

# URS SERIES

August 2004

[www.DanaherMotion.com](http://www.DanaherMotion.com)



## **COMPACT BALLSCREW POSITIONING TABLES**

The IDC URS-series with integrated steel rail provides superior product performance in a compact package.



SELECTED OFFERS

## Welcome to Danaher Motion - IDC

While business cycles will ebb and flow, technological advancements across a multitude of industries march forward. In many cases, the success of these advancements hinges upon the ability of engineers to create automated systems capable of accurately manipulating materials at both the macro and microscopic levels. Danaher Motion solutions are often at the core of these systems. Many recent advancements in the semiconductor, flat panel display, data storage, digital imaging, transportation, machine automation, and life sciences markets have been made possible by actuators and positioning systems designed and manufactured by Danaher Motion.

IDC offers an expansive range of mechanical and control products for automated positioning applications. Our customers turn to us for complete solutions to their automation needs. Our products are found in a wide variety of industrial, scientific, and commercial applications. Virtually anywhere that thrust, torque, speed, or position must be controlled, IDC has the solution. Our electro-mechanical product offering is highlighted by our standard product range of Electric Cylinders, Rodless Actuators, and Precision Positioning Tables.

**Electric Cylinders** are essentially thrust producing devices that are best suited for applications requiring high axial force with the moment and side loads already properly supported.

Screw driven **Rodless Actuators** are also thrust producing devices that are best for axial force applications where the space is limited and a payload must also be supported or carried. As individual components, Rodless Actuators are not well suited for moment loading; however, they can be effectively combined into complete Cartesian Systems for some multi-axis applications. For higher speed, lower thrust applications, Rodless Actuators can be repeatably driven with a timing belt instead of a screw.

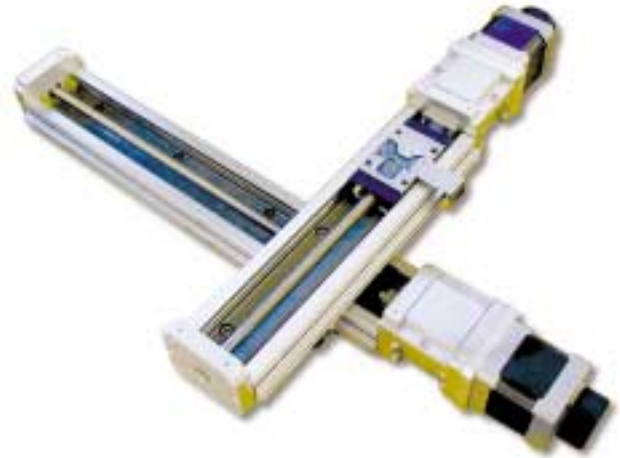
**Precision Positioning Tables** are best suited for applications where the accuracy and repeatability requirements are more important than axial thrust of the drive train. Precision Positioning Tables can also be used in less precise applications where adequate moment load support is necessary. Precision Positioning Tables are ideal building blocks for complete multi-axis positioning systems.

Our IDC product brand contains hundreds of standard electro-mechanical solutions. Still, we recognize that each application is unique and so we continue to welcome opportunities that require modification and occasionally complete redesign of our standard solutions.

Contact Danaher Motion today to discuss how we can put our trusted brand names, extensive product portfolio, and extensive applications expertise to work to provide you with your total motion control solution.



URS 3305A-150-X2345 Positioning Table



XY featuring URS20 Positioning Tables.  
Consult factory for multi-axis configurations.



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## URS = U RAIL SYSTEM.

The URS is a compact single-axis positioning table which integrates a linear bearing and precision ballscrew.

The URS series offers compact dimensions and outperforms conventional positioning tables. This is made possible by a unique "U" shaped guide rail, and a recirculating bearing module which provides the dual functions of a guide block and a ball screw nut. The "U" shaped guide rail design offers a highly rigid structure resistant to bending, allowing the URS to be single-end supported. Additionally, the bearing module contains four ball circuits which deliver high load capacity, high accuracy and high rigidity.

- COMPACT SIZE
- OPTIMIZED DESIGN
- RIGIDITY
- VALUE

### Packaged Solution:

The integration of the slide guide and precision ballscrew eliminates complex precision adjustment and reduces installation time dramatically as compared to purchasing and assembling individual components.

### High Rigidity:

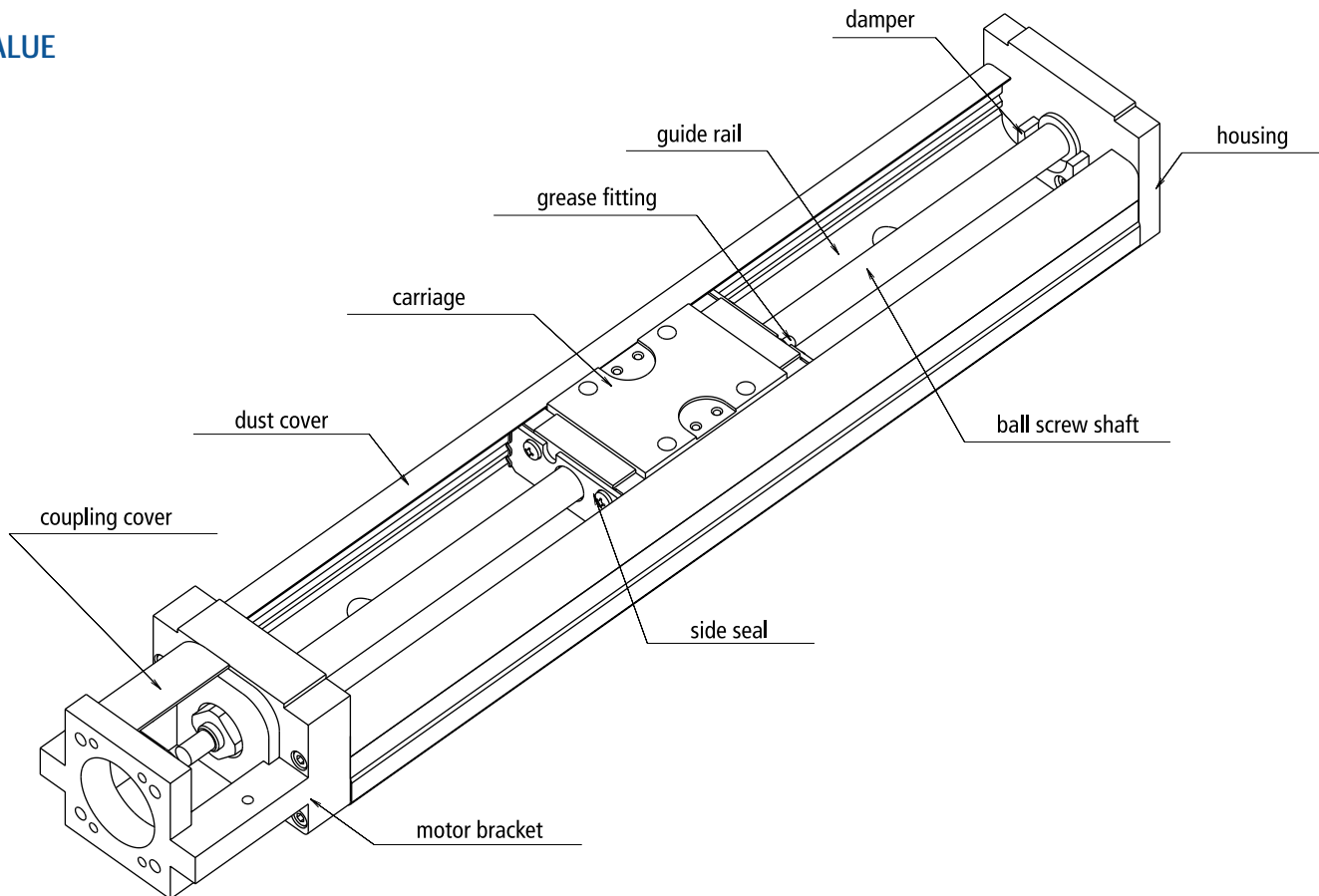
"U" shaped steel guide rail provides very high rigidity despite its compact profile, and excels in one-end supported (cantilevered slide) applications.

### High Accuracy:

The URS shuttle carriage contains four ball circuits and four-point contact ball grooves, which contributes to its high rigidity. The combination of precision ground guide rail, carriage, and precision grade ball screw provides high positioning accuracy.

### Space Saving:

In comparison to conventional positioning tables, the compact design of the URS allows for dramatic space savings. The "U" shaped guide rail and integrated carriage/ballnut design make this possible.

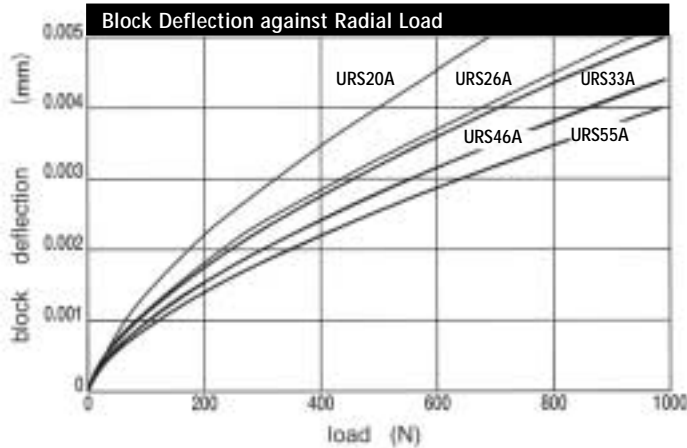


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# URS-SERIES OVERVIEW

The IDC URS-Series Positioning Tables provide superior product performance in a compact size envelope.

- A precision ground steel base/rail provides exceptional rigidity and accuracy.

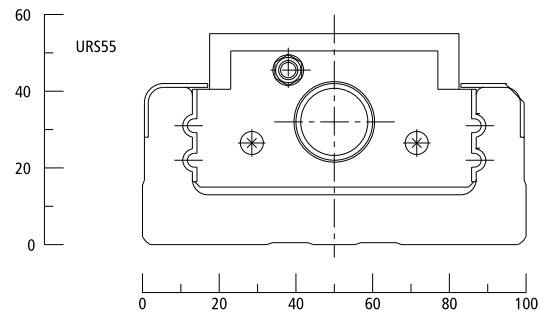
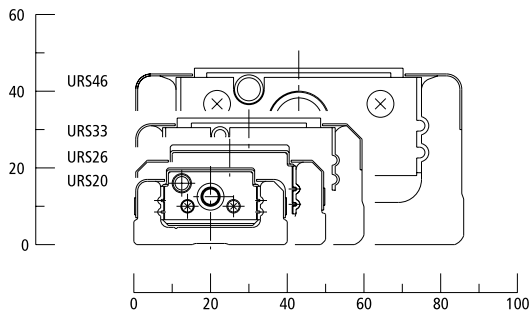
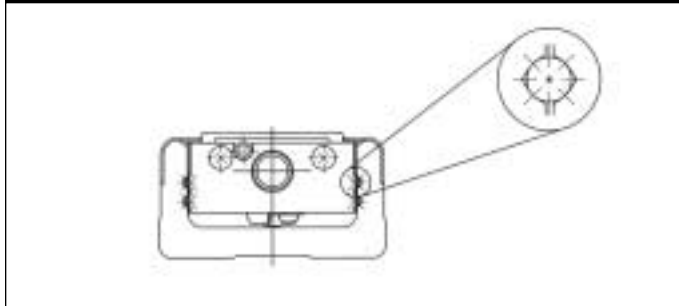


- The integrated linear bearing and precision ballscrew minimize the cross-sectional profile of the URS (see drawings below).
- The four-row linear bearing structure maximizes the rigidity of the carriage, and allows the URS to be mounted in any orientation.

## SELECTABLE OPTIONS & ACCESSORIES

- Travel lengths from 43mm to 1134mm cover a wide range of applications.
- Standard- and short-version carriages, and single- and dual-carriage options increase flexibility of load carrying.
- Commercial Grade version with repeatability down to +/- 5 microns, and Precision Grade version with repeatability down to +/- 3 microns.
- Motor flanges for NEMA 16, 17, 23 and 34 frame motors.
- Standard servo and stepper motor options.
- Hardcover is available to protect internal components and to contain lubrication within the URS.
- Limit switch packages with three (3) sensors adjustable throughout the range of travel.
- Cleanroom grease option for particulate-sensitive environments.
- Raydent surface treatment option for improved rust-resistance of the steel rail.

Ball Contact View



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## SPECIFICATIONS

|   | URS20 |      |      | URS26 |      |      |      | URS33 |     |       |     |     |     |
|---|-------|------|------|-------|------|------|------|-------|-----|-------|-----|-----|-----|
|   | 100   | 150  | 200  | 150   | 200  | 250  | 300  | 150   | 200 | 300   | 400 | 500 | 600 |
| <b>RAIL LENGTH (mm)</b>                             |       |      |      |       |      |      |      |       |     |       |     |     |     |
| <b>HEIGHT (base to carriage top)</b>                |       |      |      |       |      |      |      |       |     |       |     |     |     |
| without cover option (mm)                           |       | 20   |      |       | 26   |      |      |       |     | 33    |     |     |     |
| with cover option [-H] (mm)                         |       | 32   |      |       | 40   |      |      |       |     | 48    |     |     |     |
| <b>BASE WIDTH (mm)</b>                              |       | 40   |      |       | 50   |      |      |       |     | 60    |     |     |     |
| <b>MAX TRAVEL (hardstop to hardstop)</b>            |       |      |      |       |      |      |      |       |     |       |     |     |     |
| single long carriage [A] (mm)                       | 43    | 93   | 143  | 74    | 124  | 174  | 224  | 60    | 110 | 210   | 310 | 410 | 510 |
| dual long carriage [B] (mm)                         | -     | 50   | 100  | -     | 60   | 110  | 160  | -     | -   | 133   | 233 | 333 | 433 |
| single short carriage [C] (mm)                      | -     | -    | -    | -     | -    | -    | -    | 85    | 135 | 235   | 335 | 435 | 535 |
| dual short carriage [D] (mm)                        | -     | -    | -    | -     | -    | -    | -    | 34    | 84  | 184   | 284 | 384 | 484 |
| <b>ACCURACY</b>                                     |       |      |      |       |      |      |      |       |     |       |     |     |     |
| commercial grade (microns)                          |       | 50   |      |       | 50   |      |      | 30    |     | 35    |     | 40  | 70  |
| precision grade [P] (microns)                       |       | 20   |      |       | 20   |      |      | 15    |     | 20    |     | 25  | -   |
| <b>FLATNESS OF TRAVEL</b>                           |       |      |      |       |      |      |      |       |     |       |     |     |     |
| commercial grade (microns)                          |       | 25   |      |       | 25   |      |      | 25    |     |       |     | 35  |     |
| precision grade [P] (microns)                       |       | 10   |      |       | 10   |      |      | 10    |     |       |     | 15  |     |
| <b>REPEATABILITY</b>                                |       |      |      |       |      |      |      |       |     |       |     |     |     |
| commercial grade (microns)                          |       | ±5   |      |       | ±5   |      |      |       |     |       |     | ±5  |     |
| precision grade [P] (microns)                       |       | ±3   |      |       | ±3   |      |      |       |     |       |     | ±3  |     |
| <b>LOAD CAPACITY, NORMAL (kg)</b>                   |       |      |      |       |      |      |      |       |     |       |     |     |     |
| commercial grade (kg)                               |       | 9    |      |       | 30   |      |      |       |     | 140   |     |     |     |
| precision grade [P] (kg)                            |       | 9    |      |       | 30   |      |      |       |     | 90    |     |     |     |
| <b>LOAD CAPACITY, AXIAL (kg)</b>                    |       |      |      |       |      |      |      |       |     |       |     |     |     |
| commercial grade (kg)                               |       | 4.5  |      |       | 15   |      |      |       |     | 70    |     |     |     |
| precision grade [P] (kg)                            |       | 4.5  |      |       | 15   |      |      |       |     | 45    |     |     |     |
| <b>ACCELERATION, MAX (m/sec<sup>2</sup>)</b>        |       | 20   |      |       | 20   |      |      |       |     | 20    |     |     |     |
| <b>MOVING MASS</b>                                  |       |      |      |       |      |      |      |       |     |       |     |     |     |
| long carriage [A,B] w/o cover option (kg)           |       | 0.07 |      |       | 0.17 |      |      |       |     | 0.30  |     |     |     |
| long carriage [A,B] w/ cover option [-H] (kg)       |       | 0.11 |      |       | 0.24 |      |      |       |     | 0.40  |     |     |     |
| short carriage [C,D] w/o cover option (kg)          |       | -    |      |       | -    |      |      |       |     | 0.15  |     |     |     |
| short carriage [C,D] w/ cover option [-H] (kg)      |       | -    |      |       | -    |      |      |       |     | 0.20  |     |     |     |
| <b>TOTAL MASS</b>                                   |       |      |      |       |      |      |      |       |     |       |     |     |     |
| single long carriage [A] w/o cover option (kg)      | 0.42  | 0.58 | 0.71 | 0.93  | 1.14 | 1.36 | 1.57 | 1.6   | 2.0 | 2.6   | 3.2 | 3.9 | 4.6 |
| dual long carriage [B] w/o cover option (kg)        | 0.52  | 0.65 | 0.78 | 1.10  | 1.31 | 1.36 | 1.57 | -     | -   | 2.9   | 3.6 | 4.2 | 4.9 |
| single short carriage [C] w/o cover option (kg)     | -     | -    | -    | -     | -    | -    | -    | 1.5   | 1.8 | 2.5   | 3.1 | 3.8 | 4.4 |
| dual short carriage [D] w/o cover option (kg)       | -     | -    | -    | -     | -    | -    | -    | 1.7   | 2.0 | 2.7   | 3.3 | 3.9 | 4.6 |
| single long carriage [A] w/ cover option (kg)       | 0.50  | 0.63 | 0.77 | 1.07  | 1.30 | 1.53 | 1.76 | 1.8   | 2.1 | 2.8   | 3.5 | 4.2 | 4.9 |
| dual long carriage [B] w/ cover option (kg)         | 0.61  | 0.74 | 0.88 | 1.31  | 1.54 | 1.78 | 2.01 | -     | -   | 3.2   | 3.9 | 4.6 | 5.3 |
| single short carriage [C] w/ cover option [-H] (kg) | -     | -    | -    | -     | -    | -    | -    | 1.6   | 2.0 | 2.6   | 3.3 | 4.0 | 4.7 |
| dual short carriage [D] w/ cover option [-H] (kg)   | -     | -    | -    | -     | -    | -    | -    | 1.9   | 2.2 | 2.9   | 3.5 | 4.2 | 4.9 |
| <b>BALL SCREW DIAMETER (mm)</b>                     |       | 6    |      |       | 8    |      |      |       |     | 10    |     |     |     |
| <b>DUTY CYCLE (%)</b>                               |       | 100  |      |       | 100  |      |      |       |     | 100   |     |     |     |
| <b>BALLSCREW EFFICIENCY (%)</b>                     |       | 90   |      |       | 90   |      |      |       |     | 90    |     |     |     |
| <b>MAX BREAKAWAY TORQUE</b>                         |       |      |      |       |      |      |      |       |     |       |     |     |     |
| commercial grade (oz-in)                            |       | 0.7  |      |       | 2.1  |      |      |       |     | 9.9   |     |     |     |
| precision grade [P] (oz-in)                         |       | 1.7  |      |       | 5.7  |      |      |       |     | 21.2  |     |     | -   |
| <b>BALLSCREW LEADS AVAILABLE (mm)</b>               |       | 1, 5 |      |       | 2, 5 |      |      |       |     | 5, 10 |     |     |     |
| <b>BACKLASH</b>                                     |       |      |      |       |      |      |      |       |     |       |     |     |     |
| commercial grade (microns)                          |       | 10   |      |       | 10   |      |      |       |     | 10    |     |     |     |
| precision grade [P] (microns)                       |       | 3    |      |       | 3    |      |      |       |     | 3     |     |     | -   |
| <b>MAX BALLSCREW SPEED (rev/sec)</b>                |       | 187  |      |       | 140  |      |      |       |     | 110   |     | 93  | 62  |

