MEGAPOSITIONER™
Rotary Actuator with High Rigidity and Ultra-large Torque Output

Combination of Megatorque Motor and zero-backlash speed reducer for a compact and powerful precision rotary positioning unit.
Features

1. High-speed positioning of large-inertia loads
   Precision speed reducer combined with Megatorque Motor effectively attenuates reflected load fluctuation and disturbance for high speed positioning. Max. output torque of 1,960 N·m and applicable inertia up to 700 kg·m² (Model SR6)

2. High-accuracy positioning performance
   Provides +/- 5 arc-sec repeatability (precision type) using rigid-shaft design zero-backlash speed reducer driven by high positioning accuracy Megatorque Motor.

3. Low profile, compact footprint and large through holes
   Minimized footprint includes motor with 222 mm low-profile height (Model SR6). Output axis has 145 mm large through holes (Model SR6).

4. Max. 10 µm rotor run-out with high rigidity
   High moment rigidity in low profile design achieved with custom bearings. Moment load: Max. 9000 N·m, Rotor run-out: Max. 10 µm (Model SR6)

5. Custom Driver Unit with positioning controller function
   Positioning operation can be controlled without complicated communications or additional controller. Home position sensor incorporated so Megapositioner can be connected directly to Driver Unit.

Product Configuration

Megatorque Motor™
(PS series: High-speed outer rotor type)
This direct drive motor features high torque, high speed and compact size. It is capable of handling load inertia up to 100 times the rotor inertia. The combination of proprietary disturbance observer and preview-based feed-forward control configuration enables very-high-speed positioning.

Zero-backlash precision speed reducer
Zero-backlash design is achieved by an input screw shape in which output roller followers contact the output contact screw at consistent preload. This design enables precise positioning in any rotating direction and maintains accuracy without developing any wear.
Application examples

Index table for large loads
Model: SR6
- Table: Weight 950 [kg], Diameter 2.0 [m]
- Work: Weight 70 [kg], Radius 0.9 [m]
- Load inertia: Work 239 [kg·m²], Table 460 [kg·m²]

Model: SR4
- Table: Weight 470 [kg], Diameter 1.4 [m]
- Work: Weight 80 [kg], Radius 0.6 [m]
- Load inertia: Work 88 [kg·m²], Table 112 [kg·m²]

Cantilever index arm
Model: SR6
- Moment load: 3 450 [N·m]
- Unit: Weight 250 [kg], Radius 1.1 [m]
- Arm: Weight 140 [kg], Length 1.1 [m]
- Load inertia: Work 270 [kg·m²], Arm 70 [kg·m²]

Model: SR4
- Moment load: 1 280 [N·m]
- Unit: Weight 140 [kg], Radius 0.75 [m]
- Arm: Weight 67 [kg], Length 0.75 [m]
- Load inertia: Work 87 [kg·m²], Arm 17 [kg·m²]

Large load positioning arm
- Work: Weight 180 [kg], Length 0.75 [m]
- Arm: Weight 470 [kg] (including counterweight) Length 1.4 [m]
- Load inertia: Work 140 [kg·m²], Arm 515 [kg·m²]

Film feeder roll
- Film: Weight 370 [kg], Diameter 500 [mm], Width 1 750 [mm]
- Roll: Weight 580 [kg], Diameter 250 [mm], Length 1 950 [mm]
- Load inertia: Film 15 [kg·m²], Roll 5.5 [kg·m²]

Large load positioning arm
- Work: Weight 180 [kg], Length 0.75 [m]
- Arm: Weight 470 [kg] (including counterweight) Length 1.4 [m]
- Load inertia: Work 140 [kg·m²], Arm 515 [kg·m²]

Film feeder roll
- Film: Weight 370 [kg], Diameter 500 [mm], Width 1 750 [mm]
- Roll: Weight 580 [kg], Diameter 250 [mm], Length 1 950 [mm]
- Load inertia: Film 15 [kg·m²], Roll 5.5 [kg·m²]

*These application examples are for reference purposes only. Please consult NSK for actual applications.

