High Speed, High Payload, High Accuracy, Introducing A Direct Drive Motor Boasting

**Features**
The Direct Drive Motor is a rotary actuator that directly drives a rotary table with a motor without using any speed reducing mechanism such as a belt or reduction gears. Eliminating the speed reducing mechanism explains why high speed and excellent response can be attained with such a compact frame.

1. **High Torque Type, Large Hollow Bore Type — Latest Additions to the Series**

<table>
<thead>
<tr>
<th>Slim type (Rated torque: 8.4 N-m)</th>
<th>High torque type (Rated torque: 25 N-m)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Hollow bore type</strong></td>
<td></td>
</tr>
<tr>
<td>T18 type</td>
<td>H18 type</td>
</tr>
<tr>
<td>Hollow bore: ŝ20.5 mm</td>
<td>Hollow bore: ŝ20.5 mm</td>
</tr>
<tr>
<td><strong>Large Hollow bore type</strong></td>
<td></td>
</tr>
<tr>
<td>LT18 type</td>
<td>LH18 type</td>
</tr>
<tr>
<td>Hollow bore: ŝ47.0 mm</td>
<td>Hollow bore: ŝ47.0 mm</td>
</tr>
</tbody>
</table>

2. **High Torque, High Payload**
The series now includes models designed for high torque and high payload, so you can choose an ideal model for your application.

- **RCS2-RTC12L** (reduction ratio 1/30)
  - Allowable moment of inertia: 0.17 kg·m²
  - Max. instantaneous torque: 8.6 N·m

- **DD-T18/LT18 type**
  - Allowable moment of inertia: 0.60 kg·m²
  - Max. instantaneous torque: 25.2 N·m

- **DD-H18/LH18 type**
  - Allowable moment of inertia: 1.8 kg·m²
  - Max. instantaneous torque: 75 N·m
3. High Speed, High Acceleration/Deceleration
Shorter positioning time means shorter cycle time of your equipment, resulting in greater productivity.

<Comparison of Cycle Times>
Operating conditions: When a work part weighing 100 g is placed on an aluminum disc of 300 mm in diameter and 6 mm in thickness and rotated by 180 deg.

<table>
<thead>
<tr>
<th>Model</th>
<th>High resolution type</th>
<th>Standard type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoder resolution</td>
<td>20-bit 1,048,576 pulses/rev</td>
<td>17-bit 131,072 pulses/rev</td>
</tr>
<tr>
<td>Positioning repeatability</td>
<td>±0.00103 deg ±3.7 arcsec</td>
<td>±0.0055 deg ±19.8 arcsec</td>
</tr>
</tbody>
</table>

4. High Resolution Type Added

<table>
<thead>
<tr>
<th>Model</th>
<th>High resolution type</th>
<th>Standard type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>DD-□18P</td>
<td>DD-□18S</td>
</tr>
<tr>
<td>Encoder resolution</td>
<td>20-bit 1,048,576 pulses/rev</td>
<td>17-bit 131,072 pulses/rev</td>
</tr>
<tr>
<td>Positioning repeatability</td>
<td>±0.00103 deg ±3.7 arcsec</td>
<td>±0.0055 deg ±19.8 arcsec</td>
</tr>
</tbody>
</table>

5. Index Absolute Type or Multi-rotation Absolute Type Can be Selected

The Direct Drive Motor comes in the index absolute type having an operating range of 0 to 359.999 deg and the multi-rotation absolute type having an operating range of ±9,999 deg. Neither type requires a home return, meaning that once the power has been turned on, the actuator can move directly from the current position. The index type does not need an absolute battery.

Application Examples

- **Index table**
  <Small board inspection system>
- **Work part transfer**
  <Transfer of parts from conveyor to conveyor>
- **Multi-rotation operation**
  <Transfer of electronic components>
# DD Motor Series List

<table>
<thead>
<tr>
<th>Type</th>
<th>Standard bore, slim type</th>
<th>Large bore, slim type</th>
<th>Standard bore, high torque type</th>
<th>Large bore, high torque type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>DD-T18S</td>
<td>DD-LT18S</td>
<td>DD-H18S</td>
<td>DD-LH18S</td>
</tr>
</tbody>
</table>