[ ] Indicates option code

Load capacities specified above are based upon a life rating of 2,100 kilometers (82 million inches) of table travel. Actual life/load is dependent on many attributes, including screw lead and moment load. Life calculation formulas are available on page 30 of this Selection Guide, or use our URS load calculator available at [www.danahermotion.com/URS](http://www.danahermotion.com/URS).

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## SPECIFICATIONS

|   | URS46  |     |      |      |      |      |      | URS55 |      |      |      |   |
|---|--------|-----|------|------|------|------|------|-------|------|------|------|---|
| <b>RAIL LENGTH (mm)</b>                             | 340    | 440 | 540  | 640  | 740  | 840  | 940  | 980   | 1080 | 1180 | 1280 |   |
| <b>HEIGHT (base to carriage top)</b>                |        |     |      |      |      |      |      |       |      |      |      |   |
| without cover option (mm)                           | 46     |     |      |      |      |      |      | 55    |      |      |      |   |
| with cover option [-H] (mm)                         | 68     |     |      |      |      |      |      | 80    |      |      |      |   |
| <b>BASE WIDTH (mm)</b>                              | 86     |     |      |      |      |      |      | 100   |      |      |      |   |
| <b>MAX TRAVEL (hardstop to hardstop)</b>            |        |     |      |      |      |      |      |       |      |      |      |   |
| single long carriage [A] (mm)                       | 209    | 309 | 409  | 509  | 609  | 709  | 809  | 834   | 934  | 1034 | 1134 |   |
| dual long carriage [B] (mm)                         | 100    | 200 | 300  | 400  | 500  | 600  | 700  | 711   | 811  | 911  | 1011 |   |
| single short carriage [C] (mm)                      | 245    | 345 | 445  | 545  | 645  | 745  | 845  | -     | -    | -    | -    |   |
| dual short carriage [D] (mm)                        | 172    | 272 | 372  | 472  | 572  | 672  | 772  | -     | -    | -    | -    |   |
| <b>ACCURACY</b>                                     |        |     |      |      |      |      |      |       |      |      |      |   |
| commercial grade (microns)                          | 35     |     | 40   |      | 50   |      | 90   |       | 80   |      | 100  |   |
| precision grade [P] (microns)                       | 20     |     | 25   |      | 30   |      | -    |       | 35   |      | 40   |   |
| <b>FLATNESS OF TRAVEL</b>                           |        |     |      |      |      |      |      |       |      |      |      |   |
| commercial grade (microns)                          | 35     |     |      | 40   |      | 50   |      |       | 50   |      |      |   |
| precision grade [P] (microns)                       | 15     |     | 20   |      | -    |      | 25   |       |      |      | 30   |   |
| <b>REPEATABILITY</b>                                |        |     |      |      |      |      |      |       |      |      |      |   |
| commercial grade (microns)                          | ±5     |     |      |      |      |      |      | ±5    |      |      |      |   |
| precision grade [P] (microns)                       | ±3     |     |      |      |      |      |      | ±5    |      |      |      | - |
| <b>LOAD CAPACITY, NORMAL (kg)</b>                   |        |     |      |      |      |      |      |       |      |      |      |   |
| commercial grade (kg)                               | 250    |     |      |      |      |      |      | 530   |      |      |      |   |
| precision grade (kg)                                | 160    |     |      |      |      |      |      | 400   |      |      |      |   |
| <b>LOAD CAPACITY, AXIAL (kg)</b>                    |        |     |      |      |      |      |      |       |      |      |      |   |
| commercial grade (kg)                               | 125    |     |      |      |      |      |      | 265   |      |      |      |   |
| precision grade [P] (kg)                            | 80     |     |      |      |      |      |      | 200   |      |      |      |   |
| <b>ACCELERATION, MAX (m/sec<sup>2</sup>)</b>        | 20     |     |      |      |      |      |      | 20    |      |      |      |   |
| <b>MOVING MASS</b>                                  |        |     |      |      |      |      |      |       |      |      |      |   |
| long carriage [A,B] w/o cover option (kg)           | 0.9    |     |      |      |      |      |      | 1.7   |      |      |      |   |
| long carriage [A,B] w/ cover option [-H] (kg)       | 1.2    |     |      |      |      |      |      | 2.3   |      |      |      |   |
| short carriage [C,D] w/o cover option (kg)          | 0.5    |     |      |      |      |      |      | -     |      |      |      |   |
| short carriage [C,D] w/ cover option [-H] (kg)      | 0.7    |     |      |      |      |      |      | -     |      |      |      |   |
| <b>TOTAL MASS</b>                                   |        |     |      |      |      |      |      |       |      |      |      |   |
| single long carriage [A] w/o cover option (kg)      | 6.5    | 8.0 | 9.0  | 10.5 | 12.0 | 13.0 | 14.5 | 20    | 22   | 23   | 25   |   |
| dual long carriage [B] w/o cover option (kg)        | 7.5    | 8.5 | 10.0 | 11.5 | 13.0 | 14.0 | 15.5 | 22    | 24   | 25   | 27   |   |
| single short carriage [C] w/o cover option (kg)     | 6.0    | 7.5 | 8.5  | 10.0 | 11.5 | 13.0 | 14.0 | -     | -    | -    | -    |   |
| dual short carriage [D] w/o cover option (kg)       | 6.5    | 8.0 | 9.5  | 10.5 | 12.0 | 13.5 | 14.5 | -     | -    | -    | -    |   |
| single long carriage [A] w/ cover option (kg)       | 7.0    | 8.5 | 10.0 | 11.0 | 12.5 | 14.0 | 15.5 | 21    | 23   | 25   | 27   |   |
| dual long carriage [B] w/ cover option (kg)         | 8.0    | 9.5 | 11.0 | 12.5 | 14.0 | 15.5 | 16.5 | 24    | 26   | 27   | 29   |   |
| single short carriage [C] w/ cover option [-H] (kg) | 6.5    | 8.0 | 9.5  | 10.5 | 12.0 | 13.5 | 15.0 | -     | -    | -    | -    |   |
| dual short carriage [D] w/ cover option [-H] (kg)   | 7.0    | 8.5 | 10.0 | 11.5 | 13.0 | 14.0 | 15.5 | -     | -    | -    | -    |   |
| <b>BALL SCREW DIAMETER (mm)</b>                     | 15     |     |      |      |      |      |      | 20    |      |      |      |   |
| <b>DUTY CYCLE (%)</b>                               | 100    |     |      |      |      |      |      | 100   |      |      |      |   |
| <b>BALLSCREW EFFICIENCY (%)</b>                     | 90     |     |      |      |      |      |      | 90    |      |      |      |   |
| <b>MAX BREAKAWAY TORQUE</b>                         |        |     |      |      |      |      |      |       |      |      |      |   |
| commercial grade (oz-in)                            | 14.2   |     |      |      |      |      |      | 17.0  |      |      |      |   |
| precision grade [P] (oz-in)                         | 21.2   |     | 24.0 |      | -    |      |      | 24.0  |      | 28.3 | -    |   |
| <b>BALLSCREW LEADS AVAILABLE (mm)</b>               | 10, 20 |     |      |      |      |      |      | 20    |      |      |      |   |
| <b>BACKLASH</b>                                     |        |     |      |      |      |      |      |       |      |      |      |   |
| commercial grade (microns)                          | 10     |     |      |      |      |      |      | 50    |      |      |      |   |
| precision grade [P] (microns)                       | 3      |     |      | -    |      |      |      | 3     |      | -    |      |   |
| <b>MAX BALLSCREW SPEED (rev/sec)</b>                | 74     |     | 65   |      | 50   | 39   | 56   | 45    | 37   | 31   |      |   |

All performance specifications are based upon proper mounting procedures, with the URS fully supported on a flat surface (flat within v0.008mm/300mm).

Above specifications are measured 37.5mm directly above the center of the carriage.

Specifications are based upon operation at 20° C. Contact IDC to discuss your low- and high-temperature applications.

URS positioning tables are rated for normal loads (load vector directed down onto the surface of the carriage), for axial loads (load vector directed in the direction of travel), and for moment loads (torsional loads caused by loads with an offset center of gravity). The moment loading limits are based on the maximum moment in pitch, roll or yaw including any dynamic components that are move profile dependent. Visit [www.DanaherMotion.com/urs](http://www.DanaherMotion.com/urs) to use our moment loading calculator.

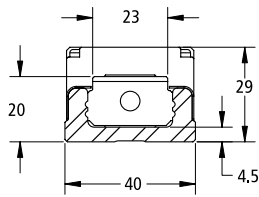
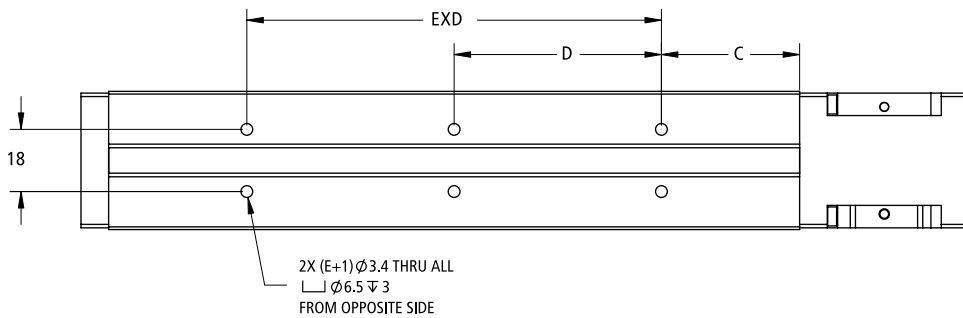
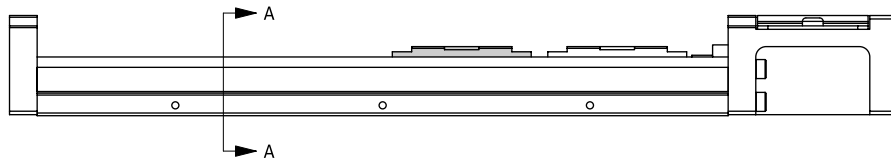
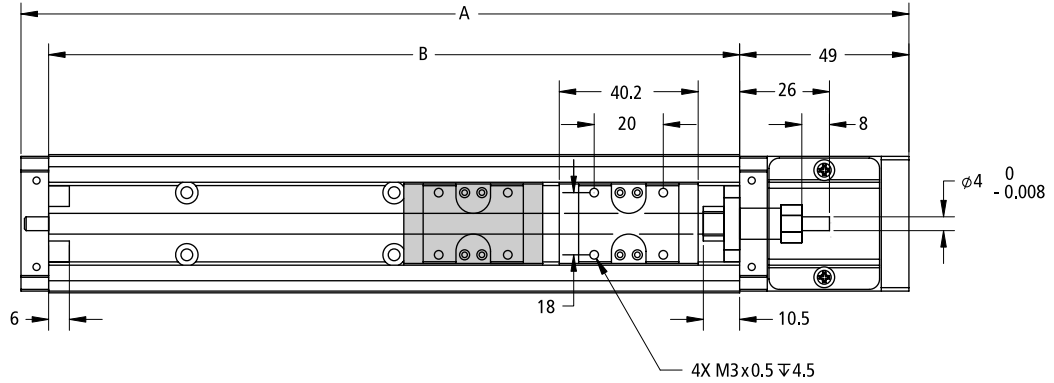
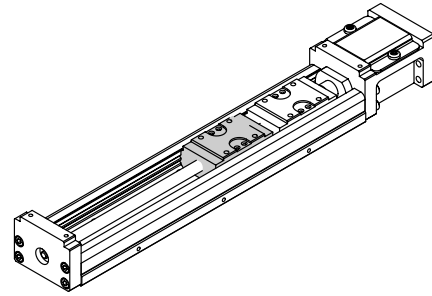
\* The specifications in this publication are believed to be accurate and reliable. However, it is the responsibility of the product user to determine the suitability of IDC products for a specific application. Specifications are subject to change without notice.

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# URS20 DIMENSIONAL DRAWING

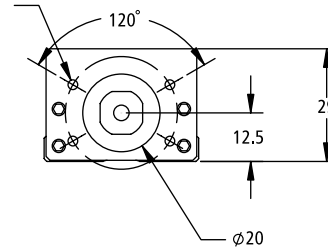
## Without Cover Option

Note: Optional second carriage shaded gray.



SECTION A-A

M3x0.5  $\nabla 6$   
ON A 29MM B.C.



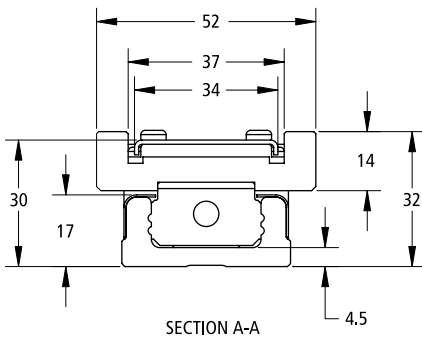
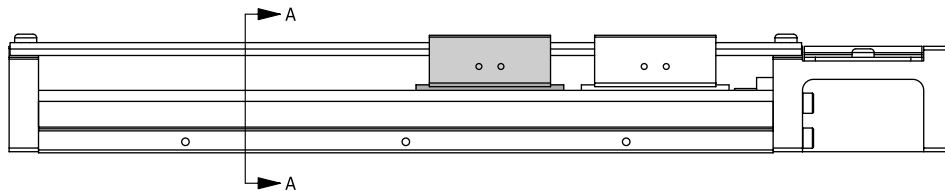
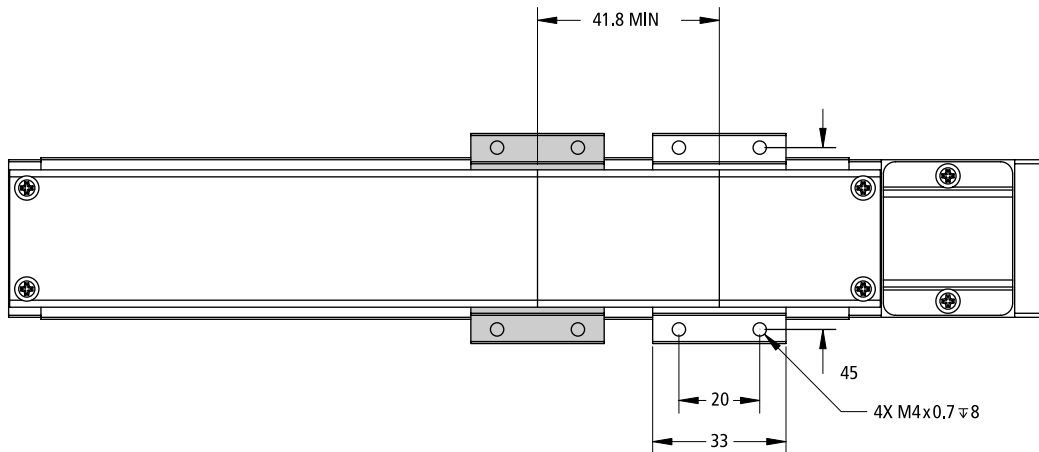
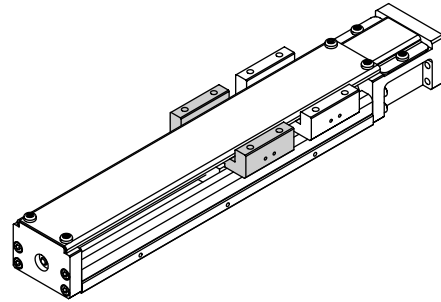
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# URS20 DIMENSIONAL DRAWING

## With Cover Option

Note: Optional second carriage shaded gray.