Load weight: 430 [kg]
Load inertia: 625 [kg·m²]

10th gen. glass substrate (2 850 × 3 050mm)

8th gen. glass substrate (2 250 × 2 500mm)

6th gen. glass substrate (1 500 × 1 850mm)

Megapositioner SR620H

Load weight: 430 [kg]
Load inertia: 625 [kg·m²]

180° indexing 4.3 [sec]

180° indexing 3.4 [sec]

Load weight: 320 [kg]
Load inertia: 600 [kg·m²]

Load weight: 150 [kg]
Load inertia: 190 [kg·m²]

Megapositioner SR4500

Load weight: 95 [kg]
Load inertia: 45 [kg·m²]

Load weight: 95 [kg]
Load inertia: 45 [kg·m²]

Megatorque Motor PN4180

Load weight: 95 [kg]
Load inertia: 45 [kg·m²]
Megapositioner

Megapositioner reference number

Example of reference number:

XY – SR 6 20H FN001 E01

Driver Unit No.
E01: Standard
C01: CC-Link

Megapositioner

Size

Max. output torque [N·m]
H indicates hecto (10^2) units

Example of reference number

Design no.
FN001: Standard, FN002: High-precision

Megapositioner specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>XY-SR4500FN001</th>
<th>XY-SR4500FN002</th>
<th>XY-SR620HFN001</th>
<th>XY-SR620HFN002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. torque [N·m]</td>
<td></td>
<td>500</td>
<td>1 960</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated torque [N·m]</td>
<td></td>
<td>80</td>
<td>520</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. speed [S⁻¹]</td>
<td></td>
<td>0.42</td>
<td>0.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated speed [S⁻¹]</td>
<td></td>
<td>0.25</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed reduction ratio</td>
<td></td>
<td>20</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor resolution [counts/rev]</td>
<td></td>
<td>52 428 800</td>
<td>62 914 560</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy [arc-rec]</td>
<td></td>
<td>60</td>
<td>40</td>
<td>60</td>
<td>40</td>
</tr>
<tr>
<td>Repeatability [arc-rec]</td>
<td></td>
<td>±15</td>
<td>±15</td>
<td>±15</td>
<td>±15</td>
</tr>
<tr>
<td>Rotor run out [μm]</td>
<td></td>
<td>10</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. axial load [N]</td>
<td></td>
<td>11 600*</td>
<td>52 700*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. radial load [N]</td>
<td></td>
<td>10 200*</td>
<td>28 900*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. moment load [N·m]</td>
<td></td>
<td>820*</td>
<td>2 770*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. load inertia [kg·m²]</td>
<td></td>
<td>200</td>
<td>700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Through hole diameter [mm]</td>
<td></td>
<td>115</td>
<td>145</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight [kg]</td>
<td></td>
<td>100</td>
<td>240</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Environmental conditions

5 to 40 ºC, 20 to 80% humidity in indoor use, free from dust, condensation and corrosive gas.

Rotational speed and output torque characteristics

Torque-speed curve

SR4500

SR620H

Rotational speed [degrees/sec]

Max. max

Rated

SR4500

SR620H

Allowable load chart

SR4500

SR620H

The load chart above shows static allowable load on the output axis.
Please consult with NSK for dynamic or impact loads.
Dimensions

XY-SR4500 FN001*** (XY-SR4500 FN002***)

- Dimensions
- (Rotating part)
- (Fixed area)
- Oil level gauge
- (Rotating part)
- Eyebolt (M10)
- Parts smaller than this diameter may interfere with Megapositioner. (222 mm range from setup face to output axis)
- 22 Drill-Thru to 32
- H7 dp. 15
- 12-M12 dp. 24 (PCD250)
- Counterbore depth 50
- (To secure Megapositioner)
- 32 Drill-Thru to 43
- H7 dp. 10
- 8-M10 dp. 20 (PCD160)
- (Rotating part)
- 32 2532336
- 10H7 pinhole)
- 22.5
- 45
- Motor cable lead
- Sensor cable lead
- Motor connector
- Resolver cable lead
- View in direction of arrow A
- View in direction of arrow B

XY-SR620H FN001*** (XY-SR620H FN002***)

- Dimensions
- (Rotating part)
- (Fixed area)
- Oil level gauge
- Eyebolt (M12)
- Parts smaller than this diameter may interfere with Megapositioner. (222 mm range from setup face to output axis)
- 22 Drill-Thru to 32
- H7 dp. 15
- 12-M12 dp. 24 (PCD250)
- Counterbore depth 50
- (To secure Megapositioner)
- 32 Drill-Thru to 43
- H7 dp. 10
- 8-M10 dp. 20 (PCD160)
- (Rotating part)
- 32 2532336
- 10H7 pinhole)
- 22.5
- 45
- Motor cable lead
- Sensor cable lead
- Motor connector
- Resolver cable lead
- View in direction of arrow A
- View in direction of arrow B
EDC Driver Unit

Features of EDC Driver Unit

- Adopts new servo algorithm (achieves settling time of 1 [ms])
  The EDC Driver Unit adopts an original disturbance observer and preview-based feed-forward control, which significantly reduce positioning time.