### External view

- Rated torque (N-m): 8.4, 25
- Max. instantaneous torque (N-m): 25.2, 75
- Rated speed (deg/s): 1,080, 1,440
- Maximum speed (deg/s): 1,800, 1,440
- Allowable load inertia (kg·m²): 0.6, 1.8
- Motor wattage (W): 200, 600
- Size (mm): 180 × 180
- Height (mm): 53, 63, 125
- Hollow bore (mm): ø20.5, ø47, ø20.5, ø47
- Weight (kg): 5, 6, 13.6, 13

### Encoder type

- Index absolute
- Multi-rotation absolute

<table>
<thead>
<tr>
<th>Applicable controller</th>
<th>XSEL SCON-CA</th>
<th>SCON-CA</th>
<th>XSEL SCON-CA</th>
<th>SCON-CA</th>
<th>XSEL SCON-CA</th>
<th>SCON-CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference page</td>
<td>P4</td>
<td>P5</td>
<td>P6</td>
<td>P7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Model Description

<table>
<thead>
<tr>
<th>DD Series</th>
<th>Type</th>
<th>Encoder type</th>
<th>Motor wattage</th>
<th>Range of operation</th>
<th>Applicable controller</th>
<th>Cable length</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD-T18S</td>
<td>Standard bore, slim</td>
<td>Standard (17-bit)</td>
<td>200, 200W</td>
<td>360 deg</td>
<td>SCON-CA</td>
<td>N None</td>
</tr>
<tr>
<td>DD-T18P</td>
<td>Standard bore, slim</td>
<td>High resolution (20-bit)</td>
<td>600, 600W</td>
<td></td>
<td>XSEL-P/Q, XSEL-R/S</td>
<td>S 3m</td>
</tr>
<tr>
<td>DD-LT18S</td>
<td>Large bore, slim</td>
<td>Standard (17-bit)</td>
<td></td>
<td></td>
<td></td>
<td>M 5m</td>
</tr>
<tr>
<td>DD-LT18P</td>
<td>Large bore, slim</td>
<td>High resolution (20-bit)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>DD-H18S</td>
<td>Standard bore, high torque</td>
<td>Standard (17-bit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DD-H18P</td>
<td>Standard bore, high torque</td>
<td>High resolution (20-bit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DD-LH18S</td>
<td>Large bore, high torque</td>
<td>Standard (17-bit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DD-LH18P</td>
<td>Large bore, high torque</td>
<td>High resolution (20-bit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Only SCON-CA can be selected for the encoder high-resolution type (20-bit).
## DD Direct Drive Motor

### Model Specification Items

<table>
<thead>
<tr>
<th>Item</th>
<th>DD-T18</th>
<th>Type</th>
<th>200</th>
<th>Range of operation (deg)</th>
<th>Motor</th>
<th>Motor wattage (W)</th>
<th>Encoder type</th>
<th>Applicable controller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>360</td>
<td></td>
<td>200</td>
<td>AI (absolute type)</td>
<td>T2: SCON-CA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AM (multi-rotation absolute type)</td>
<td>XSEL-P/Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XSEL-R/S</td>
<td>Note: Only SCON-CA applies for T18P</td>
</tr>
</tbody>
</table>

### Common Specifications

- **Drive system:** Direct Drive Motor
- **Positioning repeatability:** 17-bit: ±0.0055 deg  20-bit: ±0.00103 deg
- **Encoder resolution:** 17-bit: 131,072 (pulses/rev)  20-bit: 1,048,576 (pulses/rev)
- **Allowable thrust load (Note 2):** 3,400 N [3,100N for the high resolution type]
- **Base material:** Aluminum
- **Ambient operating temperature/humidity:** 0 to 40°C, 20 to 85% (Non-condensing)
- **Weight:** 5 kg

### Dimensional Drawing

- **Run-out of Output Shaft**
  - Thrust (axial) run-out (no load): 30 μm
  - Radial run-out (no load): 30 μm

### Applicable Controller Specifications

<table>
<thead>
<tr>
<th>Applicable controllers</th>
<th>Max. number of controlled axes</th>
<th>Operating method</th>
<th>Power supply voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCON-CA</td>
<td>1-axis</td>
<td>Positioner</td>
<td>200VAC Single-phase</td>
</tr>
<tr>
<td>XSEL-P/Q/R/S</td>
<td>2-axis 3-axis</td>
<td>Program</td>
<td>200VAC Single-phase  200VAC Three-phase</td>
</tr>
</tbody>
</table>

Note: For DD-T18P, only SCON-CA controller applies.
Note: For the three-phase XSEL-P/Q type, 6-axes is the maximum number of controlled axes.