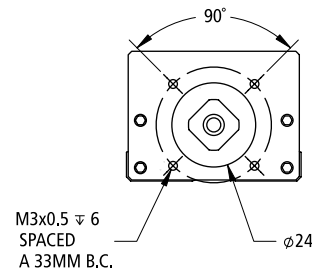
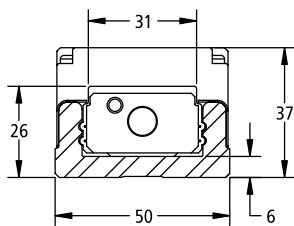
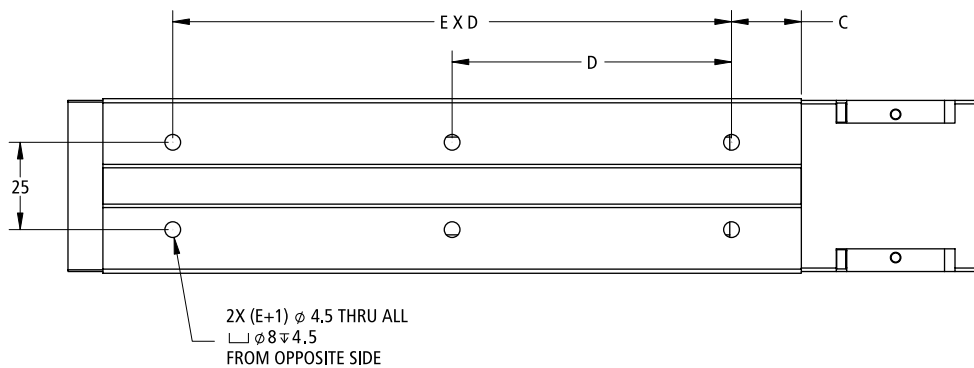
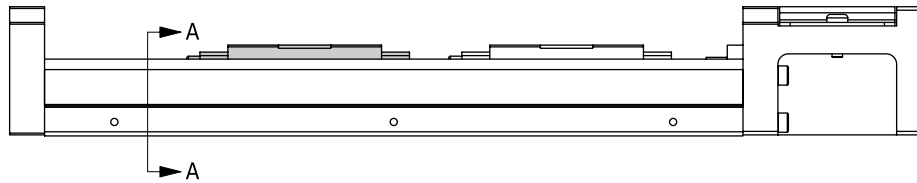
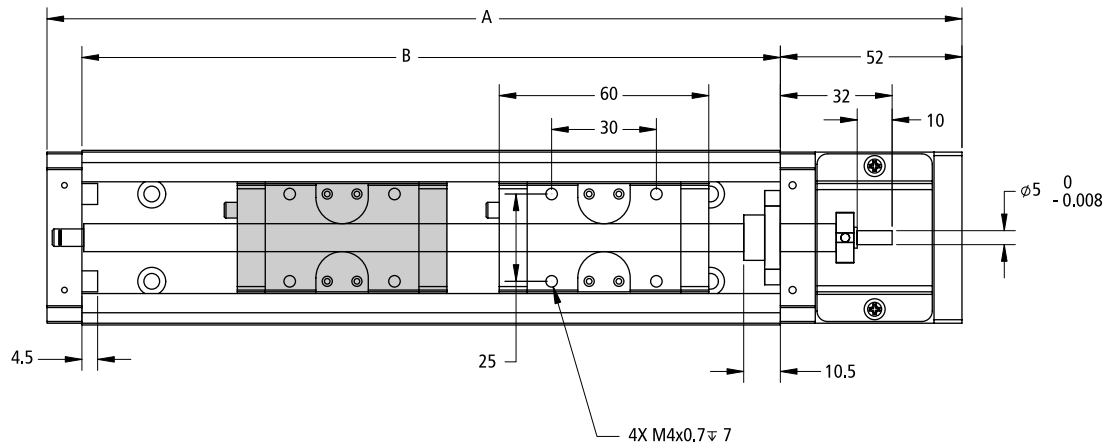
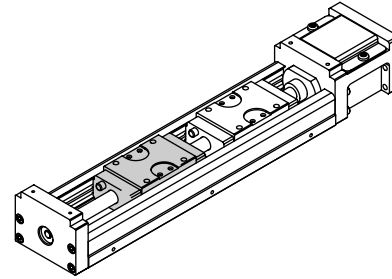
| Dimensions |     |    |    |     | Stroke Limit |          |
|------------|-----|----|----|-----|--------------|----------|
| A          | B   | C  | D  | E   | URS20**A     | URS20**B |
| 100        | 157 | 20 | 60 | 1   | 43           | -        |
| 150        | 207 | 15 |    | 2   | 93           | 50       |
| 200        | 257 | 40 |    | 143 | 100          |          |

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# URS26 DIMENSIONAL DRAWING

## Without Cover Option

Note: Optional second carriage shaded gray.

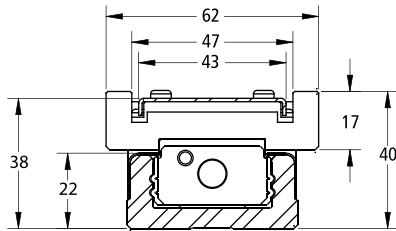
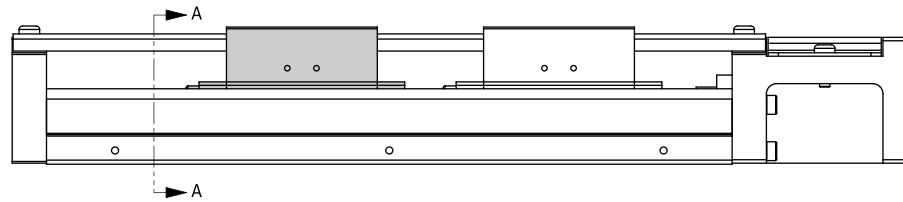
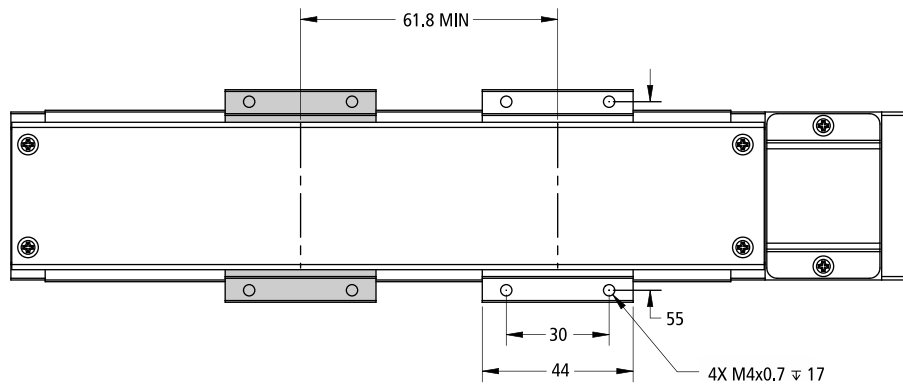
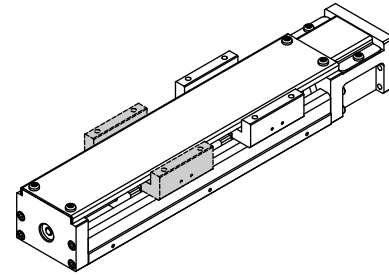


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# URS26 DIMENSIONAL DRAWING

## With Cover Option

Note: Optional second carriage shaded gray.



SECTION A-A

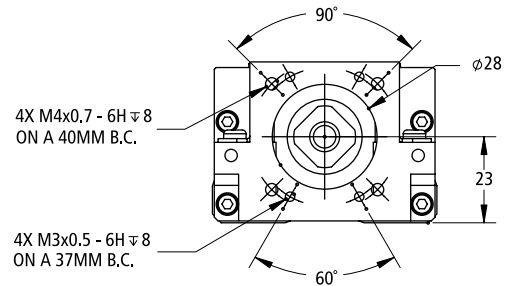
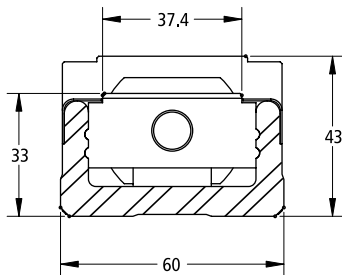
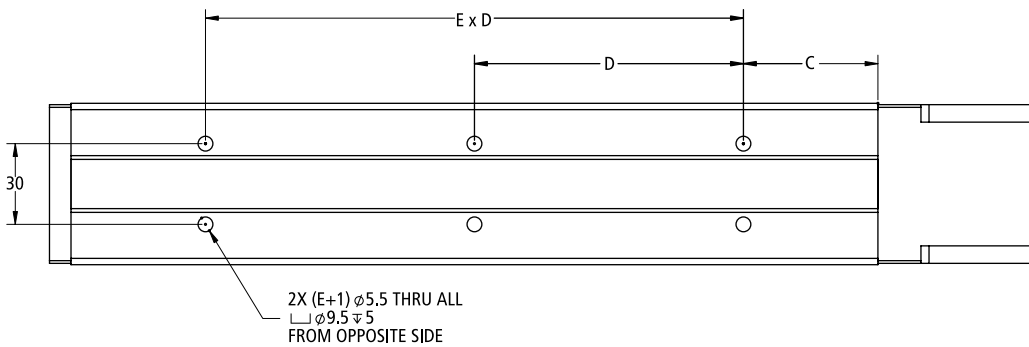
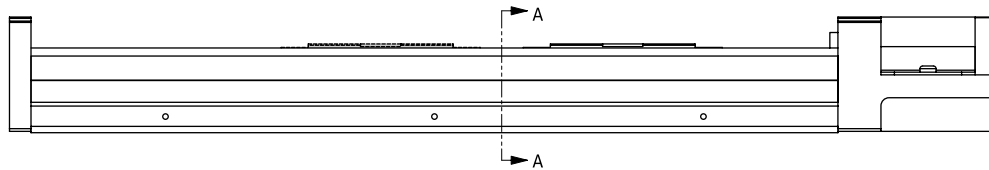
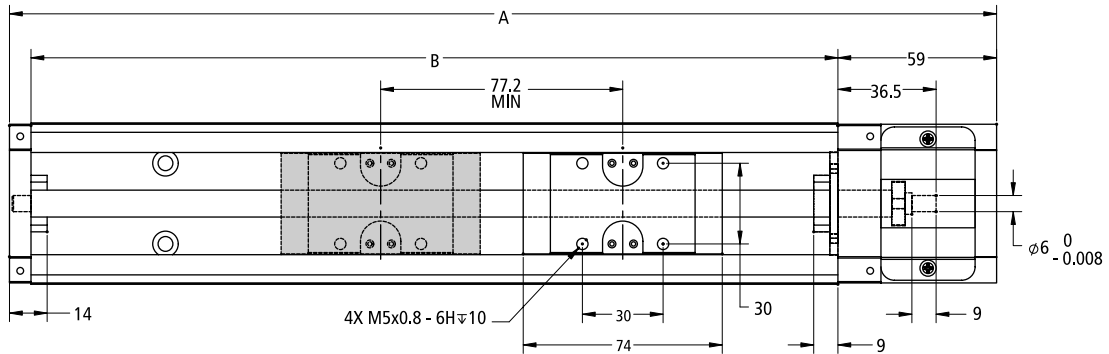
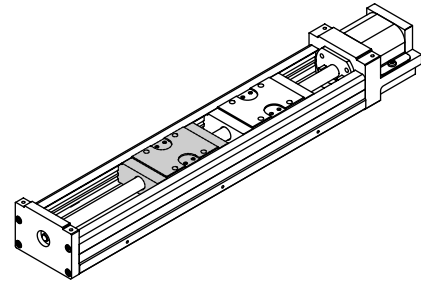
| Dimensions |     |    |    |   | Stroke Limit |        |
|------------|-----|----|----|---|--------------|--------|
| A          | B   | C  | D  | E | URS26A       | URS26B |
| 150        | 212 | 35 | 80 | 1 | 73           | -      |
| 200        | 262 | 20 |    | 2 | 127          | 61     |
| 250        | 315 | 45 |    | 3 | 173          | 111    |
| 300        | 362 | 30 |    | 3 | 223          | 161    |

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# URS33 DIMENSIONAL DRAWING

## Long Carriage(s) Without Cover Option

Note: Optional second carriage shaded gray.

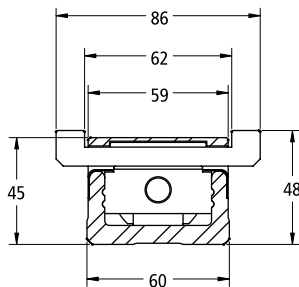
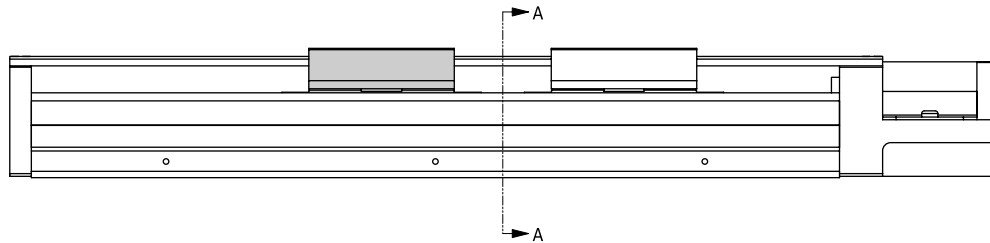
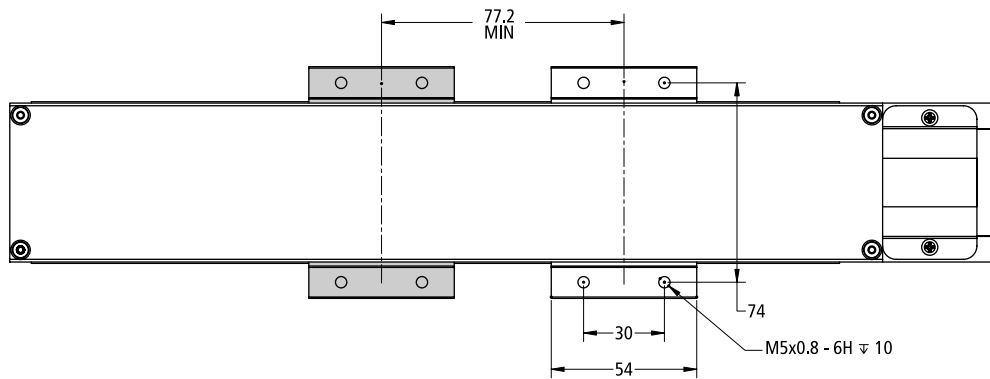
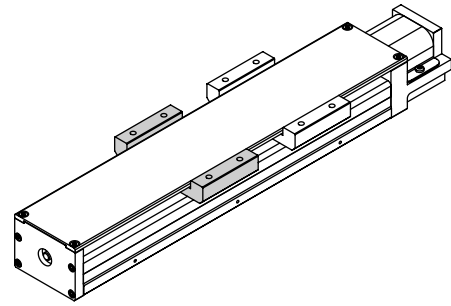


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# URS33 DIMENSIONAL DRAWING

## Long Carriage(s) With Cover Option

Note: Optional second carriage shaded gray.