- Positioning controller function
  Positioning operation can be controlled without complicated communications or upper controller.

- Compact Driver Unit
  Combined with special electric components and advanced integration technology, the Driver Unit body is 65% smaller than conventional NSK units.

- Variety of control I/Os
  Control inputs/outputs required for positioning are available, including encoder output, servo control and program control. No additional sensor is required to monitor the status.

Components and functions of EDC Driver Unit

- Rear mounting hole
  Optional mounting bracket available for front mounting.

- Independent inputs for main power and control power
  Separate power lines assure system safety.

- Motor cable connector
  Clamping type connector shortens work time and prevents miswiring.

- Seven-segment LED indicator
  Driver Unit status can be identified at a glance.

- Analog monitor output terminal
  Speed, positioning error, torque, motor current, etc. can be monitored by analog voltage.

- RD-232C communication connector
  Connect a portable terminal to set parameters.

- Control I/O connector
  Connects a portable terminal to set parameters. Use the EDC Megaterm software to communicate with a PC.

- A variety of signals are available, including servo on, in-position, emergency stop, area signal, override, various alarm outputs, and φA/φB/φZ.

EDC Megaterm Application Software

Once installed on your computer, this software enables editing, preparation and control of EDC Driver Unit programs and parameters. It also facilitates allocation and monitoring of control input/output. And its oscilloscope function allows for easy confirmation of Motor operation. EDC Megaterm can be downloaded for free from the NSK Web site (http://www.nsk.com/).

System configuration

The system configuration described above is just one example. Please refer to the manual to safely design systems on under your own responsibility.
Driver Unit specifications