---

**Caution**

- (Note 1) The value in [ ] indicates the maximum speed.
  The maximum speed may not be reached if the moving distance is short.
- (Note 2) Assuming that the actuator is operated 8 hours a day at the rated speed and smooth operation without shock, the actuator will reach its life in five years based on this load.
- (Note 3) The maximum cable length is 30 m. Specify a desired length in meters. (Example: X08 = 8m)
- (Note 4) Please consult IAI if you are considering a 20-bit actuator and using it under conditions where the allowable dynamic moment and allowable thrust load will be exceeded.
**Model/Specifications**

<table>
<thead>
<tr>
<th>Model number</th>
<th>Encoder type</th>
<th>Motor wattage (W)</th>
<th>Range of operation (deg)</th>
<th>Speed (deg/s)</th>
<th>Rated torque (N·m) (*)</th>
<th>Maximum instantaneous torque (N·m)</th>
<th>Allowable load inertia (kg·m²)</th>
<th>Rotor inertia (kg·m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD-LT18 200-360-T2</td>
<td>Index absolute type</td>
<td>200</td>
<td>360</td>
<td>1 to 1,080</td>
<td>8.4</td>
<td>25.2</td>
<td>0.6</td>
<td>0.001984</td>
</tr>
</tbody>
</table>

Legend: **Encoder resolution** | **Encoder type** | **Cable length**

(*) The value when installed on an IAI rated heat dissipating plate. (Please see P9 for further details.)

**Common Specifications**

- Drive system: Direct Drive Motor
- Positioning repeatability: 17-bit: ±0.0055 deg, 20-bit: ±0.00103 deg
- Allowable dynamic load moment: 80 N·m
- Allowable thrust load: 3,400 N (3,100N for the high resolution type)
- Base material: Aluminum
- Ambient operating temperature/humidity: 0 to 40°C, 20 to 85% (Non-condensing)
- Weight: 6 kg

**Dimensional Drawing**

- Thrust (axial) run-out (no load): 30 μm
- Radial run-out (no load): 30 μm

**Applicable Controller Specifications**

- Applicable controllers: SCON-CA, XSEL-P/Q/R/S
- Max. number of controlled axes: 1-axis, 2-axis, 3-axis
- Operating method: Positioner, Program
- Power supply voltage: 200VAC Single-phase, 200VAC Three-phase

Note: For DD-LT18P, only SCON-CA controller applies. For the three-phase XSEL-P/Q type, 6-axes is the maximum number of controlled axes.

**Caution**

- Note 1: The value in ( ) indicates the maximum speed. The maximum speed may not be reached if the moving distance is short. (Note 2) Assuming that the actuator is operated 8 hours a day at the rated speed and smooth operation without shock, the actuator will reach its life in five years based on this load. (Note 3) The maximum cable length is 30 m. Specify a desired length in meters. (Example: X08 = 8m) (Note 4) Please consult IAI if you are considering a 20-bit actuator and using it under conditions where the allowable dynamic moment and allowable thrust load will be exceeded.
**DD-H18**

**Direct Drive Motor**
- **Standard bore**
- **High-torque type**

### Model Specifications

<table>
<thead>
<tr>
<th>Model/ Specification Items</th>
<th>DD - H18</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encoder type</td>
<td>AI: Index absolute type</td>
<td>AM: Multi-rotation absolute type</td>
</tr>
<tr>
<td>Motor wattage (W)</td>
<td>600</td>
<td>600W</td>
</tr>
<tr>
<td>Range of operation (deg)</td>
<td>360</td>
<td>360deg</td>
</tr>
<tr>
<td>Applicable controller</td>
<td>T2: SCON-CA XSEL-P/Q XSEL-R/S</td>
<td></td>
</tr>
</tbody>
</table>

### Common Specifications

- **Drive system**: Direct Drive Motor
- **Positioning repeatability**: 17-bit: ±0.0055 deg  20-bit: ±0.00103 deg
- **Encoder resolution**: 17-bit: 131,072 pulses/rev  20-bit: 1,048,576 pulses/rev
- **Motor wattage (W)**: 600
- **Rated torque (N·m)**: 25
- **Maximum instantaneous torque (Nm)**: 75
- **Allowable load inertia (kg·m²)**: 1.8
- **Rotor inertia (kg·m²)**: 0.0106