SECTION A-A

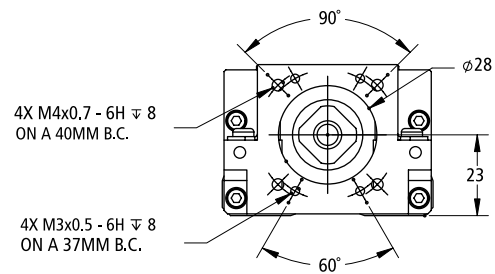
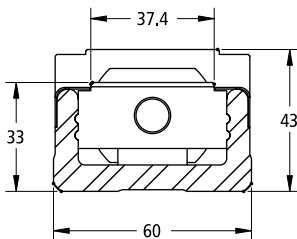
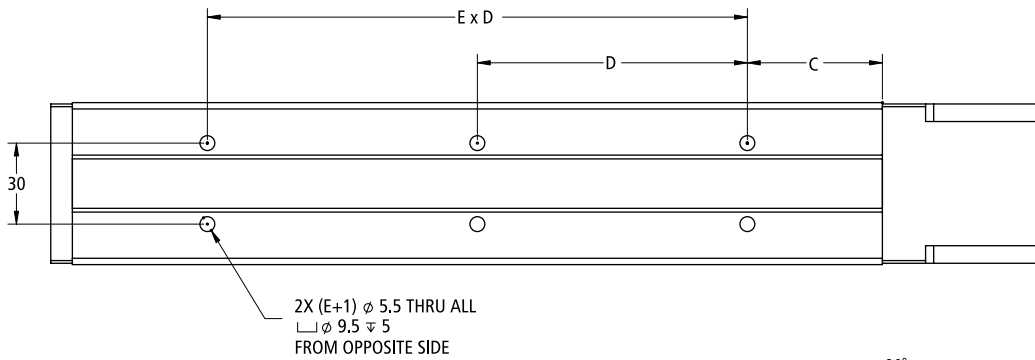
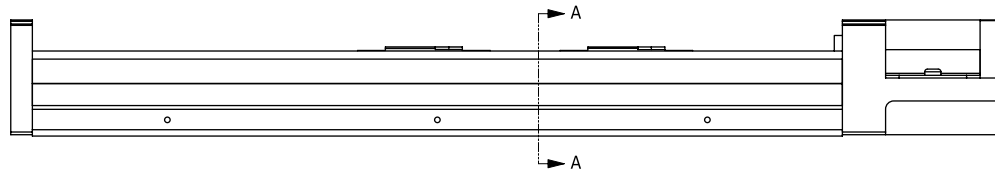
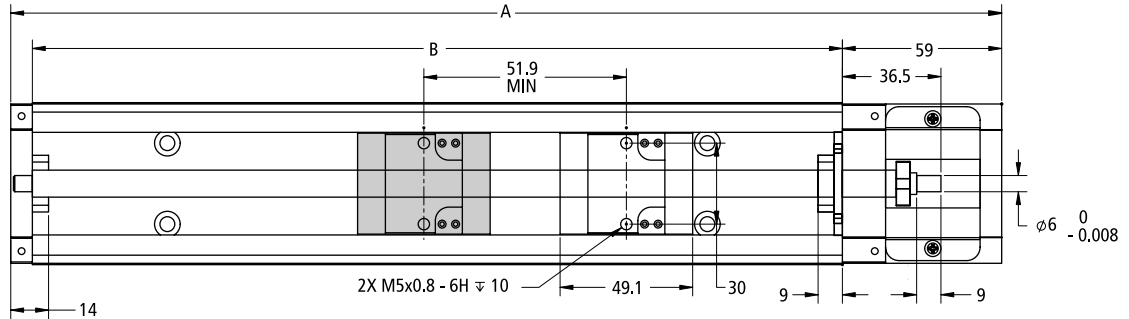
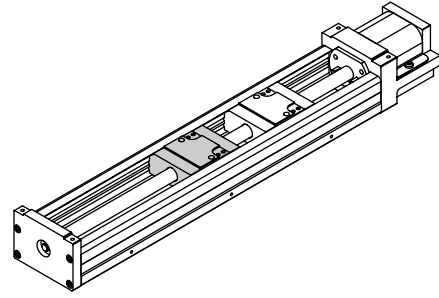
| Dimensions |     |    |     |     | Stroke Limit |          |
|------------|-----|----|-----|-----|--------------|----------|
| A          | B   | C  | D   | E   | URS33**A     | URS33**B |
| 217        | 150 | 25 | 100 | 1   | 60           | -        |
| 267        | 200 | 50 |     |     | 2            | 110      |
| 367        | 300 |    |     | 3   | 210          | 133      |
| 467        | 400 |    |     | 4   | 310          | 233      |
| 567        | 500 | 5  |     | 410 | 333          |          |
| 667        | 600 |    |     |     | 510          | 433      |

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# URS33 DIMENSIONAL DRAWING

## Short Carriage(s) Without Cover Option

Note: Optional second carriage shaded gray.

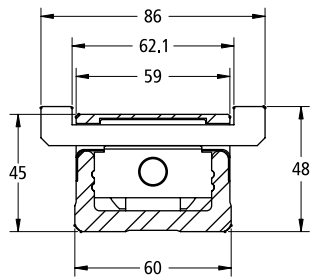
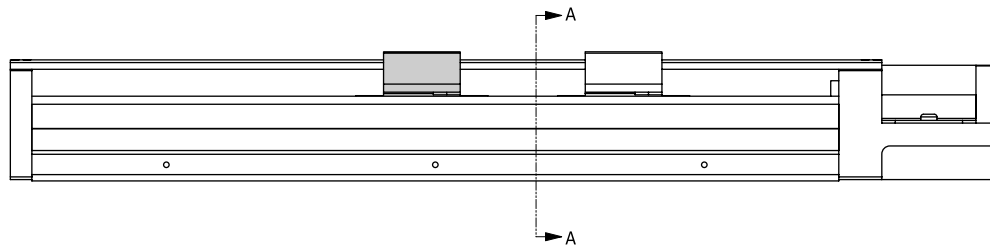
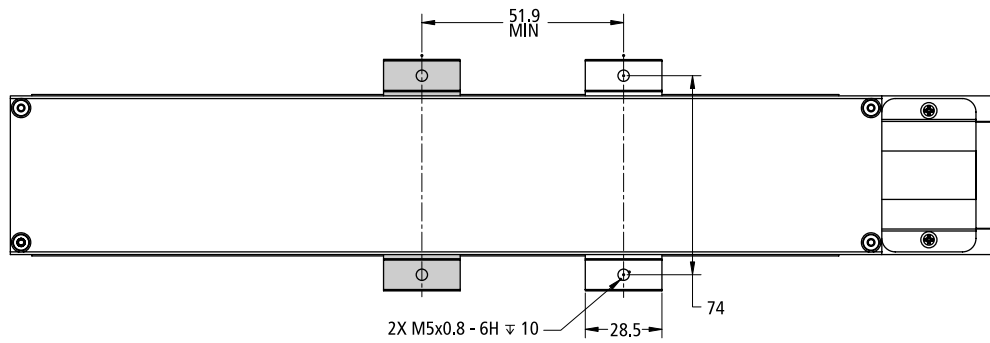
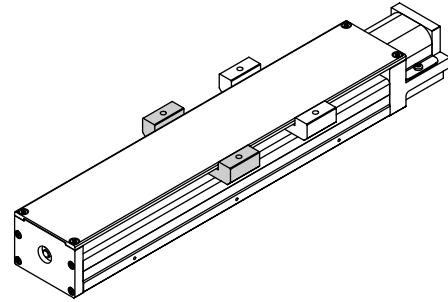


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# URS33 DIMENSIONAL DRAWING

## Short Carriage(s) With Cover Option

Note: Optional second carriage shaded gray.



SECTION A-A

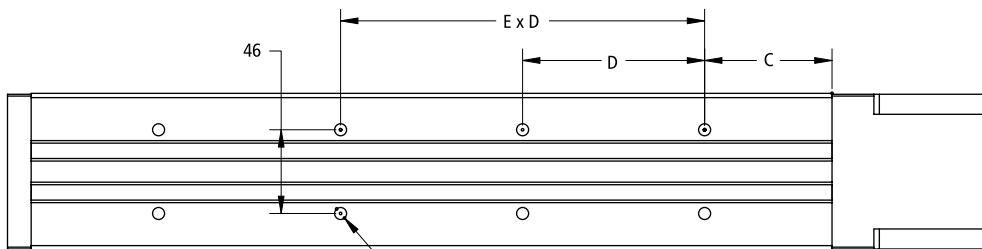
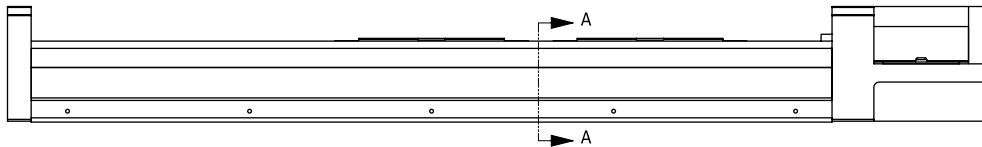
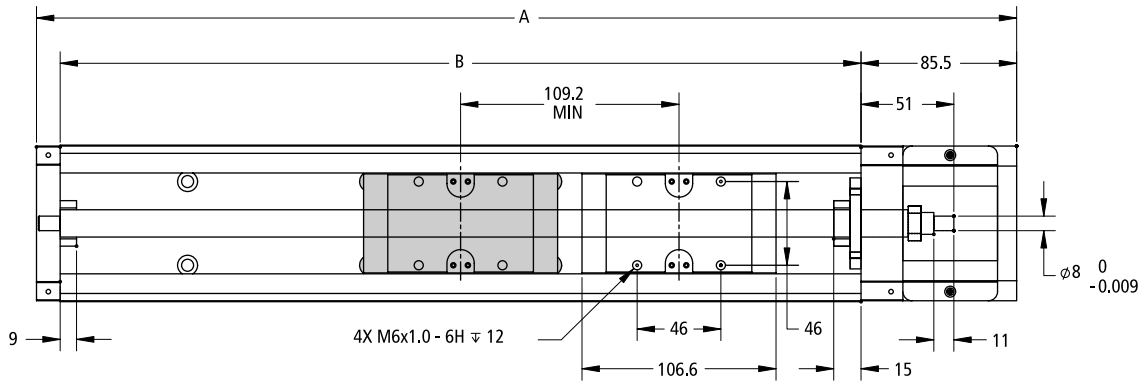
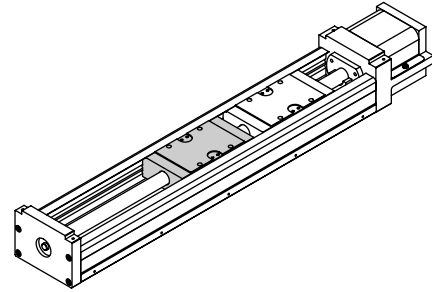
| Dimensions |     |    |     |     | Stroke Limit |          |
|------------|-----|----|-----|-----|--------------|----------|
| A          | B   | C  | D   | E   | URS33**C     | URS33**D |
| 217        | 150 | 25 | 100 | 1   | 85           | 34       |
| 267        | 200 | 50 |     |     | 2            | 135      |
| 367        | 300 |    |     | 3   | 235          | 184      |
| 467        | 400 |    |     | 4   | 335          | 284      |
| 567        | 500 | 5  |     | 435 | 384          |          |
| 667        | 600 |    |     |     | 535          | 484      |

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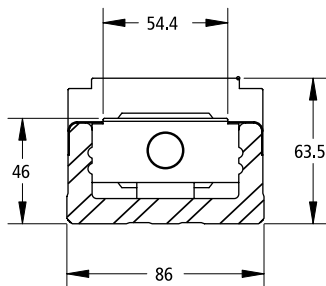
# URS46 DIMENSIONAL DRAWING

## Long Carriage(s) Without Cover Option

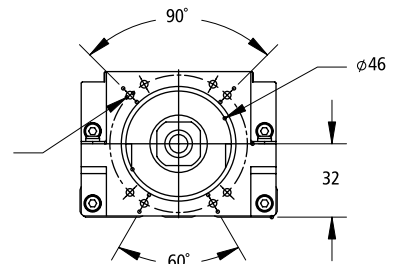
Note: Optional second carriage shaded gray.



2X (E+1)  $\phi$  6.6 THRU ALL  
 $\square$   $\phi$  11  $\pm$  6.5  
 FROM OPPOSITE SIDE



8X M4x0.7 - 6H  $\pm$  8  
 ON A 60MM B.C.



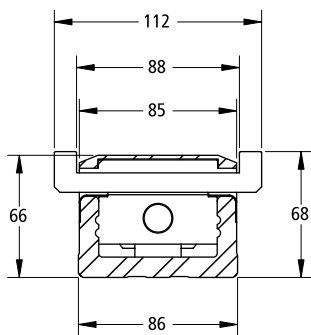
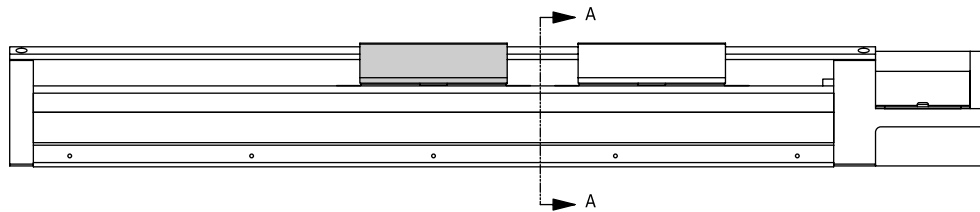
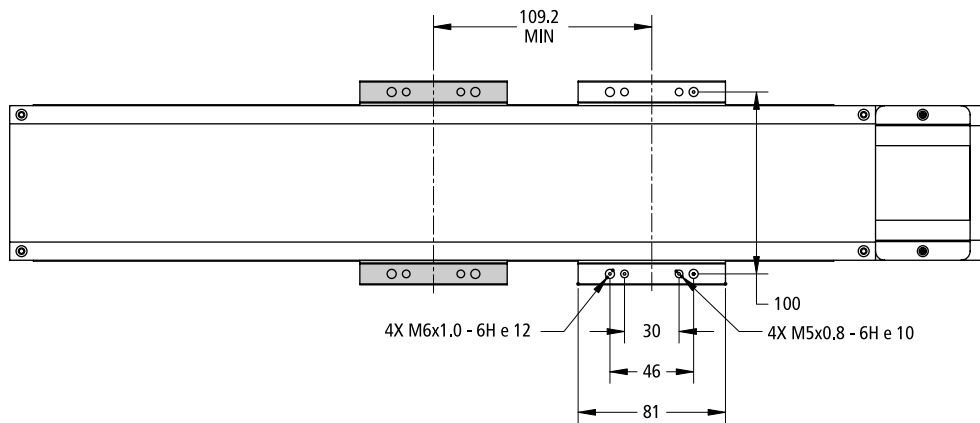
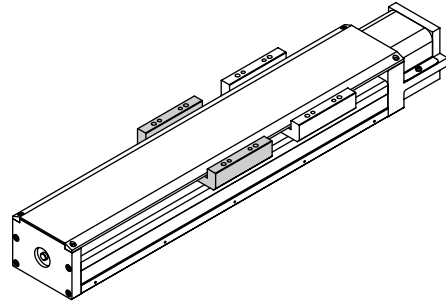
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# URS46 DIMENSIONAL DRAWING

## Long Carriage(s) With Cover Option

Note: Optional second carriage shaded gray.



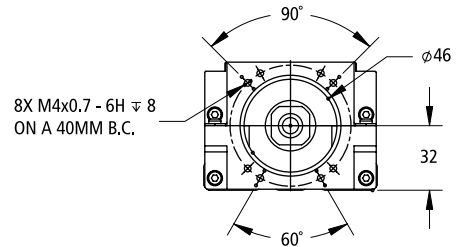
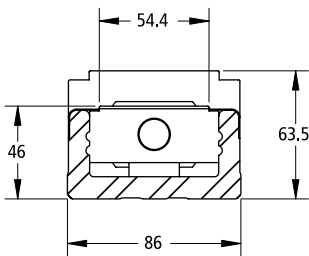
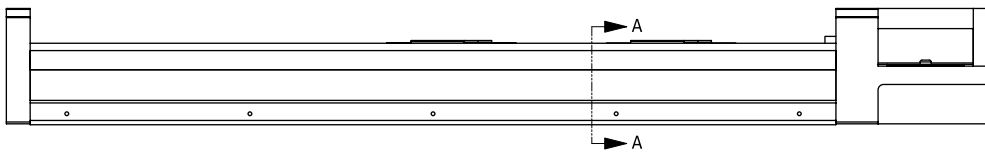
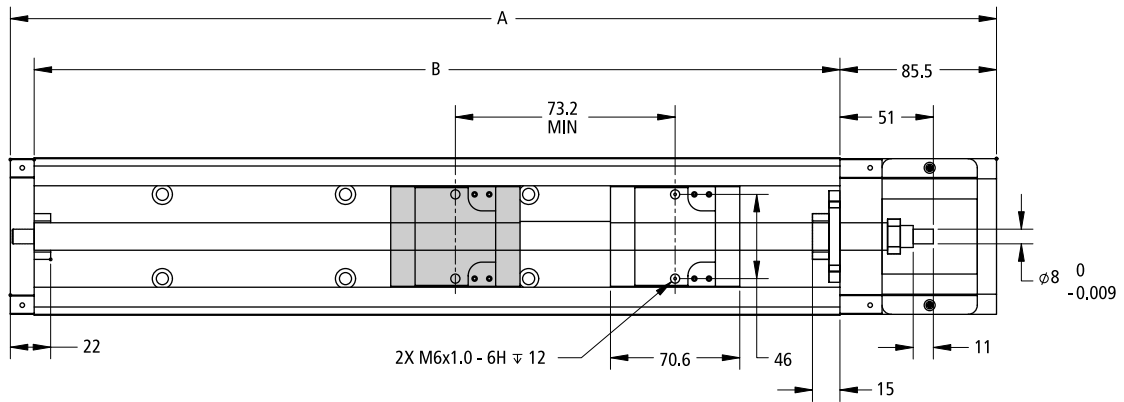
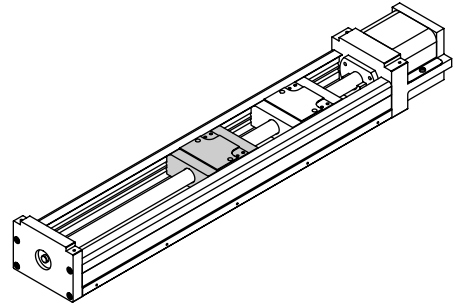
| Dimensions |     |    |     |   | Stroke Limit |          |
|------------|-----|----|-----|---|--------------|----------|
| A          | B   | C  | D   | E | URS46**A     | URS46**B |
| 438.5      | 340 | 70 | 100 | 2 | 209          | 100      |
| 538.5      | 440 |    |     | 3 | 309          | 200      |
| 638.5      | 540 |    |     | 4 | 409          | 300      |
| 738.5      | 640 |    |     | 5 | 509          | 400      |
| 838.5      | 740 |    |     | 6 | 609          | 500      |
| 938.5      | 840 |    |     | 7 | 709          | 600      |
| 1038.5     | 940 |    |     | 8 | 809          | 700      |

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# URS46 DIMENSIONAL DRAWING

## Short Carriage(s) Without Cover Option

Note: Optional second carriage shaded gray.