**Signal Specifications of CN2 (Control I/O)**

<table>
<thead>
<tr>
<th>Item</th>
<th>XY-SR4500FN***E01</th>
<th>XY-SR4500FN***C01</th>
<th>XY-SR620HFN***E01</th>
<th>XY-SR620HFN***C01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Unit part No.</td>
<td>M-EDC-PS3033AB5F-01</td>
<td>M-EDC-PS3033AB5F-01</td>
<td>M-EDC-PS3033AB5F-01</td>
<td>M-EDC-PS3033AB5F-01</td>
</tr>
<tr>
<td>AC power</td>
<td>800 [VA]</td>
<td>5 500 [VA]</td>
<td>800 [VA]</td>
<td>5 500 [VA]</td>
</tr>
<tr>
<td>Positioning mode</td>
<td>Programmable channels (Max. 256 channels)</td>
<td>Programmable channels (Max. 256 channels)</td>
<td>Programmable channels (Max. 256 channels)</td>
<td>Programmable channels (Max. 256 channels)</td>
</tr>
<tr>
<td>Input</td>
<td>17 input signals, DC 24 [V]</td>
<td>Emergency stop, Servo On, Homing, Execute program, Jog, etc.</td>
<td>17 input signals, DC 24 [V]</td>
<td>Emergency stop, Servo On, Homing, Execute program, Jog, etc.</td>
</tr>
<tr>
<td>Output</td>
<td>7 output signals, DC 24 [V]</td>
<td>Sensor state, Warning, In-position, etc.</td>
<td>7 output signals, DC 24 [V]</td>
<td>Sensor state, Warning, In-position, etc.</td>
</tr>
<tr>
<td>Protection</td>
<td>Emergency stop, Sensor error, Motor cable error, Over speed, Excess position error, Software thermal error, Over heat, Over voltage, Excess current, etc.</td>
<td>Emergency stop, Sensor error, Motor cable error, Over speed, Excess position error, Software thermal error, Over heat, Over voltage, Excess current, etc.</td>
<td>Emergency stop, Sensor error, Motor cable error, Over speed, Excess position error, Software thermal error, Over heat, Over voltage, Excess current, etc.</td>
<td>Emergency stop, Sensor error, Motor cable error, Over speed, Excess position error, Software thermal error, Over heat, Over voltage, Excess current, etc.</td>
</tr>
<tr>
<td>Monitor</td>
<td>• Dual Analog monitor (Velocity, Position error, Torque command, etc.) • Monitor through RS-232C</td>
<td>• Dual Analog monitor (Velocity, Position error, Torque command, etc.) • Monitor through RS-232C</td>
<td>• Dual Analog monitor (Velocity, Position error, Torque command, etc.) • Monitor through RS-232C</td>
<td>• Dual Analog monitor (Velocity, Position error, Torque command, etc.) • Monitor through RS-232C</td>
</tr>
<tr>
<td>Communication</td>
<td>RS-232C (9600 [bps])</td>
<td>RS-232C (9600 [bps])</td>
<td>RS-232C (9600 [bps])</td>
<td>RS-232C (9600 [bps])</td>
</tr>
<tr>
<td>Other functions</td>
<td>Dynamic brake built in / Optional external re-generation resistor / Allocatable input and output / Individual acceleration and deceleration / Cam motion profile / Alarm history</td>
<td>Dynamic brake built in / Optional external re-generation resistor / Allocatable input and output / Individual acceleration and deceleration / Cam motion profile / Alarm history</td>
<td>Dynamic brake built in / Optional external re-generation resistor / Allocatable input and output / Individual acceleration and deceleration / Cam motion profile / Alarm history</td>
<td>Dynamic brake built in / Optional external re-generation resistor / Allocatable input and output / Individual acceleration and deceleration / Cam motion profile / Alarm history</td>
</tr>
<tr>
<td>Field Bus option</td>
<td>CC-Link Ver. 1.10</td>
<td>CC-Link Ver. 1.10</td>
<td>CC-Link Ver. 1.10</td>
<td>CC-Link Ver. 1.10</td>
</tr>
<tr>
<td>Environmental conditions</td>
<td>Temperature Operation at 0 to 50 [°C] / Storage at -20 to 70 [°C]</td>
<td>Temperature Operation at 0 to 50 [°C] / Storage at -20 to 70 [°C]</td>
<td>Temperature Operation at 0 to 50 [°C] / Storage at -20 to 70 [°C]</td>
<td>Temperature Operation at 0 to 50 [°C] / Storage at -20 to 70 [°C]</td>
</tr>
<tr>
<td></td>
<td>Humidity Max. 90 [%], No condensation</td>
<td>Humidity Max. 90 [%], No condensation</td>
<td>Humidity Max. 90 [%], No condensation</td>
<td>Humidity Max. 90 [%], No condensation</td>
</tr>
<tr>
<td></td>
<td>Vibrations Max. 4.9 [m/s²]</td>
<td>Vibrations Max. 4.9 [m/s²]</td>
<td>Vibrations Max. 4.9 [m/s²]</td>
<td>Vibrations Max. 4.9 [m/s²]</td>
</tr>
</tbody>
</table>

Driver Unit dimensions

- **Standard**: M-EDC-PS3033AB5F-01
  - Weight: 1.1 [kg]
  - Dimensions: 140 x 306 x 60 [mm]
- **SR4500**: Weight: 1.3 [kg]
  - Dimensions: 140 x 306 x 60 [mm]
- **SR620H**: Weight: 2.0 [kg]
  - Dimensions: 140 x 306 x 60 [mm]

**ECC Driver Unit with CC-Link Function**

- **Input signals**
  - DC24: 1, 2 (DC 24 V external power supply)
  - EMST: 3 (Emergency stop)
  - HLS: 4 (Home position limit)
  - OTP / OTM: 5 / 6 (Over travel limit (+/- direction))
  - SVON: 7 (Servo on)
  - RUN: 8 (Start program)
  - STP: 9 (Stop)
- **Output signals**
  - BUSY: 10 (In-operation)
  - IPOS: 14 (In-position)
  - NEARA: 15 (Target proximity A)
  - EMST: 3 (Emergency stop)
  - HLS: 4 (Home position limit)
  - OTP / OTM: 5 / 6 (Over travel limit (+/- direction))

**Cable with CN2 connector (optional)**

- Reference number: M-E011DCCN1-001
- L = 500 ±100 [mm] (DHF-PDA10-3-A01-FA [DDK], or equivalent)

**RS-232C Communication Cable (Communication cable between EDC Driver Unit and PC)**

- Reference number: M-C003RS03
## Accessories

### Cable Set Reference Number

**Example of Reference Number**

<table>
<thead>
<tr>
<th>M–C</th>
<th>004</th>
<th>SCP</th>
<th>13</th>
</tr>
</thead>
</table>

03: Stationary cable 13: Flexible cable

Cable bending radius (Motor cable, Resolver cable)

<table>
<thead>
<tr>
<th>Bending radius for fixed part</th>
<th>Bending radius for flexible part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary cable</td>
<td>R43 or more</td>
</tr>
<tr>
<td>Flexible cable</td>
<td>R80 or more</td>
</tr>
</tbody>
</table>

*Cable must be installed without bending stress around cable connector part.