### Run-out of Output Shaft
- **Thrust (axial) run-out (no load)**: 30 μm
- **Radial run-out (no load)**: 30 μm

### Dimensional Drawing

- **Encoder connector**
- **Motor connector**
- **Motor**
- **Encoder**

### Applicable Controller Specifications

<table>
<thead>
<tr>
<th>Applicable controllers</th>
<th>Max. number of controlled axes</th>
<th>Operating method</th>
<th>Power supply voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCON-CA</td>
<td>1-axis</td>
<td>Positioner</td>
<td>200VAC Single-phase</td>
</tr>
<tr>
<td>XSEL-P/Q/R/S</td>
<td>1-axis Single-phase</td>
<td>Program</td>
<td>200VAC Single-phase</td>
</tr>
<tr>
<td></td>
<td>2-axis Three-phase</td>
<td></td>
<td>200VAC Three-phase</td>
</tr>
</tbody>
</table>

**Note**: For DD-H18P, only SCON-CA controller applies.

**Caution**
- The maximum speed may not be reached if the moving distance is short.
- Assuming that the actuator is operated 8 hours a day at the rated speed and smooth operation without shock, the actuator will reach its life in 5 years based on this load.
- The maximum cable length is 30 m. Specify a desired length in meters. (Example: X08 = 8m)
- Please consult IAI if you are considering a 20-bit actuator and using it under conditions where the allowable dynamic moment and allowable thrust load will be exceeded.
DD-LH18 Direct Drive Motor
Large bore  High-torque type

Model Specifications

<table>
<thead>
<tr>
<th>Model number</th>
<th>Encoder type</th>
<th>Motor wattage (W)</th>
<th>Range of operation (deg)</th>
<th>Speed (Note 1) (deg/s)</th>
<th>Rated torque (N·m) (*)</th>
<th>Maximum instantaneous torque (N·m)</th>
<th>Allowable load inertia (kg·m²)</th>
<th>Rotor inertia (kg·m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD-LH18</td>
<td>Index absolute type</td>
<td>600</td>
<td>360</td>
<td>1 to 1,440</td>
<td>25</td>
<td>75</td>
<td>1.8</td>
<td>0.0106</td>
</tr>
</tbody>
</table>

Legend
- Encoder type
- Multi-rotation absolute type
- Encoder type
- Cable length

(*) The value when installed on an IAI rated heat dissipating plate. (Please see P9 for further details.)

Common Specifications

- Drive system: Direct Drive Motor
- Positioning repeatability: 17-bit: ±0.0055 deg 20-bit: ±0.00103 deg
- Allowable dynamic load moment (Note 2): 80 N·m
- Allowable thrust load (Note 2): 1,400 N (3,100N for the high resolution type)
- Base material: Aluminum
- Ambient operating temperature/humidity: 0 to 40°C, 20 to 85% (Non-condensing)
- Weight: 13 kg

Dimensional Drawing

Run-out of Output Shaft

- Thrust (axial) run-out (no load): 30 μm
- Radial run-out (no load): 30 μm

Applicable Controller Specifications

<table>
<thead>
<tr>
<th>Applicable controllers</th>
<th>Max. number of controlled axes</th>
<th>Operating method</th>
<th>Power supply voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCON-CA</td>
<td>1-axis</td>
<td>Positioner</td>
<td>200VAC Single-phase</td>
</tr>
<tr>
<td>XSEL-P/Q/R/S</td>
<td>1-axis Single-phase 2-axis Three-phase</td>
<td>Program</td>
<td>200VAC Single-phase 200VAC Three-phase</td>
</tr>
</tbody>
</table>

Note: For DD-LH18P, only SCON-CA controller applies.
### Controller Model Numbers

The controller may be selected from the two models described below.

#### Model Number of Positioner Single-axis Type <SCON-CA>

<table>
<thead>
<tr>
<th>SCON</th>
<th>CA</th>
<th>A</th>
<th>Options</th>
<th>I/O type</th>
<th>I/O cable length</th>
<th>Power-supply voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>200S</td>
<td>A (200W)</td>
<td>Absolute specification</td>
<td>I</td>
<td>I</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>600S</td>
<td>CA (600W)</td>
<td>Index absolute type</td>
<td>M</td>
<td>M</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

* Because the 200W driver for the SCON-CA for DD motors is larger than the regular 200-watt type, the motor type will be 200S.

