>
<td>80</td>
<td>20</td>
<td>1.25 (1/16 step)</td>
<td>±0.1</td>
<td>±0.1</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td></td>
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</tbody>
</table>
### Model Number Coding

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Stroke code</th>
<th>SEED Driver Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCS9S</td>
<td>330</td>
<td>S330</td>
</tr>
</tbody>
</table>

- **PCS9S**: Belt driven short slider type
- **PCS9D**: Belt driven long slider type
- **PCS9RD**: Sliding screw drive Rod type
- **PCS9SL**: Sliding screw drive Slider type
- **PCS9GP**: Sliding screw drive Gripper type

**Refer to Table 1 List of Stroke Codes.**

#### Table 1 List of Stroke Codes

<table>
<thead>
<tr>
<th>Stroke code</th>
<th>PCS9S</th>
<th>PCS9D</th>
<th>PCS9RD</th>
<th>PCS9SL</th>
<th>PCS9GP</th>
</tr>
</thead>
<tbody>
<tr>
<td>020</td>
<td>20mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>330</td>
<td>330mm</td>
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</tr>
</tbody>
</table>

**Refer to Table 1 List of Stroke Codes.**

### Detailed Specifications of Options

#### COM module

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SOPT-CMSU-A</th>
<th>SOPT-CMSU-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB cable</td>
<td>Supplied (1 m length)</td>
<td>Not supplied</td>
</tr>
<tr>
<td>Baud rate</td>
<td>115200bps</td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>USB connector: TYPE A</td>
<td>Micro B connector: Micro B</td>
</tr>
</tbody>
</table>

Prepare a cable between **CM-MS** and PC separately.

#### External I/O module

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SOPT-IO16-A</th>
<th>SOPT-IO16-B</th>
<th>SOPT-IO16-C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector</td>
<td>Connectors by J.S.T.Mfg.</td>
<td>Connectors by Phoenix Contact</td>
<td>Connectors by Wago, Co. of Japan</td>
</tr>
<tr>
<td>Housing</td>
<td>XAP-10V (by J.S.T.Mfg.)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pin contact</td>
<td>XA-001 (by J.S.T.Mfg.)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Recommended cable</td>
<td>AWG #22 / #20</td>
<td>AWG #30/20</td>
<td>AWG #26/20</td>
</tr>
</tbody>
</table>

#### I/O specifications

- **Parallel IO input interface**: 3.3V
- **Parallel IO output interface**: 200 LEDs

<table>
<thead>
<tr>
<th>Input format</th>
<th>DC input (shared by positive common / negative common)</th>
<th>Output format</th>
<th>PhotoMOS relay output (shared Sink/Source)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation method</td>
<td>Insulation by photocoupler</td>
<td>Insulation method</td>
<td>Insulation by PhotoMOS relay</td>
</tr>
<tr>
<td>Number of inputs</td>
<td>16</td>
<td>Number of outputs</td>
<td>16</td>
</tr>
<tr>
<td>Input voltage</td>
<td>3.3VDC – 24VDC</td>
<td>Load voltage</td>
<td>3.3VDC – 24VDC</td>
</tr>
<tr>
<td>Load current/1 point</td>
<td>Max. 100mA/point</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Relay

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SOPT-RLYS-A60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact rating</td>
<td>AC125V 3A DC30 5A</td>
</tr>
<tr>
<td>Recommended cable</td>
<td>AWG #30/20</td>
</tr>
</tbody>
</table>

#### EH-DC Jack

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SCBL-EHDC-A-0150</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC jack specification</td>
<td>Ø5.5x2.1</td>
</tr>
<tr>
<td>AC adapter</td>
<td>24VDC</td>
</tr>
</tbody>
</table>
**SEED+Picsel Combination Unit**

Compact and lightweight. Completely new RT equipment with no control box.

Gantry type  
**i-Picsel 100/200**  
![Image of i-Picsel 100/200]

Cantilever type  
**3-axis Picsel 100/200/300**  
![Image of 3-axis Picsel 100/200/300]

**Picsel Clamper/Chuck**

Electric chuck hand

- PCS-CLS25  
- PCS-CLV25  
- PCS-2F05

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Stroke [mm]</th>
<th>Holding force [N]</th>
<th>Open/close time [s]</th>
<th>Positioning repeatability [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCS-CLS25</td>
<td>20</td>
<td>10</td>
<td>0.25</td>
<td>±0.1</td>
</tr>
<tr>
<td>PCS-CLV25</td>
<td>20</td>
<td>10</td>
<td>0.25</td>
<td>±0.1</td>
</tr>
<tr>
<td>PCS-2F05</td>
<td>10</td>
<td>5</td>
<td>1.00</td>
<td>±0.1</td>
</tr>
</tbody>
</table>

**Application Examples**

**Glue dispenser**
- Simple supplementary operation (14 axes max.)
- Combination of 255 points at each axis
- Wide settings via scripts

**Vacuum pick & place machine**
- No air piping required
- Suction pressure monitored

**Compact multi-axis manufacturing unit**
- Up to 14 axes can be freely combined.
- Compact type
- No control box required

Note: Contact THK for combined units, Picsel Clamper/Chuck, and application examples.
Precautions on Use

● Safety Precautions

• Be careful not to drop or strike this product. Doing so may cause injury to the user or damage the unit. If the product is dropped or impacted, functionality may be reduced even if there is no surface damage.

• Do not rework or disassemble this product. Doing so may allow foreign materials to enter or lose product functionality. Reworking the driver will cause the risk of electric shock.

• Before performing installation, adjustment, verification, or services regarding the SEED+Picsel and the relevant connected equipment, make sure to remove all power plugs from the outlet and apply locking or safety plugs so that nobody else can turn on the power. When using this unit mounted vertically, take appropriate measures to ensure safety and prevent damage to the device caused by the slider falling.

• Since the SEED includes a communication system in its configuration, there is a risk that it cannot be forcefully stopped in case of system failure, etc. Make sure, therefore, to install a circuit to immediately stop the operation and shut down the power in case of an emergency.

• Driver and motor surfaces may become very hot. Whether the power is on or off, ensure that the driver and motor are sufficiently cooled before performing any work.

• Do not use the Picsel and the SEED Driver in any combination other than specified. Doing so may lead to loss of functionality.

• Read the manual carefully, understand the contents fully, and strictly follow the safety precautions.

● Environment

• The power supply voltage is DC 24V. Use the product while using a noise filter and taking other measures to prevent the effects of noise.

• Do not connect the ground line to an earth ground shared with a strong electric system.

• When performing wiring work, pay extra attention to the radiation noise from other equipment.

• Extreme environmental conditions can cause the SEED+Picsel to fall. The best place to use the product is as follows:
  - An indoor location and ambient temperatures from 5 to 35°C, and humidity of 80%RH or below (no freezing or condensation).
  - A place free from corrosive gas and flammable gas.
  - A place free from dielectric powder (such as iron powder), dust, oil mist, cutting fluid, moisture, salt, and organic solvent.
  - A place free from any device generating strong noise.
  - A place free from direct sunlight and radiant heat.
  - A place free from strong electric and magnetic fields.
  - A place where vibration or impact is not transmitted to the unit.
  - A place that is easily accessible for service and cleaning purposes.

• Read the manual carefully, understand the contents fully, and strictly follow the instructions on installation and use environment.

● Storage

• When storing the unit, enclose it in a package designated by THK and store it in a horizontal orientation with the power off in a place without condensation while avoiding high temperature, low temperature and high humidity.
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