### Dimension of Cable Set

![Diagram of Cable Set Dimensions](image)

### Handy Terminal

**Reference number: M-FTH21**

Handy Terminal FHT21 is an easy-to-handle RS-232C communication terminal for inputting parameters and programs to the EDC Driver Unit. The device can also read and save (upload) driver unit parameters and channel programs and transmit (download) them to other driver units.

- LCD screen: 20 characters x 4 lines, no external power source required, cable length: 3 m

Conventional model M-FTH11 is also supported by the EDC Driver Unit.

### Optional Regeneration Resistor (M-E014DCKR-100/101)

<table>
<thead>
<tr>
<th>Item</th>
<th>Reference Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated wattage [W]</td>
<td>M-E014DCKR1-100</td>
</tr>
<tr>
<td>Resistance [Ω]</td>
<td>70</td>
</tr>
<tr>
<td>Thermal sensor temperature [°C]</td>
<td>100</td>
</tr>
<tr>
<td>Ambient temperature [°C]</td>
<td>0 to 40</td>
</tr>
</tbody>
</table>

![Diagram of Optional Regeneration Resistor](image)
Safety Warnings and Cautions

1. Device selection
- This product is intended for general industrial use. It was not designed or manufactured for uses that may affect human life. Please use only in the following types of environments or locations.
  (1) Places that are not in a vacuum or high pressure, places out of direct sunlight, and environments without condensation
  (2) Places without excessive electromagnetic noise and that are insulated from electrical current (Sufficient measures need to be taken especially near welding machines.)
  (3) Places with no radioactive materials or strong electromagnetic fields
  (4) Places where there are no combustible/flammable materials in the surrounding area.
  (5) Strong, flat, and smooth surfaces that can withstand the weight of the product and loads (rigid surfaces where resonant vibration due to vibration when running will not occur)
- This product has lubricant in it. Lubricant may leak from oil seals when in use. Take protective measures such as setting up an oil pan to avoid accidents including operators slipping and falling and malfunctioning of equipment.
- Use within the scope of specifications noted in the specifications table.
- To prevent loads (work, etc.) from vibrating when running, consider rigidity and securely hold or fix the load.
- This product has very high delivery efficiency and part does not have self-locking ability. It cannot maintain the stop position when motor force is released with large torque applied to the output shaft when used with unbalanced loads such as those placed vertically. If the stop position must be maintained, use clamps and the like.
- Maintain space to prevent impact with surrounding equipment and place safety stoppers and safety sensors to stop the product safely even if the load moves in an unexpected manner.

2. Transport
- Prevent impact when transporting by taking care not to bump into objects or drop the product.
- Work must be done by an operator qualified for crane operation and slinging. Improper work may lead to the product dropping or falling over, injuries, equipment damage, etc.
- Before hoisting, check the product’s weight by catalogs, diagrams, and the like, and use proper hoisting gear.
- When hoisting, screw the supplied eye bolts in at the specified tap hold positions and lift with equal force on the two locations. Stay away from the product while it is being hoisted. Failure to do so may lead to dropping or swinging.
- Do not place loads (work, etc.) on the product until it is set up.
- Avoid lifting machinery, etc. with the product attached to it.

3. Installation/assembly
- Installation must be done by someone with a basic knowledge of machinery assembly.
- Personnel involved in the work must maintain safety and undergo hygiene/safety training before starting work.
- Electrical wiring must be done by someone with basic knowledge in that field upon reading and understanding the operating manual for this product and the Driver Unit.
- Apply thread-locking adhesive to the tightening bold of the output shaft, and tighten to the specified torque (with a torque wrench. (See the product’s operating manual for specified torque.)
- Before using, conduct risk assessment and take countermeasures based on analyzed and assessed risks.
- Secure an appropriate safety zone and take protective measures through a safety protection system.
- When using an external regeneration resistor, be sure to set up protective covers and guards at the resistor to protect against burns.