#### Model Number of Programmable Multi-axis Type <XSEL>

<table>
<thead>
<tr>
<th>XSEL</th>
<th>Type</th>
<th>Number of connected axes</th>
<th>Motor type</th>
<th>Encoder type</th>
<th>Options</th>
<th>Motor type</th>
<th>Encoder type</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>6-axis type</td>
<td>1 axis</td>
<td>CA</td>
<td>Absolute specification</td>
<td>I</td>
<td>CA</td>
<td>Absolute specification</td>
<td>I</td>
</tr>
<tr>
<td>Q</td>
<td>6-axis global type</td>
<td>8 axes</td>
<td>CA</td>
<td>Multi-rotation absolute type</td>
<td>M</td>
<td>CA</td>
<td>Multi-rotation absolute type</td>
<td>M</td>
</tr>
<tr>
<td>R</td>
<td>8-axis type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>8-axis global type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Specs for axis 1)

(Specs for axes 2–8)

For the remaining part of the model number, see the ROBO Cylinder General Catalog.

* A single controller can operate multiple actuators other than the DD motor (single-axis robot, ROBO Cylinder) at the same time. For details on actuators other than the DD motor that can be connected, refer to the page listing the XSEL model numbers in the ROBO Cylinder General Catalog.

#### System Configuration

**When the SCON controller is connected**

- **Option** Regenerative resistor unit
  - Model: REU-2
  - Comes with the actuator
  - Motor Cable
    - Model: CB-X-YZ
    - Comes with the actuator
  - Encoder cable
    - Model: CB-X3-PA

* See page 9 to find out how many regenerative resistor units are needed.

**When the XSEL controller is connected**

- **Option** Regenerative resistor unit
  - Model: REU-1
  - Comes with the actuator
  - Motor Cable
    - Model: CB-X-YZ
    - Comes with the actuator
  - Encoder cable
    - Model: CB-X3-PA

* See page 9 to find out how many regenerative resistor units are needed.

- **Option** Teaching pendant
  - Model: TB-01-S

* Be sure to use a noise filter on the power supply.
  (For recommended models, see the general catalog.)

- **Option** Field network
  - (For details, see the ROBO Cylinder General Catalog.)

- **Option** PC software
  - RS232 connection type
    - Model: RCM-101-MW
  - USB connection type
    - Model: RCM-101-USB

- **Option** Teaching pendant
  - Model: TB-01-C

* Be sure to use a noise filter on the power supply.
  (For recommended models, see the general catalog.)

- **Option** Field network
  - (For details, see the ROBO Cylinder General Catalog.)

- **Option** PC software
  - RS232 connection type
    - Model: RCM-101-MW
  - USB connection type
    - Model: RCM-101-USB
## Installation

Do not install it in a vertical position or hung on the ceiling.

### Controllers

- **The output of the DD motor is 200 watts, but the outside dimensions of the SCON-CA controller are those of the 400-watt type.**
  (For details on the outside dimensions of the SCON-CA, see the ROBO Cylinder General Catalog.)
- One and two regenerative resistor units are required for T18/LT18 and H18/LH18, respectively to operate a DD motor with the SCON-CA.
- When operating DD motor(s) with the XSEL controller, regenerative resistor units are required as shown below:

<table>
<thead>
<tr>
<th>Number of DD motor(s)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of regenerative resistor units</td>
<td>T18/LT18</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>H18/LH18</td>
<td>2</td>
<td>4</td>
<td>(Cannot be connected)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The number of DD motor(s) connectable to the XSEL controller are a max. of 8 units for the T18/LT18 types, and a max. of 2 units for the H18/LH18 types.
- Please note that, when the DD motor is operated with the SCON-CA, the motor cannot be connected to the ROBO Cylinder gateway function of the XSEL controller.
- Calculation for power supply value:
  - **T18/LT18 types:** single-phase 600W • three-phase 200W
  - **H18/LH18 types:** single-phase 1,200W • three-phase 600W

### Operation Types

Two operation types can be selected to suit specific operating conditions.

Check the features of the different types of DD motors and other notes before use.