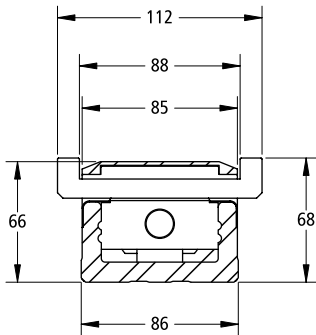
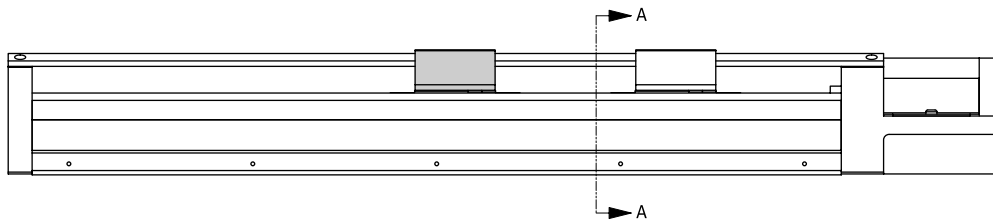
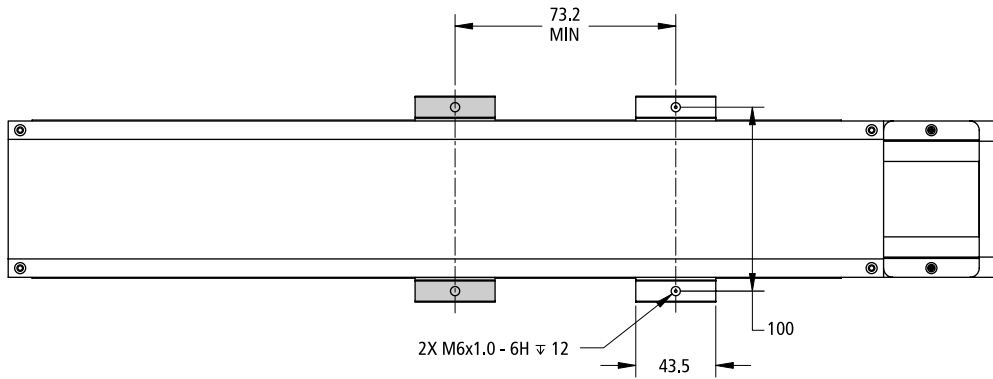
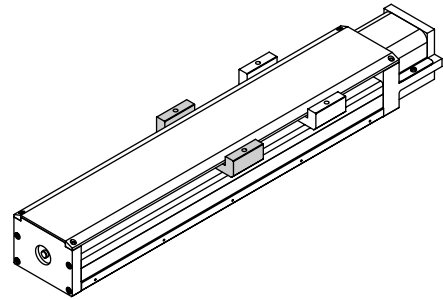


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# URS46 DIMENSIONAL DRAWING

## Short Carriage(s) With Cover Option

Note: Optional second carriage shaded gray.



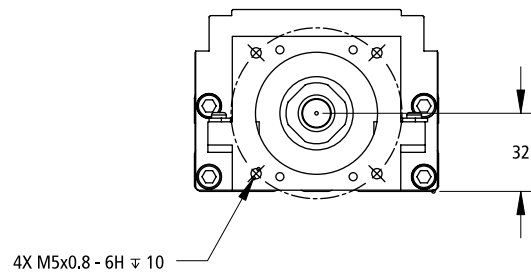
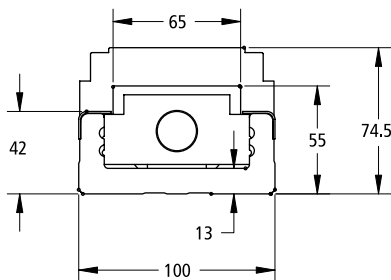
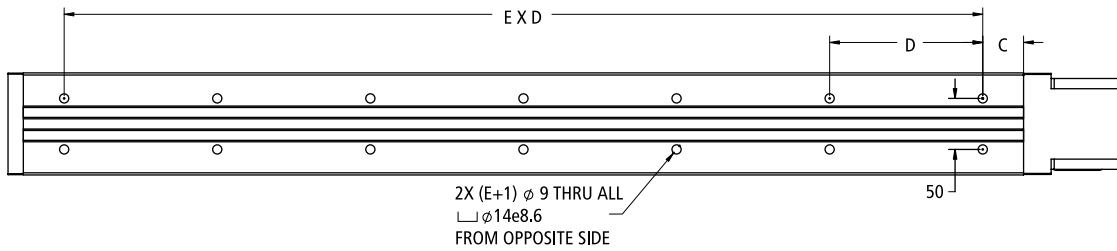
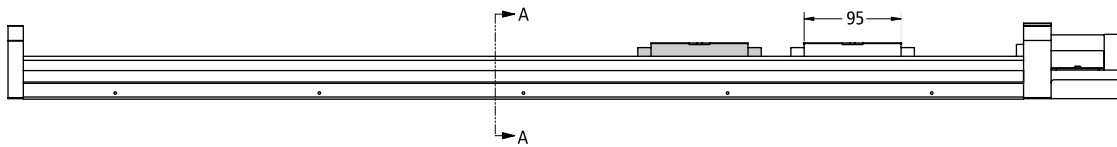
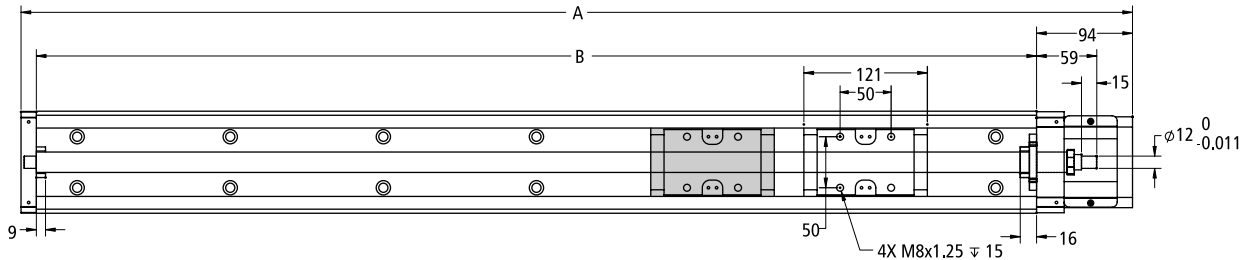
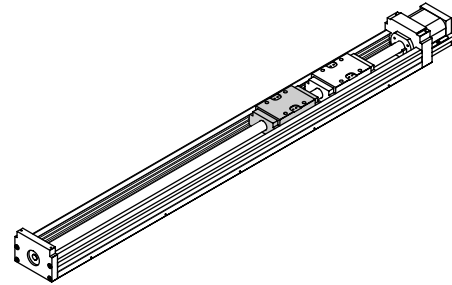
| Dimensions |     |    |     |   | Stroke Limit |          |
|------------|-----|----|-----|---|--------------|----------|
| A          | B   | C  | D   | E | URS46**C     | URS46**D |
| 438.5      | 340 | 70 | 100 | 2 | 245          | 172      |
| 538.5      | 440 |    |     | 3 | 345          | 272      |
| 638.5      | 540 |    |     | 4 | 445          | 372      |
| 738.5      | 640 |    |     | 5 | 545          | 472      |
| 838.5      | 740 |    |     | 6 | 645          | 572      |
| 938.5      | 840 |    |     | 7 | 745          | 672      |
| 1038.5     | 940 |    |     | 8 | 845          | 772      |

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# URS55 DIMENSIONAL DRAWING

## Without Cover Option

Note: Optional second carriage shaded gray.

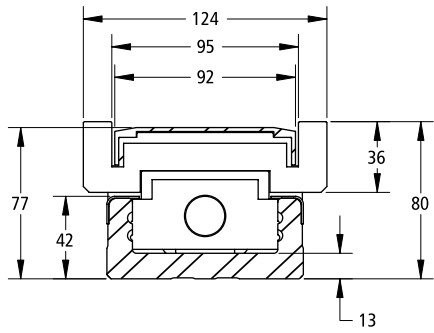
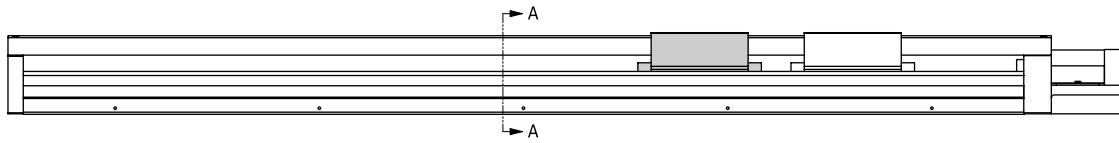
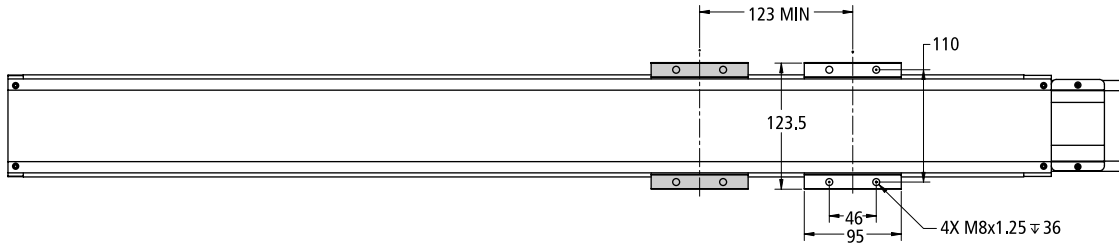
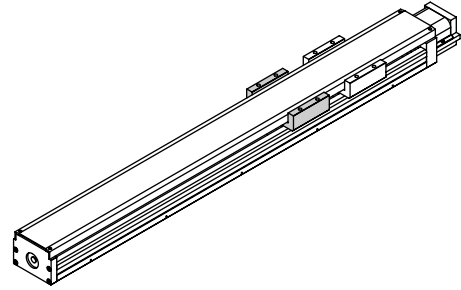


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# URS55 DIMENSIONAL DRAWING

## With Cover Option

Note: Optional second carriage shaded gray.



| Dimensions |      |    |     | Stroke Limit |          |          |
|------------|------|----|-----|--------------|----------|----------|
| A          | B    | C  | D   | E            | URS55**A | URS55**B |
| 980        | 1089 | 40 | 150 | 6            | 834      | 711      |
| 1080       | 1189 | 15 |     | 7            | 934      | 811      |
| 1180       | 1289 | 65 |     | 8            | 1034     | 911      |
| 1280       | 1389 | 40 |     | 9            | 1134     | 1011     |
| 1380       | 1489 | 15 |     |              | 1234     | 1111     |

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# MOTOR FLANGE OPTIONS

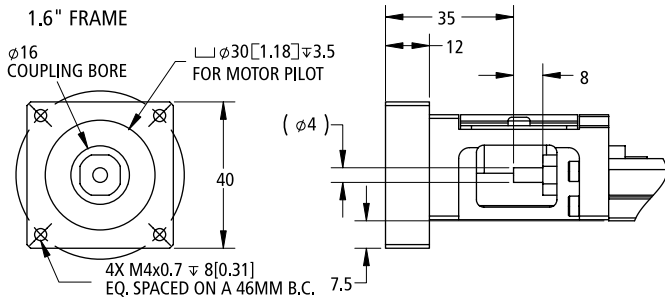
## SELECTION CHART

|                         | X16     | X17     | X23     | X34     |
|-------------------------|---------|---------|---------|---------|
| Motor Flange Ref (1)    | NEMA 16 | NEMA 17 | NEMA 23 | NEMA 34 |
| Encoder Resolution      | -       | -       | -       | -       |
| Motor Brake Description | -       | -       | -       | -       |
| URS20                   | ■       | ■       |         |         |
| URS26                   | ■       | ■       |         |         |
| URS33                   | ■       | ■       | ■       |         |
| URS46                   |         |         | ■       |         |
| URS55                   |         |         | ■       | ■       |

(1) Flange/motor dimensions may not be "true" NEMA; Reference drawings provided in this brochure.

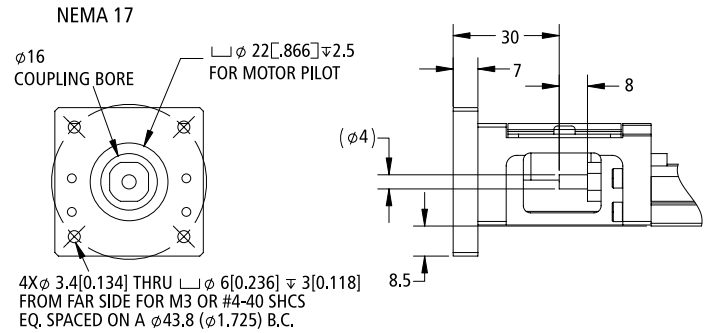
### X16 Flanges

#### URS20

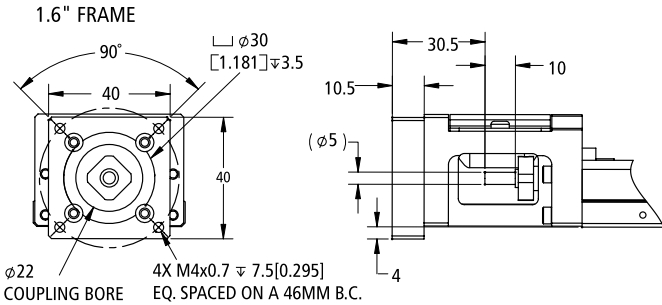


### X17 Flanges

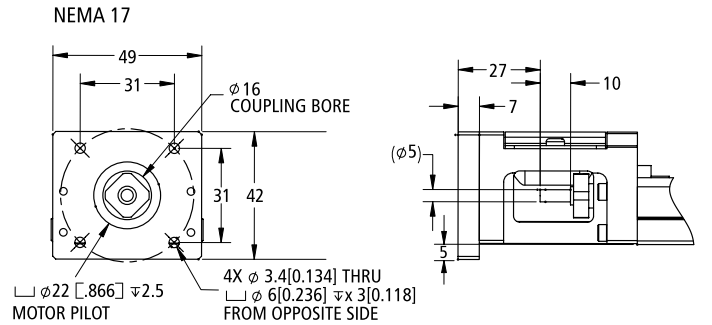
#### URS20



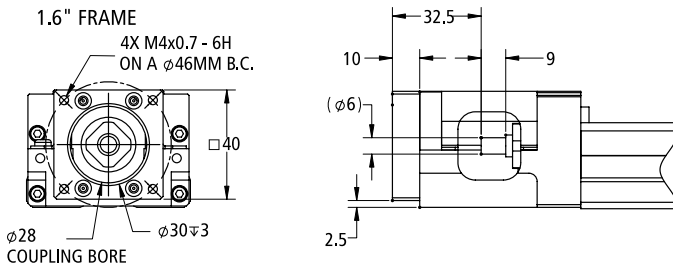
#### URS26



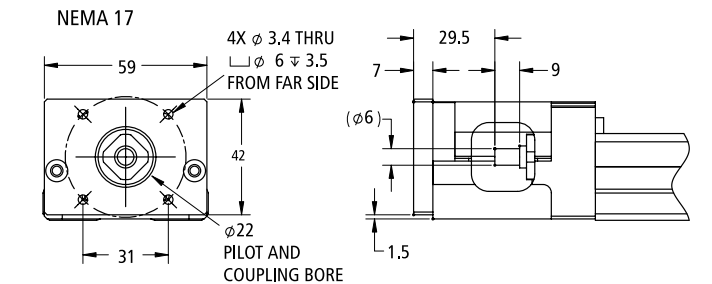
#### URS26



#### URS33



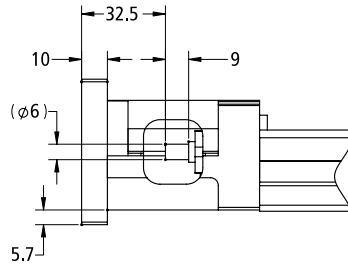
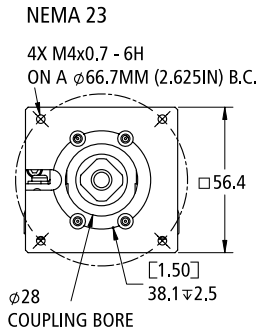
#### URS33



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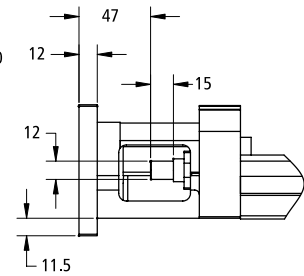
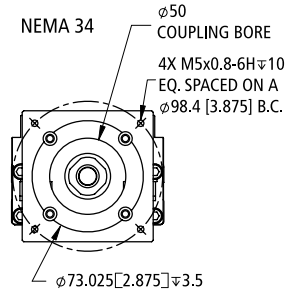
## X23 Flanges

### URS33

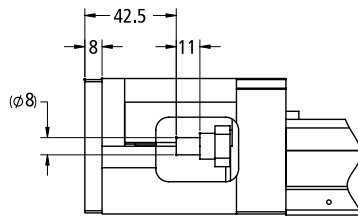
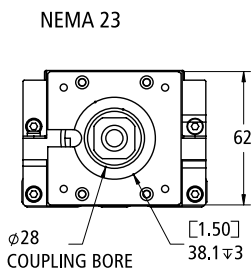


## X34 Flanges

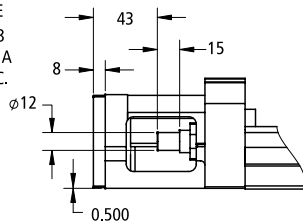
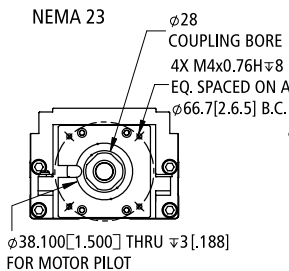
### URS55



### URS46



### URS55

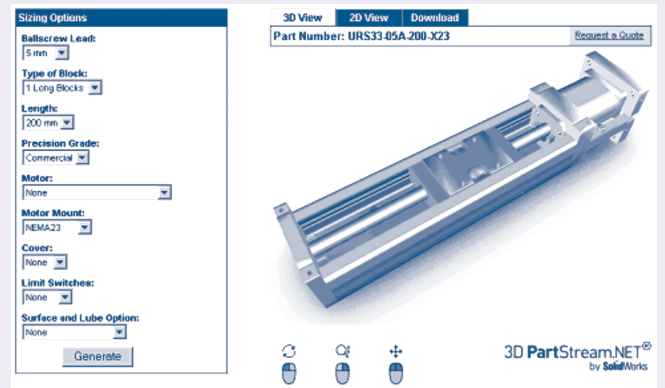


## MODELS ON DEMAND:

Leading edge system for configuring and downloading 3D solid models and 2D drawings.