4. Startup adjustment (instruction)
- Conduct startup adjustment outside the safety fence in a safe location outside the range of movement of the load.
- Set up a safety system whereby the power is disconnected in irregular situations.
- Conduct work by personnel with knowledge in machinery assembly, electrical wiring, this product, and the Driver Unit.
- When conducting work, confirm work instructions, use of protective gear, and securing of the main unit and load.
- Make sure fingers and tools are not inserted into openings on the main unit and load.
- When using with unbalanced loads such as those placed vertically, take safety measures so there is no danger or movement even in cases such as reverse operation.

5. Operation (use)
- Set up safety fences and the like, and make sure nobody except the person directly involved in work enters the work area.
- Train personnel instructing and controlling operation start on work regulations regarding safety.
- Give instructions to notify that the device is operating.
- Set up mechanisms by which operation is immediately stopped in irregular situations, such as by pressing the emergency stop button.
- The emergency stop function (CN2) of the Driver Unit does not satisfy requirements in IEC 60204-1 (US B9960-1) for disconnecting device power. Therefore, set up a safety system that can safely stop the device (disconnect power) at input of emergency stop signal.
- Take safety measures by a safety system that can immediately stop the device (disconnect power) at alarms from the product or by signals of safety sensors installed.
- Confirm safety when starting operation. Also prepare work regulations that stipulate safety confirmation procedures and items.
- Stop operation immediately in abnormalities with the product (irregular nose, irregular smell, vibration, etc.)
- If the product is stopped (power disconnected) by the safety system, investigate the reason for stopping and only restart operation when the irregularity is eliminated. Prepare work regulations that stipulate investigation procedures and methods in such situations.

6. Maintenance/inspections
- Personnel involved in the work must maintain safety and undergo hygiene/safety training before starting work.
- Give instructions when conducting maintenance inspection work.
- When using with unbalanced loads such as those placed vertically, take safety measures so there is no danger in load movement even in cases such as reverse operation.
- Do not conduct maintenance/inspection work with the power live.
- Conduct periodic inspections/maintenance. (See the operating instructions of this product for inspection/maintenance items.)

7. Disposal
- Dispose this product appropriately as industrial waste.
Megapositioner setup/maintenance

The Megapositioner can be set up in two directions: upright and horizontal.

- Do not use a motor lead lines or resolver lead lines for moving parts. Also, lead line curve radius must be R30 mm or greater.
- For maintenance inspections, space should be secured around motor attachment, homing sensor attachment, oil plug, drain, and grease nipple.
- Set up on a flat and smooth surface.
- Apply Locktite 242 or equivalent thread-locking adhesive to loads bolts for securing load, and tighten to the specified torque with a torque wrench.
- Use the following types of oil as lubricant. Periodically replace lubricant to maintain safety and quality. See the instructions included with the lubricant for replacement timing.

<table>
<thead>
<tr>
<th>Oil</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobil SHC 629</td>
<td>Exxon Mobil</td>
</tr>
</tbody>
</table>
| Grease         | Pyronoc Universal 2| Nippon Oil

Driver Unit Setup

- Be sure to set up the EDC Driver Unit in a vertical position so the heat sink fins for air-cooling are at the top and bottom.
- Keep the ambient temperature between 0 and 50 ºC. The Driver Unit cannot be used in high temperatures greater than 50 ºC. Keep space of 100 mm or more above and below the Driver Unit in the control cabinet. If heat is trapped above the Driver Unit, open the space above it to allow the heat to dissipate (dust prevention measures required) or provide a forced air cooling system to provide an environment where heat can escape.
- Use the Driver Unit in a control cabinet with IP54 or higher protection from dust and water. Protect the Driver Unit from exposure to oil mist, cutting water, cutting dust, coating gas, etc. to prevent their entry into the Driver Unit through ventilation openings. Failing to do so may lead to failure.
- When installing two or more Driver Units for multi-axis combinations and the like, provide 10 mm or more space between adjacent Driver Units so they are not too close to each other.
- The EDC Driver Unit can be attached to a panel using the supplied mounting brackets.
- The maximum power loss of the EDC Driver Unit is 55 W.

Cable setup

- Do not cut the cable set to extend, shorten, disconnect, etc.
- Do not place the power lines (AC main power and motor cable) and the signal lines in close proximity. Do not tie wrap them or to put them in the same duct.