<table>
<thead>
<tr>
<th>Operation type</th>
<th>Index absolute type</th>
<th>Multi-rotation absolute type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller type</td>
<td>SCON-CA</td>
<td>XSEL (*1)</td>
</tr>
<tr>
<td>Operation range</td>
<td>0 to 359.999°</td>
<td>Max. ±9,999° (±2,520°)</td>
</tr>
<tr>
<td>Maximum travel per travel command</td>
<td>360°</td>
<td>180° (*2)</td>
</tr>
<tr>
<td>Infinite rotation</td>
<td>Available (*3)</td>
<td>Not available</td>
</tr>
<tr>
<td>Home return</td>
<td>Not required</td>
<td>Not required (*4)</td>
</tr>
<tr>
<td>Absolute battery</td>
<td>Not required</td>
<td>Required</td>
</tr>
</tbody>
</table>

(*1) The high resolution specification can be connected only to the SCON-CA.
(*2) When the XSEL absolute index type travels more than 180° from the current position, it rotates in a direction that requires a shorter travel to reach the target position. Therefore, please note that the direction of rotation changes according to the current position and travel. If you want to specify the direction of rotation, use the SCON-CA.
(*3) The index type can be rotated in a given direction infinitely, but it actually cannot continue to rotate in the same direction without stopping, like a regular motor does, because the maximum travel distance per command from the XSEL controller is 180°. If you want to allow the motor to rotate continuously, use the SCON-CA.
(*4) Home return is required for the multi-rotation absolute encoder during the initial setting and replacement of the absolute battery.

### Controllers

- The output of the DD motor is 200 watts, but the outside dimensions of the SCON-CA controller are those of the 400-watt type.
- One and two regenerative resistor units are required for T18/LT18 and H18/LH18, respectively to operate a DD motor with the SCON-CA.
- When operating DD motor(s) with the XSEL controller, regenerative resistor units are required as shown below:

<table>
<thead>
<tr>
<th>Number of DD motor(s)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of regenerative resistor units</td>
<td>T18/LT18</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>H18/LH18</td>
<td>2</td>
<td>4</td>
<td>(Cannot be connected)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The number of DD motor(s) connectable to the XSEL controller are a max. of 8 units for the T18/LT18 types, and a max. of 2 units for the H18/LH18 types.
- Please note that, when the DD motor is operated with the SCON-CA, the motor cannot be connected to the ROBO Cylinder gateway function of the XSEL controller.

**Calculation for power supply value:**
- **T18/LT18 types:** single-phase 600W • three-phase 200W
- **H18/LH18 types:** single-phase 1,200W • three-phase 600W
Conditions for Selection

The following should be checked to determine whether the DD motor can be used to suit the specific conditions required by the customer:

1. Check Load Conditions

The customer should confirm that the following three points under actual use do not exceed their maximum allowable levels as specified for the DD motor.

[1] Thrust load

The total load of device(s) mounted on the actuator

[2] Load moment applied

The total load moment of device(s) mounted on the actuator

[3] Load inertia

The load inertia of device(s) mounted on the actuator

To calculate the load conditions, calculate the load inertia of device(s) mounted on the actuator and check the details with the DD motor selection software. The equations used to calculate the load inertia of typical shapes are shown below for reference purposes.

\[
J = \frac{1}{8} M \times D^2 \\
J = M \times R^2 + \frac{1}{8} M \times D^2 \\
J = \frac{1}{12} M \times (a^2 + b^2) \\
J = M \times R^2 + \frac{1}{12} M \times (a^2 + b^2)
\]

Weight: \( M \)

Center of rotation: \( a \)

(Not) The time listed in the above table is the duration from the reception of a travel command until convergence within the positioning band of 0.028 degrees (approximately 100 arcseconds).

Download the DD motor selection software from:  http://www.intelligentactuator.com/dd-selection-software

2. Check Operating Conditions

Check the distance, speed, acceleration, deceleration, stop time and other conditions in actual operation against the DD motor specifications to determine whether the DD motor can be used under the applicable operating conditions.

Download the DD motor selection software from:  http://www.intelligentactuator.com/dd-selection-software

3. Travel Time Guide

The travel time changes according to the load inertia. See the tables below to check the travel time data.

* The data in the tables is only intended as a guide, so the travel time is not guaranteed.