- Configure a URS to specific requirements including rail length, motor mounting, cover and limit options.
- Rule-based system prevents misconfiguring a model.
- Currently offers fifty-two downloadable CAD formats (3D/2D).
- View 3D model online with zoom, pan and rotate features.
- Real-time downloads (no large emails or FTP sites).

[www.DanaherMotion.com/URS](http://www.DanaherMotion.com/URS)



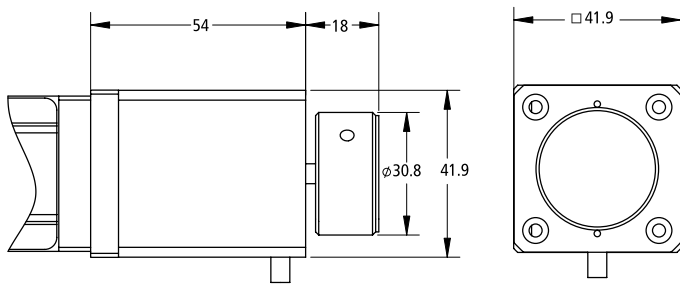
# STEPPER MOTOR OPTIONS

## SELECTION CHART

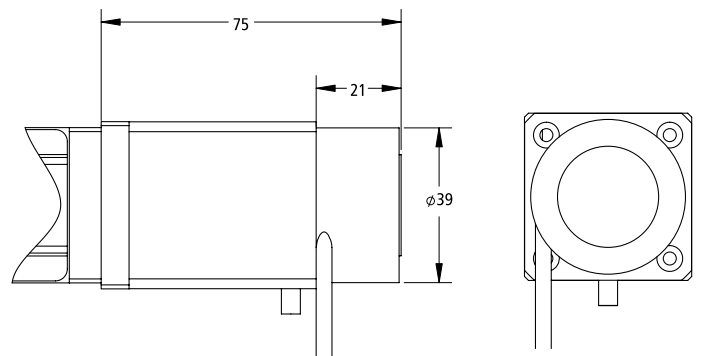
|                         | T12     | T12EM/T12EMK   | T22x    | T22xEM/T22xEMK | T32x    | T32xEM/T32xEMK |
|-------------------------|---------|----------------|---------|----------------|---------|----------------|
| Motor Flange Reference  | NEMA 17 | NEMA 17        | NEMA 23 | NEMA 23        | NEMA 34 | NEMA 34        |
| Encoder Resolution      | -       | 500/1000 lines | -       | 500/1000 lines | -       | 500/1000 lines |
| Motor Brake Description | -       | -              | -       | -              | -       | -              |
| URS20                   | ■       | ■              |         |                |         |                |
| URS26                   | ■       | ■              |         |                |         |                |
| URS33                   | ■       | ■              | ■       | ■              |         |                |
| URS46                   |         |                | ■       | ■              |         |                |
| URS55                   |         |                | ■       | ■              | ■       | ■              |

EM = 500 line encoder option  
 EMK = 1000 line encoder option

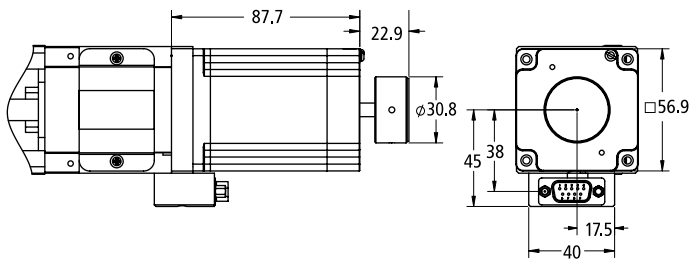
### T12



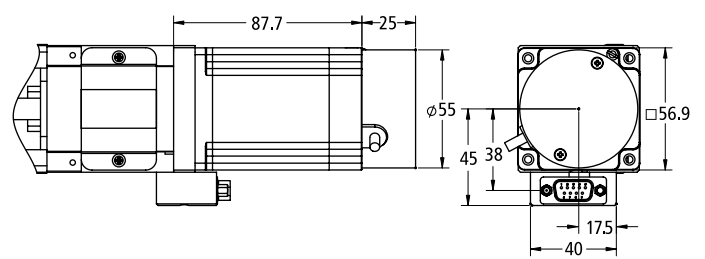
### T12EM/T12EMK



### T22x



### T22xEM/T22xEMK



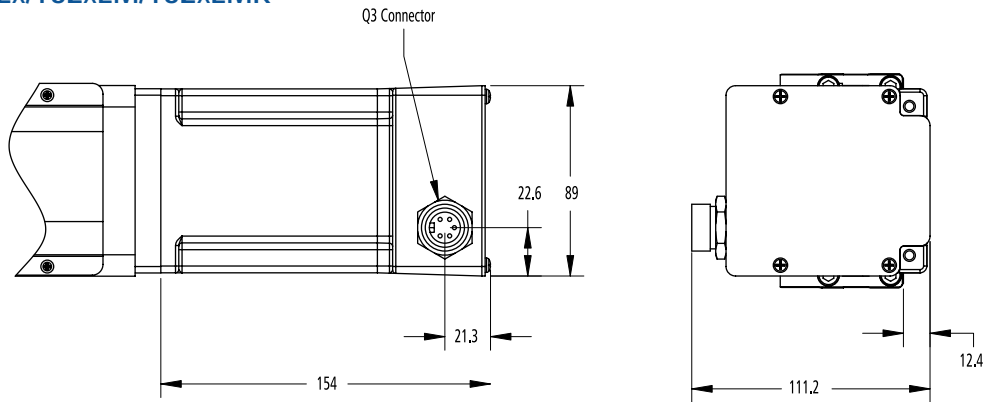
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### STEPPER MOTOR PARAMETERS

| Specification                  | Units                                      | T12                              | T22T                            | T22V                            | T32T                             | T32V                             |
|--------------------------------|--|----------------------------------|---------------------------------|---------------------------------|----------------------------------|----------------------------------|
| Holding Torque                 | N-m (oz-in)                                | 0.32 (45)                        | 1.52 (215)                      | 1.52 (215)                      | 8.5 (1206)                       | 8.5 (1206)                       |
| Rated Continuous Current/Phase | A  | 1.2                              | 0.77                            | 1.50                            | 1.58                             | 3.3                              |
| Phase Inductance (+/- 20%)     | mH/phase                                   | 2.8                              | 65.5                            | 17                              | 120                              | 30                               |
| Weight                         | kg (lb)                                    | 0.35 (0.8)                       | 1.0 (2.3)                       | 1.0 (2.3)                       | 3.81 (8.4)                       | 3.81 (8.4)                       |
| Rotor Inertia                  | kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> ) | 0.068 (6.02 x 10 <sup>-3</sup> ) | 0.408 (3.5 x 10 <sup>-4</sup> ) | 0.408 (3.5 x 10 <sup>-4</sup> ) | .038 (0.268 x 10 <sup>-3</sup> ) | .038 (0.268 x 10 <sup>-3</sup> ) |

### T32x/T32xEM/T32xEMK



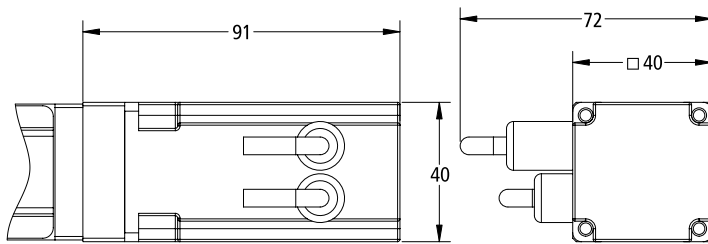
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# SERVO MOTOR OPTIONS

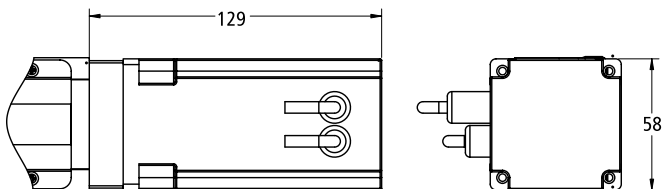
## SELECTION CHART

|                         | BK11              | BK22              | BK22B             | BK22S   | BK22SB           | BK32              | BK32B             |
|-------------------------|-------------------|-------------------|-------------------|---------|------------------|-------------------|-------------------|
| Motor Flange Reference  | NEMA 16           | NEMA 23           | NEMA 23           | NEMA 23 | NEMA 23          | NEM A 34          | NEMA 34           |
| Feedback                | 2048 line encoder | 2048 line encoder | 2048 line encoder | SFD     | SFD              | 2048 line encoder | 2048 line encoder |
| Motor Brake Description | -                 | -                 | 24 VDC Power-off  | -       | 24 VDC Power-off | -                 | 24 VDC Power-off  |
| URS20                   | ■                 |                   |                   |         |                  |                   |                   |
| URS26                   | ■                 |                   |                   |         |                  |                   |                   |
| URS33                   | ■                 | ■                 | ■                 | ■       | ■                |                   |                   |
| URS46                   |                   | ■                 | ■                 | ■       | ■                |                   |                   |
| URS55                   |                   | ■                 | ■                 | ■       | ■                | ■                 | ■                 |

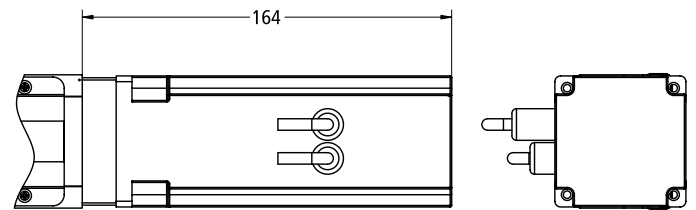
### BK11



### BK22/BK22S



### BK22B/BK22SB

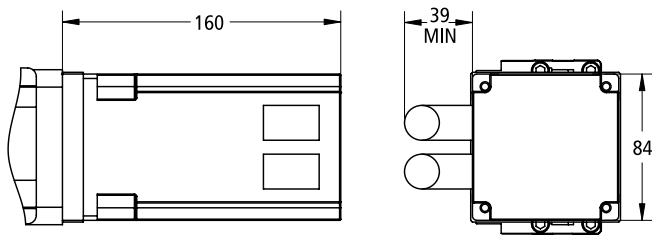


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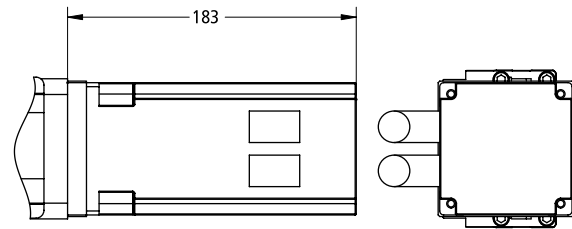
## SERVO MOTOR PARAMETERS

| Specification              | Units                                      | BK11                            | BK22                           | BK22B                          | BK32                          | BK32B                           |
|----------------------------|--|---------------------------------|--------------------------------|--------------------------------|-------------------------------|---------------------------------|
| Continuous Stall Torque    | N-m (oz-in)                                | 0.185 (26)                      | 0.84 (119)                     | 0.83 (117)                     | 3.43 (486)                    | 3.17 (449)                      |
| Peak Torque                | N-m (oz-in)                                | 0.614 (87)                      | 2.73 (386)                     | 2.73 (386)                     | 11.5 (1629)                   | 11.5 (1629)                     |
| Torque Sensitivity +/--10% | N-m/Arms (oz-in/Arms)                      | 0.129 (18.24)                   | 0.61 (86.4)                    | 0.61 (86.4)                    | 0.74 (104)                    | 0.74 (104)                      |
| Back EMF +/- 10%           | Vrms/krpm                                  | 8.3                             | 39                             | 39                             | 47.5                          | 47.5                            |
| Maximum Speed              | rpm  | 6000                            | 8000                           | 8000                           | 6000                          | 6000                            |
| Weight                     | kg (lb)                                    | 0.35 (0.8)                      | 1.1 (2.4)                      | 1.1 (2.4)                      | 3.39 (7.5)                    | 3.39 (7.5)                      |
| Rotor Inertia              | kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> ) | 0.017 (1.5 x 10 <sup>-3</sup> ) | 0.16 (1.4 x 10 <sup>-4</sup> ) | 0.17 (1.5 x 10 <sup>-4</sup> ) | 1.5 (1.3 x 10 <sup>-3</sup> ) | 1.57 (1.31 x 10 <sup>-3</sup> ) |

### BK32



### BK32B



### CLEANROOM LUBRICATION OPTION

The “GK” lubrication option is a low-particulate generating lubricant suitable for cleanroom applications, with the same lubrication and rust-preventing performance as the standard lithium-based grease. Operating range is -30°C to 150°C.

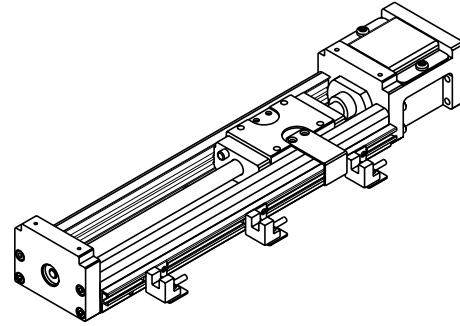
### RAYDENT SURFACE TREATMENT OPTION

The “RD” option provides for Raydent treatment of the rail surfaces. Raydent is a proven, precisely applied thin rust-preventing film. The surface treatment has exceptional durability (greater than 10 years), and any fine grains of Raydent that do break away from the contact between the rail and recirculating balls will actually add to the lubricity of the grease.

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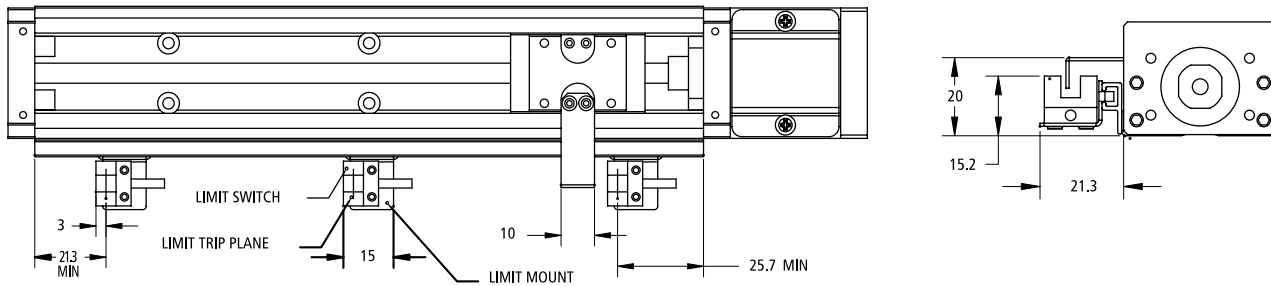
## SENSOR OPTIONS

All URS models are offered with optional Limit and Home Sensor packages. Sensors are recommended to prevent overtravel of the carriage and to provide a reliable index position. Each sensor package includes a T-slotted mounting rail and three (3) sensors. The Sensors are adjustable throughout the full travel range of the URS.