Regeneration resistor setup

- Do not use in environments such as underwater or with high temperature and humidity, condensation, corrosive gas, etc.
- The surface will become hot, so measures to protect from burning are necessary. Be sure to set up protective covers to prevent people from easily gaining access. Protective covers must be secured or other measures taken to prevent accidental contact. Also avoid setting up in closed spaces.

Selecting a Megapositioner

Consider the following when selecting a Megapositioner.

1. Load on output shaft
   - External moment load inertia, axial/radial/moment load, holding torque when static
2. Positioning accuracy
3. Calculation of positioning time
4. Calculation of effective torque/ave. rotational speed
5. Selection of regeneration resistor

1. Load on output shaft
   A. External load inertia
      - Load inertia placed on the Megapositioner output shaft greatly affects acceleration and deceleration performance.
      - Calculate the load inertia placed on the output shaft.
   B. Axial/radial/moment load
      - Calculate the load placed on the Megapositioner output shaft.
      - Typical patterns of the relation between external force and load are shown below. Make sure the individual loads are less than the allowable values.

2 Positioning accuracy

Repeated positioning accuracy can be found by the formula below from amplitude A [mm] and distance L from center [mm].

\[
\text{Amplitude (A)} = 3 \times 600 \times \tan \left( \frac{A}{L} \right) \text{ [sec.]} 
\]
3. How to calculate positioning time

Estimated positioning time within 360º can be calculated by the formula described below.

\[ T_2 = \frac{2\pi \times N \times \eta \times T_w}{i} \]

\( T_2 \): Torque at constant speed \([\text{N} \cdot \text{m}]\)

- \( N \): Speed \([\text{r} / \text{min}]\)
- \( \eta \): Speed reduction ratio
- \( T_w \): Torque at rotational speed \([\text{N} \cdot \text{m}]\)

**Note:**

Please consult NSK for positioning greater than 360º and for continuous rotation.

(2) Effective torque

\[ T_{\text{rms}} = T_2 \times \text{Load factor} \]

\( T_{\text{rms}} \): Effective torque \([\text{N} \cdot \text{m}]\)

4. Effective torque and average rotational speed

When selecting Megapositioner, it is necessary to consider the maximum required torque. Also, allowable effective torque must be less than rated torque, and average rotational speed must be less than rated rotational speed.

(3) Positioning time.

Positioning time \( t_1 \) is calculated by the formula below:

\[ t_1 = \frac{\theta}{360 \times N} + \Delta t \text{ [s]} \]

\( t_2 \): Settling time \([\text{s}]\)

Total positioning time \( t_3 \) is:

\[ t_3 = t_1 + t_2 \text{ [s]} \]

Where

\[ 2 \Delta t + \Delta t > 0 \]

(5) Required capacity Ru for regeneration resistor.

Required capacity Ru can be calculated by the formula below:

\[ Ru = \frac{E}{0.25 \times i_S} \text{ [W]} \]

\( Ru \): Required capacity of regeneration resistor \([\text{W}]\)

\( E \): Energy capacity consumed by optional regeneration resistor \([\text{J}]\)

\( i_S \): Load factor of regeneration resistor

Please consult NSK if Ru calculation value results are 120 W or greater.

Reconsidering conditions for 3. Positioning time and 4. Effective torque / Average rotational speed may allow conditions for regeneration resistor to be met.
Form for Requesting Selection

NSK will assist in selecting the optimal Megapositioner. Please fill in the necessary items in the below form and send it by fax to your local NSK office. Items marked with * represent important information required for selection. Please provide as much detail as possible.

1. To Date (DD/MM/YYYY): / /

2. Company Name: ____________________________

3. Name: ____________________________

4. Application and equipment used (specify with as much detail as possible)

5. Motor installation position

   [ ] Upright position

   [ ] Horizontal position

6. Load conditions

   (1) Geometry, dimensions, thickness, material (or mass) of table

   (2) Dimensions, mass, quantity of loads/jigs

   (3) PCD (distance between the jigs/load) (example of description)

7. Timing of external force

   [ ] Impact

   [ ] Friction

8. Cautions regarding maintenance and repairs

   (1) Lubricant/grease

   (2) Homing sensor

9. When returning for maintenance, etc., return this product only. Also, use packaging and method of transportation equivalent to that used at delivery. NSK Ltd. bears no responsibility for damage, loss, etc. to items other than the returned product.