DD-T18/LT18

<table>
<thead>
<tr>
<th>Load inertia lower limit [kg(\cdot)m(^2)]</th>
<th>0</th>
<th>0.005</th>
<th>0.01</th>
<th>0.02</th>
<th>0.03</th>
<th>0.04</th>
<th>0.05</th>
<th>0.06</th>
<th>0.07</th>
<th>0.08</th>
<th>0.09</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load inertia upper limit [kg(\cdot)m(^2)]</td>
<td>0.005</td>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
<td>0.04</td>
<td>0.05</td>
<td>0.06</td>
<td>0.07</td>
<td>0.08</td>
<td>0.09</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>45° travel time [sec.]</td>
<td>0.09</td>
<td>0.10</td>
<td>0.11</td>
<td>0.12</td>
<td>0.13</td>
<td>0.14</td>
<td>0.15</td>
<td>0.17</td>
<td>0.19</td>
<td>0.21</td>
<td>0.23</td>
<td>0.23</td>
<td>0.39</td>
<td>0.62</td>
<td>0.70</td>
<td>0.87</td>
</tr>
<tr>
<td>90° travel time [sec.]</td>
<td>0.12</td>
<td>0.12</td>
<td>0.14</td>
<td>0.16</td>
<td>0.17</td>
<td>0.18</td>
<td>0.20</td>
<td>0.22</td>
<td>0.24</td>
<td>0.26</td>
<td>0.29</td>
<td>0.48</td>
<td>0.73</td>
<td>0.83</td>
<td>1.02</td>
<td>1.23</td>
</tr>
<tr>
<td>180° travel time [sec.]</td>
<td>0.17</td>
<td>0.17</td>
<td>0.19</td>
<td>0.21</td>
<td>0.23</td>
<td>0.24</td>
<td>0.27</td>
<td>0.29</td>
<td>0.32</td>
<td>0.35</td>
<td>0.37</td>
<td>0.60</td>
<td>0.89</td>
<td>1.01</td>
<td>1.22</td>
<td>1.42</td>
</tr>
<tr>
<td>270° travel time [sec.]</td>
<td>0.22</td>
<td>0.22</td>
<td>0.24</td>
<td>0.26</td>
<td>0.27</td>
<td>0.29</td>
<td>0.32</td>
<td>0.35</td>
<td>0.38</td>
<td>0.41</td>
<td>0.44</td>
<td>0.69</td>
<td>1.00</td>
<td>1.14</td>
<td>1.36</td>
<td>1.68</td>
</tr>
</tbody>
</table>

DD-H18/LH18

| Load inertia lower limit [kg\(\cdot\)m\(^2\)] | 0 | 0.005 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.08 | 0.10 | 0.15 | 0.2 | 0.3 | 0.4 | 0.6 | 0.8 | 1.0 | 1.2 | 1.4 | 1.8 |
|-----------------|----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|
| Load inertia upper limit [kg\(\cdot\)m\(^2\)] | 0.005 | 0.01 | 0.02 | 0.03 | 0.04 | 0.06 | 0.08 | 0.1 | 0.15 | 0.2 | 0.3 | 0.4 | 0.6 | 0.8 | 1 | 1.2 | 1.4 | 1.8 |
| 45° travel time [sec.] | 0.098 | 0.096 | 0.096 | 0.097 | 0.099 | 0.104 | 0.113 | 0.12 | 0.16 | 0.14 | 0.157 | 0.207 | 0.257 | 0.352 | 0.447 | 0.53 | 0.629 | 0.795 | 0.875 |
| 90° travel time [sec.] | 0.129 | 0.128 | 0.127 | 0.128 | 0.131 | 0.136 | 0.144 | 0.153 | 0.163 | 0.184 | 0.208 | 0.268 | 0.329 | 0.44 | 0.549 | 0.646 | 0.758 | 0.941 | 1.035 |
| 180° travel time [sec.] | 0.192 | 0.19 | 0.19 | 0.191 | 0.193 | 0.199 | 0.207 | 0.215 | 0.225 | 0.249 | 0.279 | 0.354 | 0.428 | 0.562 | 0.692 | 0.806 | 0.933 | 1.133 | 1.257 |
| 270° travel time [sec.] | 0.254 | 0.252 | 0.252 | 0.253 | 0.256 | 0.262 | 0.27 | 0.278 | 0.288 | 0.312 | 0.341 | 0.42 | 0.504 | 0.655 | 0.8 | 0.925 | 1.064 | 1.274 | 1.415 |

(Note) The time listed in the above table is the duration from the reception of a travel command until convergence within the positioning band of 0.028 degrees (approximately 100 arcseconds).