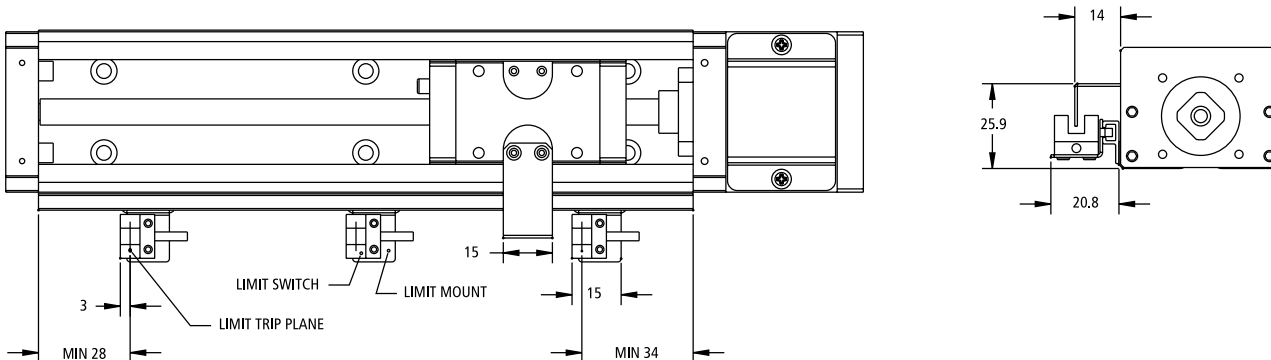


|                   |                   |
|-------------------|-------------------|
| Sensor Type       | Photoelectric     |
| Output Logic Type | NPN (sinking)     |
| Switch Type       | Normally Open     |
| Input Voltage     | 5 - 24 VDC +/-10% |
| Current Capacity  | 100mA             |
| Repeatability     | +/-15 microns     |

### URS20

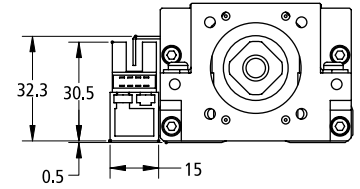
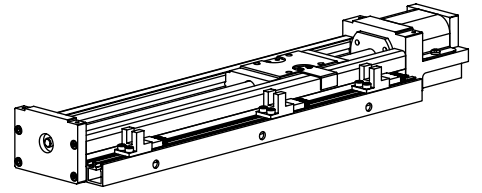
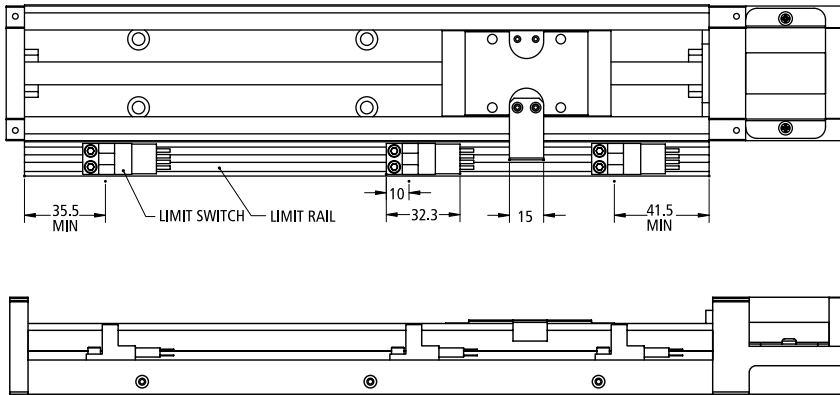


### URS26

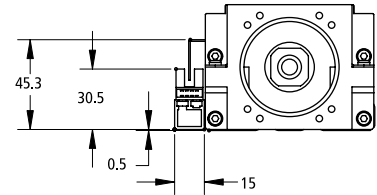
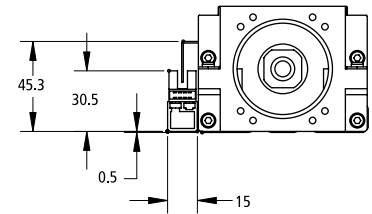
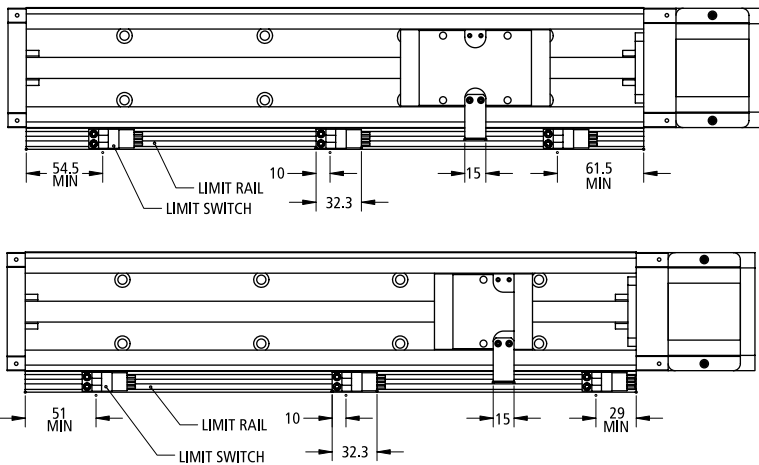


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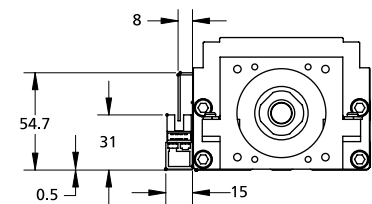
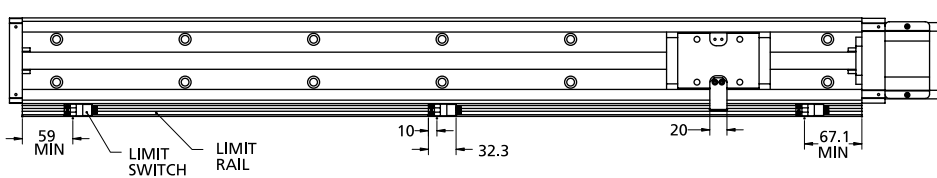
URS33



URS46



URS55



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## INERTIA OF THE CARRIAGES(S) AND BALLSCREW

Inertia Value Units =  $1 \times 10^{-4} \text{ kg} \cdot \text{m}^2$

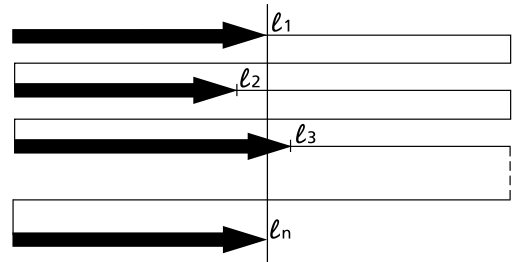
| base model | rail length (mm) | without top-cover |          |                   |          | with top-cover    |          |                   |          | rail Length mm |
|------------|------------------|-------------------|----------|-------------------|----------|-------------------|----------|-------------------|----------|----------------|
|            |                  | Long carriage (s) |          | Short Carriage(s) |          | Long carriage (s) |          | Short Carriage(s) |          |                |
|            |                  | single [A]        | dual [B] | single [C]        | dual [D] | single [A]        | dual [B] | single [C]        | dual [D] |                |
| URS2001    | 100              | 0.001             | 0.001    | —                 | —        | 0.001             | 0.001    | —                 | —        | 100            |
|            | 150              | 0.002             | 0.002    | —                 | —        | 0.002             | 0.002    | —                 | —        | 150            |
|            | 200              | 0.002             | 0.002    | —                 | —        | 0.002             | 0.002    | —                 | —        | 200            |
| URS2602    | 150              | 0.006             | 0.006    | —                 | —        | 0.006             | 0.006    | —                 | —        | 150            |
|            | 200              | 0.008             | 0.008    | —                 | —        | 0.008             | 0.008    | —                 | —        | 200            |
|            | 250              | 0.009             | 0.009    | —                 | —        | 0.009             | 0.010    | —                 | —        | 250            |
|            | 300              | 0.011             | 0.011    | —                 | —        | 0.011             | 0.011    | —                 | —        | 300            |
| URS3305    | 150              | 0.016             | —        | 0.016             | 0.016    | 0.017             | —        | —                 | —        | 150            |
|            | 200              | 0.020             | —        | 0.019             | 0.020    | 0.021             | —        | 0.020             | 0.021    | 200            |
|            | 300              | 0.028             | 0.030    | 0.027             | 0.028    | 0.029             | 0.031    | 0.027             | 0.029    | 300            |
|            | 400              | 0.036             | 0.038    | 0.035             | 0.036    | 0.036             | 0.039    | 0.035             | 0.036    | 400            |
|            | 500              | 0.043             | 0.045    | 0.042             | 0.043    | 0.044             | 0.046    | 0.043             | 0.044    | 500            |
|            | 600              | 0.051             | 0.053    | 0.050             | 0.051    | 0.052             | 0.054    | 0.050             | 0.052    | 600            |
| URS3310    | 150              | 0.022             | 0.030    | 0.018             | 0.022    | 0.025             | 0.035    | 0.020             | 0.025    | 150            |
|            | 200              | 0.026             | 0.034    | 0.022             | 0.026    | 0.029             | 0.039    | 0.023             | 0.029    | 200            |
|            | 300              | 0.034             | 0.041    | 0.030             | 0.034    | 0.036             | 0.046    | 0.031             | 0.036    | 300            |
|            | 400              | 0.041             | 0.049    | 0.038             | 0.041    | 0.044             | 0.054    | 0.039             | 0.044    | 400            |
|            | 500              | 0.049             | 0.057    | 0.045             | 0.049    | 0.052             | 0.062    | 0.046             | 0.052    | 500            |
|            | 600              | 0.056             | 0.064    | 0.053             | 0.057    | 0.059             | 0.070    | 0.055             | 0.060    | 600            |
| URS4610    | 340              | 0.179             | 0.202    | 0.169             | 0.182    | 0.187             | 0.217    | 0.174             | 0.192    | 340            |
|            | 440              | 0.218             | 0.241    | 0.208             | 0.220    | 0.225             | 0.256    | 0.213             | 0.231    | 440            |
|            | 540              | 0.257             | 0.279    | 0.246             | 0.259    | 0.264             | 0.295    | 0.252             | 0.269    | 540            |
|            | 640              | 0.295             | 0.318    | 0.285             | 0.298    | 0.303             | 0.333    | 0.290             | 0.308    | 640            |
|            | 740              | 0.334             | 0.357    | 0.324             | 0.337    | 0.342             | 0.372    | 0.329             | 0.347    | 740            |
|            | 840              | 0.373             | 0.396    | 0.363             | 0.375    | 0.380             | 0.411    | 0.367             | 0.383    | 840            |
|            | 940              | 0.412             | 0.435    | 0.402             | 0.414    | 0.419             | 0.450    | 0.406             | 0.422    | 940            |
| URS4620    | 340              | 0.247             | 0.339    | 0.207             | 0.258    | 0.278             | 0.399    | 0.227             | 0.298    | 340            |
|            | 440              | 0.286             | 0.377    | 0.246             | 0.296    | 0.317             | 0.438    | 0.266             | 0.337    | 440            |
|            | 540              | 0.325             | 0.416    | 0.284             | 0.335    | 0.355             | 0.477    | 0.305             | 0.376    | 540            |
|            | 640              | 0.364             | 0.455    | 0.323             | 0.374    | 0.394             | 0.516    | 0.344             | 0.414    | 640            |
|            | 740              | 0.403             | 0.494    | 0.362             | 0.413    | 0.433             | 0.555    | 0.382             | 0.453    | 740            |
|            | 840              | 0.441             | 0.534    | 0.402             | 0.451    | 1.523             | 1.756    | 0.417             | 0.482    | 840            |
|            | 940              | 0.480             | 0.572    | 0.441             | 0.490    | 1.646             | 1.879    | 0.456             | 0.521    | 940            |
| URS5520    | 980              | 1.462             | 1.635    | —                 | —        | 1.523             | 1.756    | —                 | —        | 980            |
|            | 1080             | 1.585             | 1.757    | —                 | —        | 1.646             | 1.879    | —                 | —        | 1080           |
|            | 1180             | 1.707             | 1.880    | —                 | —        | 1.768             | 2.001    | —                 | —        | 1180           |
|            | 1280             | 1.830             | 2.002    | —                 | —        | 1.891             | 2.124    | —                 | —        | 1280           |
|            | 1380             | 1.953             | 2.125    | —                 | —        | 2.013             | 2.246    | —                 | —        | 1380           |

[A], [B], [C], [D] Represents carriage option.

# ACCURACY STANDARDS

## Positioning Repeatability:

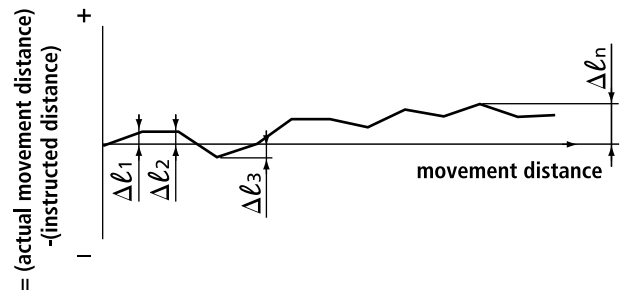
Establish an arbitrary point. From one end, position the inner block at this point and measure the stop position. Repeat the positioning and measure the stop position. Repeat the positioning and measurement process 7 times. Repeat the same process with respect to the established set point at the midpoint and near both ends of travel. Take the maximum measurement and divide the maximum difference by 2 and indicate it with either a positive or negative sign as the test result.



$$\text{Positioning Repeatability} = \pm 1/2 \{(\text{Maximum value of } h_n) - (\text{Minimum value of } h_n)\}$$

## Positioning Accuracy:

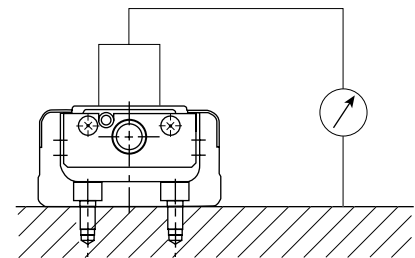
Positioning is performed in only one direction and the resulting position is set as the reference measurement point. Calculate the difference between the length of actual travel and the commanded travel length. continuing in the same direction (without returning to the start point) repeat this process randomly several times until reaching limit of full stroke. Express the accuracy by the absolute maximum difference.



$$\text{Positioning Accuracy} = (gh_n)_{\text{max}}$$

## Running Parallelism:

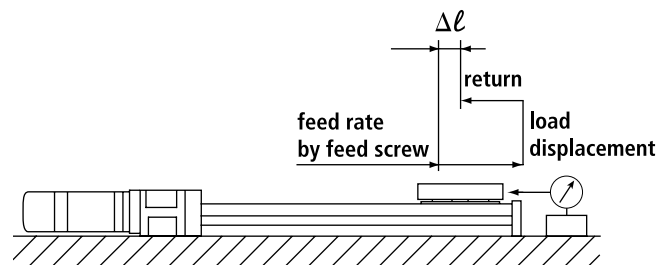
Making sure that the surface plate is absolutely flat. Use the test indicator as shown in at the right, run the block over the entire length of travel and use the maximum difference in readings as the test results.



## Backlash:

Use the feed screw to move the block a little. Take the test indicator reading and make it the reference point. While in this position, load the block in the same direction without using the feed screw. Release the load and read the return. Calculate the difference between the reference point. Repeat the same process at the midpoint and near both ends. Use the maximum difference as the test result.

$$\text{Backlash} = (gh)_{\text{max}}$$



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# RATED LIFE

To obtain the rated life of the URS actuator, complete the following life calculation equations for the Guide portion (A) and the Ball Screw / Support Bearing portion (B) and use the minimum value as your rated life.

## A. Life of the Guide

Life of the guide is calculated as follows:

equation (1)

$$L_G = \left( \frac{f_C}{f_W} \cdot \frac{C}{P_T} \right)^3 \cdot 50$$

$L_G$ : Life in distance (Km)

$f_C$ : Contact coefficient (See Table 1)

$f_W$ : Load coefficient (See Table 2)

$C$ : Basic dynamic rating (N)

$P_T$ : Calculated load carried by single block (N)

### A-1 Calculation of $P_T$

To calculate the life by using equation (1) for  $P_T$ , it is necessary to obtain theoretical load on single carriage by taking the actual moment load and other factors into consideration. When high acceleration or short stroke motion is present,  $P_T$  should be calculated with acceleration in consideration. This calculation for acceleration is performed with the mass carried by the URS actuator.

To obtain  $P_T$ , calculate each load at uniform motion, acceleration motion, and deceleration motion. The average value is  $P_T$ .