10. Environmental conditions

    Operating environment

    [ ] General environment (equivalent to IP30)

    [ ] Oil, water and chemical

    [ ] Chips and dust

    [ ] Clean

    Operating temperature

    [ ] 0°C to 40°C

    [ ] Below 0°C

    [ ] Above 40°C

    Contact NSK, Ltd. for details.

11. Cable specification and length

    [ ] Stationary cable

    [ ] Flexible cable

    Length: m

12. Desired model

    [ ] XY-SR6

    [ ] XY-SR4

    [ ] Unknown

13. Motor size requested

14. Positioning command system

   [ ] Internal program system

   [ ] CC-Link

15. Repeatability (s)

   ± seconds (± mm at mm from the motor center)

16. Cyclic pattern (desired positioning time)

   (*Specify setting time.)

17. Desired model

18. Environmental conditions

    Operating environment

    General environment (equivalent to IP30)

    Oil, water and chemical

    Chips and dust

    Clean

    Operating temperature

    0°C to 40°C

    Below 0°C

    Above 40°C

    Other

19. Contact NSK, Ltd. for details.

Warranty Term and Scope

1. Content and term of warranty

   NSK will repair for the purchaser of this product (hereinafter, the “user”), without charge (hereinafter, “warranty”) failures that occur within one year of the product delivery (hereinafter, the “warranty term”) due to fault of NSK. Actions taken for failures that occur after the warranty term has expired will be charged by NSK Ltd.

2. Immunities

   The warranty does not cover failures that occur for the following reasons.

   (1) Relocation, transport, storage, setup, operation, or use in a manner contrary to items displayed on or with the product. Items noted in instructions and other manuals, catalogs and the like, and items instructed or notified to the user at delivery or before failure; as well as confirmed use in environments or maintenance contrary to as noted in the above places

   (2) Repairs or modifications conducted by parties other than NSK Ltd. without the approval of NSK Ltd.

   (3) Combination with products other than those for this product (including software)

   (4) Consumption of consumables

   (5) Replacement of parts for this product by the user other than lubricant, grease, and homing sensor

   (6) Reasons not foreseeable by scientific or technical standards at the time of product delivery by NSK Ltd.

   (7) Natural disasters, accidents, conflicts, and other force majeure and external factors not attributable to the product including fire, application of irregular voltage/signals

   (8) Other reasons not attributable to fault by NSK

3. Limit of responsibility

   Items noted herein are the entirety of responsibility by NSK in terms of product warranty. NSK bears no responsibility whatsoever for secondary or incidental damages, loss of opportunity, etc. caused by failure of this product.

4. Service fees, etc.

   Fees for dispatch of NSK Ltd. personnel and for the following services conducted based on request by the user shall be paid by the user. Such fees shall be calculated according to NSK Ltd. regulations.

   (1) Re-application, repair, or replacement of consumables such as lubricant, grease, or sealed components such as oil seals (NSK will not notify of need for replacement of consumables.)

   (2) Items other than repair of failures (unpacking, setup/adjustment/maintenance, operation instruction, diagnosis of failure, removal, transport for return, relocation/re-setup, etc.)

   (3) Product disconnection and maintenance term

   NSK Ltd. will notify of disconnection of the product and its repair parts at least one year in advance. The maintenance term after such disconnection (including term in which repair parts are supplied) shall be five years.

   (4) Confirmation of applicability to use

   This product is intended for general industrial use. It was not designed or manufactured for uses that may pose serious risk to people’s lives or property. It cannot be adapted for special uses such as nuclear control, aeronautical devices, transport devices, medical devices, explosive/corrosive/poisonous material handling devices, safety devices, and other systems. Please contact NSK, Ltd. in advance before using this product for such uses. We will study compatibly upon setting separate special use conditions and quality assurance conditions.

   Users are required to as a condition for using this product to have the failsafe function for failure, malfunction, or other problems with this product be appropriately applied to external mechanisms of this product.

3. The user is requested to confirm standards that must be used for this product to have the failsafe function for failure, malfunction, or other problems with this product be appropriately applied to external mechanisms of this product.

4. The user is requested to confirm standards that must be used for this product to have the failsafe function for failure, malfunction, or other problems with this product be appropriately applied to external mechanisms of this product.

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22. The user is requested to confirm standards that must be used for this product to have the failsafe function for failure, malfunction, or other problems with this product be appropriately applied to external mechanisms of this product.
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For the latest information, please refer to the NSK website.

www.nsk.com

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For more information about NSK products, please contact:

P: Phone ☏: Head Office

<As of March 2014>