Table 1 Contact coefficient ( $f_c$ )

| number of blocks to be mounted on an axis | contact coefficient ( $f_c$ ) |
|---|-------------------------------|
| 1   | 1                             |
| 2   | 0.81                          |

Table 2 Load coefficient ( $f_w$ )

| Operating condition |                | Load coefficient ( $f_w$ ) |
|---------------------|----------------|----------------------------|
| vibration           | speed          |                            |
| none                | 5m/min or less | 1.0 ~ 1.5                  |
| minor               | 0m/min or less | 1.5 ~ 2.0                  |
| major               | m/min or more  | 2.0 ~ 3.5                  |

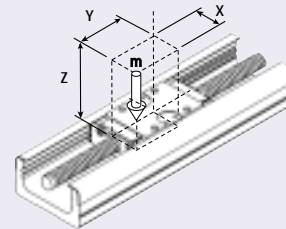
Table 3 Equivalent coefficient of the moment

|          | $k_p$                 | $k_y$                 | $k_r$                 |
|----------|-----------------------|-----------------------|-----------------------|
| URS20**A | $2.16 \times 10^{-1}$ | $1.82 \times 10^{-1}$ | $7.84 \times 10^{-2}$ |
| URS20**B | $3.56 \times 10^{-2}$ | $2.99 \times 10^{-2}$ | $3.92 \times 10^{-2}$ |
| URS26**A | $1.41 \times 10^{-1}$ | $1.18 \times 10^{-1}$ | $5.85 \times 10^{-2}$ |
| URS26**B | $2.34 \times 10^{-2}$ | $1.96 \times 10^{-2}$ | $2.92 \times 10^{-2}$ |
| URS33**A | $1.18 \times 10^{-1}$ | $9.90 \times 10^{-2}$ | $4.84 \times 10^{-2}$ |
| URS33**B | $1.96 \times 10^{-2}$ | $1.65 \times 10^{-2}$ | $2.42 \times 10^{-2}$ |
| URS33**C | $2.36 \times 10^{-1}$ | $2.02 \times 10^{-1}$ | $4.83 \times 10^{-2}$ |
| URS33**D | $3.93 \times 10^{-2}$ | $3.37 \times 10^{-2}$ | $2.41 \times 10^{-2}$ |
| URS46**A | $7.87 \times 10^{-2}$ | $6.61 \times 10^{-2}$ | $3.19 \times 10^{-2}$ |
| URS46**B | $1.31 \times 10^{-2}$ | $1.10 \times 10^{-2}$ | $1.60 \times 10^{-2}$ |
| URS46**C | $1.57 \times 10^{-1}$ | $1.33 \times 10^{-1}$ | $3.19 \times 10^{-2}$ |
| URS46**D | $2.62 \times 10^{-2}$ | $2.22 \times 10^{-2}$ | $1.60 \times 10^{-2}$ |
| URS55**A | $6.75 \times 10^{-2}$ | $5.69 \times 10^{-2}$ | $2.75 \times 10^{-2}$ |
| URS55**B | $1.12 \times 10^{-2}$ | $9.48 \times 10^{-3}$ | $1.38 \times 10^{-2}$ |

i) At uniform motion ( $P_{TC}$ )

equation (2)

$$P_{TC} = \left( \frac{1}{n} \cdot W \right) + (k_p \cdot M_p) + (k_y \cdot M_y) + (k_r \cdot M_r)$$



ii) At uniform motion ( $P_{Ta}$ )

equation (3)

$$P_{Ta} = \frac{1}{n} \cdot W + k_p (M_p + m \cdot \alpha_a \cdot Z) + k_y (M_y + m \cdot \alpha_a \cdot X) + k_r \cdot M_r$$

However, when the value of  $(M_p + m \cdot \alpha_a \cdot Z)$ ,  $(M_y + m \cdot \alpha_a \cdot X)$  is negative, use a value of zero.

iii) At deceleration motion ( $P_{Td}$ )

equation (4)

$$P_{Td} = \frac{1}{n} \cdot W + k_p (M_p + m \cdot -\alpha_d \cdot Z) + k_y (M_y + m \cdot -\alpha_d \cdot X) + k_r \cdot M_r$$

However, when the value of  $(M_p + m \cdot -\alpha_d \cdot Z)$ ,  $(M_y + m \cdot -\alpha_d \cdot X)$  is negative, use a value of zero.

$P_{TC}$ : Calculated load carried by single block at uniform motion (N)

$P_{Ta}$ : Calculated load carried by single block at acceleration motion (N)

$P_{Td}$ : Calculated load carried by single block at deceleration motion (N)

$n$ : Number of carriages(s) on URS actuator

$W$ : Load(N)

$M$ : Mass carried by the actuator

$\alpha_a$ : Acceleration (m/sec<sup>2</sup>)

$\alpha_d$ : Deceleration (m/sec<sup>2</sup>)

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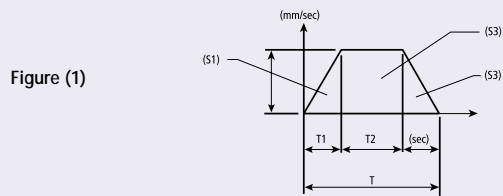


- X: Distance from the center of URS Actuator to center of gravity of the mass (MM)
- Z: Distance from the center of ball screw in URS actuator to the center of gravity of the mass (mm)
- kp: Equivalent coefficient of the moment at pitching direction (see Table 3)
- ky: Equivalent coefficient of the moment at yawing direction (See Table 3)
- kr: Equivalent coefficient of the moment at rolling direction (See Table 3)
- Mp: Load moment at pitching direction (Nmm)
- My: Load moment at yawing direction (Nmm)
- Mr: Load moment at rolling direction (Nmm)

Using the above factors to calculate average load, obtain the theoretical load carried by single carriage (P<sub>T</sub>).

**equation (5)**

$$P_T = \sqrt[3]{\frac{1}{(S1 + S2 + S3)} (P_{Ta}^3 \cdot S1 + P_{Tc}^3 \cdot S2 + P_{Td}^3 \cdot S3)}$$



- P<sub>T</sub>: Calculated load carried by single carriage (N)
- S1: Travel distance at acceleration motion (mm) (See Fig. 1)
- S2: Travel distance at uniform motion (mm) (See Fig. 1)
- S3: Travel Distance at decelerating motion (mm) (See Fig. 1)
- P<sub>Ta</sub>: Calculated load carried by single carriage at acceleration motion (N)—Equation (3)
- P<sub>Tc</sub>: Calculated load carried by single carriage at uniform motion (N)—Equation (2)
- P<sub>Td</sub>: Calculated load carried by single carriage at deceleration motion (N)—Equation (4)

**B. Life of the Ball Screw and Support Bearing Calculations** of life for Ball Screw and Support Bearing are performed by common equation as introduced hereunder. Compare the dynamic load rating of Ball Screw and that of Support Bearing and use the lesser value for life calculation.

**equation (6)**

$$L_a = \left( \frac{1}{f_W} \cdot \frac{Ca \text{ or } Cb}{P_a} \right)^3 \cdot \gamma$$

- L<sub>a</sub>: Life in travel distance (km)
- f<sub>W</sub>: Load coefficient (See Table 2)
- Ca: Basic Dynamic load rating of ball screw (N)
- Cb: Basic dynamic load rating of support bearing (N)
- P<sub>a</sub>: Load at axis direction (N)
- γ: Lead of Ball Screw (mm)

**B-1. Calculation of Pa**

To calculate life by using equation (6), perform calculation for Pa with acceleration in consideration. Calculate the load at axis direction for each case at uniform motion, acceleration motion, and deceleration motion. Then obtain the average load of Pa.

**i) At uniform motion (P<sub>ac</sub>)**

**equation (7)**

$$P_{ac} = \mu \cdot W + F + f_b \cdot n$$

**ii) At acceleration motion (P<sub>aa</sub>)**

**equation (8)**

$$P_{aa} = \mu \cdot W + F + f_b \cdot n + (m + m_b \cdot n) \alpha_a$$

**iii) At deceleration motion (P<sub>ad</sub>)**

**equation (9)**

$$P_{ad} = \mu \cdot W + F + f_b \cdot n - (m + m_b \cdot n) \alpha_d$$

- P<sub>ac</sub>: Basic load rating at axis direction at uniform motion (N)
- P<sub>aa</sub>: Basic load rating at axis direction at acceleration motion (N)
- P<sub>ad</sub>: Basic load rating at axis direction at deceleration motion (N)
- μ: Frictional coefficient (0.006)
- W: Load applied on block (N)
- F: External force (load) on axis direction (N)
- f<sub>b</sub>: Sliding resistance of single carriage (N) (See Table S-2)
- n: Number of carriage(s) on URS actuator
- m: Mass carried by the actuator (Kg)
- m<sub>b</sub>: Mass of the carriage of URS actuator (kg) (See "Moving Mass" specifications on page 4-5)
- α<sub>a</sub>: Acceleration (m/sec<sup>2</sup>)
- α<sub>d</sub>: Deceleration (m/sec<sup>2</sup>)

**Table 4 Sliding resistance of single carriage (f<sub>b</sub>)**

|       | (Rolling resistance + Seal resistance) Unit:N |                     |
|-------|---|---------------------|
|       | Commercial grade                              | Precision grade (P) |
| URS20 | 2.3   | 4.9                 |
| URS26 | 5.4   | 9.8                 |
| URS33 | 4.4   | 10.2                |
| URS46 | 7.4   | 13.3                |
| URS55 | 9.0   | 16.0                |

Hence, the average axis directional load (P) would be obtained.

**equation (10)**

$$P_a = \sqrt[3]{\frac{1}{(S1 + S2 + S3)} (P_{aa}^3 \cdot S1 + P_{ac}^3 \cdot S2 + P_{ad}^3 \cdot S3)}$$

- P<sub>a</sub>: Average axis directional load (N)
- S1: Travel distance at acceleration motion (mm) (See Fig. 1)
- S2: Travel distance at uniform motion (mm) (See Fig. 1)
- S3: Travel distance at deceleration motion (mm) (See Fig. 1)
- P<sub>aa</sub>: Axis direction load at acceleration motion (N) Equation (8)
- P<sub>ac</sub>: Axis direction load at uniform motion (N) - Equation (7)
- P<sub>ad</sub>: Axis directional load at deceleration motion (N) - Equation (9)

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## PART NUMBERING/ORDERING INFORMATION

| Base Unit | Ballscrew Lead | Carriage Type | Rail Length | Grade | Motor or Motor Flange | Cover Option | Sensor Option | Surface & Lube Options |
|-----------|----------------|---------------|-------------|-------|-----------------------|--------------|---------------|------------------------|
| URS20     | 01             | A             | 100         | P     | X17                   | H            | S             | GKRD                   |
| 1         | 2              | 3             | 4           | 5     | 6                     | 7            | 8             | 9                      |

### URS20 AVAILABLE CONFIGURATIONS

|       |          |        |                   |             |  |             |             |                      |
|-------|----------|--------|-------------------|-------------|--|-------------|-------------|----------------------|
| URS20 | 01<br>05 | A<br>B | 100<br>150<br>200 | (none)<br>P | X16<br>X17<br>T12<br>T12EM<br>T12EMK<br>BK11 | (none)<br>H | (none)<br>S | (none)<br>GK<br>GKRD |
|-------|----------|--------|-------------------|-------------|--|-------------|-------------|----------------------|

### URS26 AVAILABLE CONFIGURATIONS

|       |          |        |                          |             |  |             |             |                            |
|-------|----------|--------|--------------------------|-------------|--|-------------|-------------|----------------------------|
| URS26 | 02<br>05 | A<br>B | 150<br>200<br>250<br>300 | (none)<br>P | X16<br>X17<br>T12<br>T12EM<br>T12EMK<br>BK11 | (none)<br>H | (none)<br>S | (none)<br>GK<br>RD<br>GKRD |
|-------|----------|--------|--------------------------|-------------|--|-------------|-------------|----------------------------|

### URS33 AVAILABLE CONFIGURATIONS

|       |          |                  |  |             |   |             |             |                            |
|-------|----------|------------------|--|-------------|---|-------------|-------------|----------------------------|
| URS33 | 05<br>10 | A<br>B<br>C<br>D | 150<br>200<br>300<br>400<br>500<br>600 | (none)<br>P | X16<br>X17<br>X23<br>T12<br>T12EM<br>T12EMK<br>T22T<br>T22TEM<br>T22TEMK<br>T22V<br>T22VEM<br>T22VEMK<br>BK11<br>BK22<br>BK22B<br>BK22S<br>BK22SB | (none)<br>H | (none)<br>S | (none)<br>GK<br>RD<br>GKRD |
|-------|----------|------------------|--|-------------|---|-------------|-------------|----------------------------|

### URS46 AVAILABLE CONFIGURATIONS

|       |          |                  |   |             |   |             |             |                            |
|-------|----------|------------------|---|-------------|---|-------------|-------------|----------------------------|
| URS46 | 10<br>20 | A<br>B<br>C<br>D | 340<br>440<br>540<br>640<br>740<br>840<br>940 | (none)<br>P | X23<br>T22T<br>T22TEM<br>T22TEMK<br>T22V<br>T22VEM<br>T22VEMK<br>BK22<br>BK22B<br>BK22S<br>BK22SB | (none)<br>H | (none)<br>S | (none)<br>GK<br>RD<br>GKRD |
|-------|----------|------------------|---|-------------|---|-------------|-------------|----------------------------|

### URS55 AVAILABLE CONFIGURATIONS

|       |    |        |                                     |             |   |             |             |                            |
|-------|----|--------|-------------------------------------|-------------|---|-------------|-------------|----------------------------|
| URS55 | 20 | A<br>B | 980<br>1080<br>1180<br>1280<br>1380 | (none)<br>P | X23<br>X34<br>T22T<br>T22TEM<br>T22TEMK<br>T22V<br>T22VEM<br>T22VEMK<br>T32T<br>T32TEM<br>T32TEMK<br>T32V<br>T32VEM<br>T32VEMK<br>BK22<br>BK22B<br>BK22S<br>BK22SB<br>BK32<br>BK32B | (none)<br>H | (none)<br>S | (none)<br>GK<br>RD<br>GKRD |
|-------|----|--------|-------------------------------------|-------------|---|-------------|-------------|----------------------------|

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# CONFIGURATION GUIDE

| 1. Base Unit |  |
|--------------|--|
| URS20        | Base rail profile = 20mm tall x 40mm wide  |
| URS26        | Base rail profile = 26mm tall x 50mm wide  |
| URS33        | Base rail profile = 33mm tall x 60mm wide  |
| URS46        | Base rail profile = 46mm tall x 86mm wide  |
| URS55        | Base rail profile = 55mm tall x 100mm wide |

| 2. Ballscrew Lead |                     |
|-------------------|---------------------|
| 01                | 1mm lead ballscrew  |
| 02                | 2mm lead ballscrew  |
| 05                | 5mm lead ballscrew  |
| 10                | 10mm lead ballscrew |
| 20                | 20mm lead ballscrew |

| 3. Carriage Type |                                 |
|------------------|---------------------------------|
| A                | Single long (standard) carriage |
| B                | Dual long (standard) carriages  |
| C                | Single short carriage           |
| D                | Dual short carriages            |

| 4. Rail Length  |  |
|-----------------|--|
| Specified in mm | Refer to Specifications for allowable travel |

| 5. Grade |                  |
|----------|------------------|
| (none)   | Commercial grade |
| P        | Precision grade  |

| 6. Motor or Motor Flange |   |
|--------------------------|---|
| X16                      | Motor flange for 16 Frame motor                                   |
| X17                      | Motor flange for 17 Frame motor                                   |
| X23                      | Motor flange for 23 Frame motor                                   |
| X34                      | Motor flange for 34 Frame motor                                   |
| T12                      | Stepper motor, 17 Frame   |
| T12EM                    | Stepper motor, 17 Frame with 500 line encoder                     |
| T12EMK                   | Stepper motor, 17 Frame with 1000 line encoder                    |
| T22T                     | Stepper motor, 23 Frame wired in series                           |
| T22TEM                   | Stepper motor, 23 Frame wired in series, with 500 line encoder    |
| T22TEMK                  | Stepper motor, 23 Frame wired in series, with 1000 line encoder   |
| T22V                     | Stepper motor, 23 Frame wired in parallel                         |
| T22VEM                   | Stepper motor, 23 Frame wired in parallel, with 500 line encoder  |
| T22VEMK                  | Stepper motor, 23 Frame wired in parallel, with 1000 line encoder |
| T32T                     | Stepper motor, 34 Frame wired in series                           |
| T32TEM                   | Stepper motor, 34 Frame wired in series, with 500 line encoder    |
| T32TEMK                  | Stepper motor, 34 Frame wired in series, with 1000 line encoder   |
| T32V                     | Stepper motor, 34 Frame wired in parallel                         |
| T32VEM                   | Stepper motor, 34 Frame wired in parallel, with 500 line encoder  |
| T32VEMK                  | Stepper motor, 34 Frame wired in parallel, with 1000 line encoder |
| BK11                     | Brushless servo motor, 16 Frame with encoder                      |
| BK22                     | Brushless servo motor, 23 Frame with encoder                      |
| BK22B                    | Brushless servo motor, 23 Frame with encoder & brake              |
| BK22S                    | Brushless servo motor, 23 Frame with SFD feedback                 |
| BK22SB                   | Brushless servo motor, 23 Frame with SFD feedback and brake       |
| BK32                     | Brushless servo motor, 34 Frame with encoder                      |
| BK32B                    | Brushless servo motor, 34 Frame with encoder & brake              |

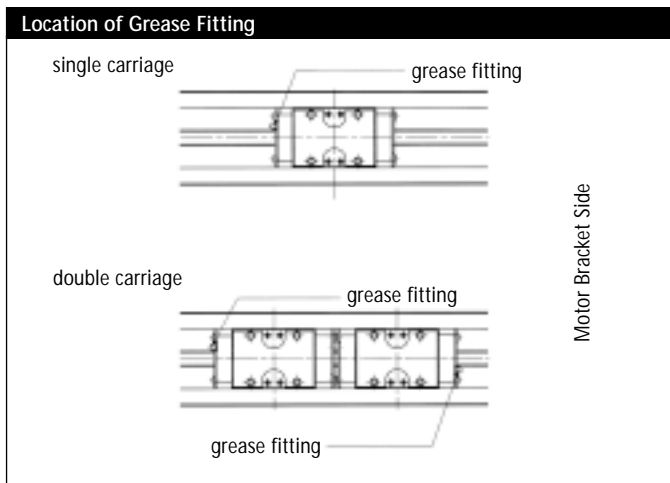
| 7. Cover Option |  |
|-----------------|--|
| (none)          | No cover provided                        |
| H               | Hard cover with auxiliary carriage plate |

| 8. Sensor Option |  |
|------------------|--|
| (none)           | No cover provided                        |
| S                | Set of 3 adjustable limit / home sensors |

| 9. Surface Treatment & Lube Options |   |
|-------------------------------------|---|
| (none)                              | No additional options provided          |
| GK                                  | Cleanroom (low-particulate) lubrication |
| RD                                  | Raydent treatment of rail surfaces      |
| GKRD                                | GK & RD options (described above)       |

## LUBRICATION AND OPERATING TEMPERATURE

- The URS contains a lithium-soap based grease. Apply similar grade of grease for lubrication as required depending on your terms of operation.
- Use grease fitting to lubricate the guide block. For ball screw apply grease directly to surface of screw shaft.
- Unless otherwise instructed, a grease fitting is located as shown.
- The recommended ambient working temperature is 80°C or lower. For configurations with the limit sensor option, the maximum recommended working temperature is 55°C.



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