

NA Series User's Manual

Electric linear actuators



Disclaimer

Zaber's products are not intended for use in any critical medical, aviation, or military applications or situations where a product's use or failure could cause personal injury, death, or damage to property. Zaber disclaims any warranty of fitness for a particular purpose. The user of this product agrees to [Zaber's general terms and conditions of sale](#).

Precautions

Zaber's autodetect peripheral axes are designed to be used effortlessly with Zaber's line of autodetect controllers. The NA includes onboard memory that allows Zaber's controllers to autodetect the model and set reasonable parameters. See the [Protocol Manual](#) for more information on how to modify the settings. Damage to the axis may result if the settings are not correct. To use your Zaber peripheral with a third-party controller, review the motor, sensor, and encoder specifications and pin-outs carefully.

Zaber's motion control devices are precision instruments and must be handled with care. In particular, moving parts must be treated with care. Avoid axial loads in excess of the rated thrust load, axial and radial impact, dust and other contaminants and damage to the lead screw thread. These will reduce the performance of the device below stated specifications.

Conventions used throughout this document

- Fixed width type indicates communication to and from a device. The \backslash symbol indicates a carriage return, which can be achieved by pressing enter when using a terminal program.
- An [ASCII command](#) followed by (T:xx) indicates a legacy T-Series [Binary Protocol](#) command that achieves the same result. For example, `move abs 10000 (T:20:10000)` shows that a move abs ASCII command can also be achieved with Binary command number 20.

Not all ASCII commands have an equivalent Binary counterpart.

Device Overview

AutoDetect

Your NA peripheral is equipped with AutoDetect, a feature that allows a Zaber controller to automatically configure its settings for the peripheral when it is connected.

 **Important:** The controller should always be powered down before disconnecting or connecting your NA peripheral.

To connect the peripheral to a controller:

- Power off the controller.
- Connect the NA peripheral.
- Power on the controller.
- The controller will activate the peripheral shortly after it is powered on.

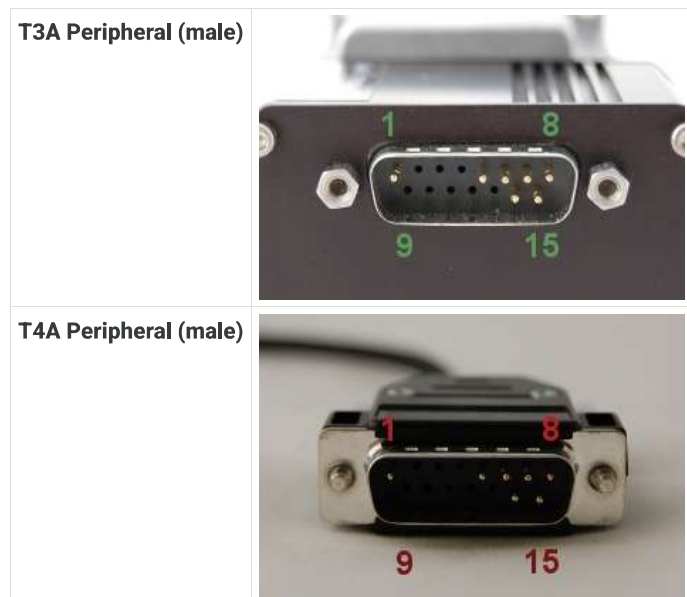
See the Zaber controller user manual for more details on peripheral activation and control.

Connectors

Recommended controller(s) for your NA peripheral are provided in the product specifications. Zaber's controllers and peripherals are designed for ease of use when used together. Optimal settings for each peripheral are automatically detected by Zaber's controllers when the device is connected.

For reference, the pinout for the peripheral cable connectors is shown below:

Pinout for D-sub 15 Connectors (peripherals)



Pin #	Function
1	+5V for Limits & Encoder
2	AutoDetect Data
3	N.C.
4	Away Sensor
5	Home Sensor
6	Ground
7	Motor B1
8	Motor A1
9	AutoDetect Clock
10	Encoder A
11	Encoder B
12	Encoder Index
13	Ground
14	Motor B2
15	Motor A2

Not all pins are used for all models

Alternate Controllers

The NA can be controlled by any 2-phase stepper motor controller with limit sensor input. **We do not recommend using your own controller unless you are familiar with how to control a stepper motor with hall sensor limit switches.** Damage to the device due to incorrect wiring is not covered by warranty.

Motors

For motor information see the [NA product page](#)

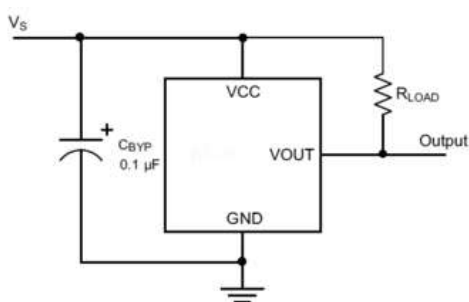
Limit Sensors

Hall effect sensors are used in the NA as home sensors. The Hall sensors used are part number A1120LLHLT-T made by Allegro. [Click here for data sheet](#). Your controller should be configured so the stage stops immediately (quick deceleration) when the sensors are triggered.

- PCB wire colour code:
 - 5 Vdc input - red

- Home signal - yellow
- Away signal - white
- Ground - black

The Hall sensor has an open-collector output. The default output is high impedance when the Hall sensor is not active. When the sensor detects a magnet, the Hall sensor pulls the output low to ground.



If you are not using a Zaber controller, ensure that your controller has a pull-up resistor on the output line of each Hall sensor as shown in the diagram. The bypass capacitor is optional, but may help to eliminate false triggering in noisy environments. The typical value for the pull-up resistor (R_{LOAD}) is 10 k Ω and for the bypass capacitor is 0.1 μ F to 1 μ F. The larger the capacitance, the better the noise filtering but the slower the response time.

Installation

You can mount the NA actuators by the cylindrical mounting shank or by the four mounting holes on the square body section. See the [NA web page](#) for dimensions, resolution and other details.

Trajectory Control and Behaviour

This section describes the behaviour of the axis trajectory when a movement command is issued.

Software Position Limits

The travel range of the axis is limited by the Minimum Position and Maximum Position settings. The factory settings for the axis are configured to match the physical travel range. If a customized range is desired, it can be changed by configuring the [limit.min \(T:106\)](#) and [limit.max \(T:44\)](#) settings to appropriate values. For the Current Position, query [pos \(T:60\)](#).

Minimum Position

When the Current Position is less than the Minimum Position value, the axis cannot move in the negative direction (towards the motor).

Maximum Position

When the Current Position is greater than the Maximum Position value, the axis cannot move in the positive direction (away from the motor).

Movement Speed

The movement speed of the axis depends on axis status and various speed settings. If the axis has not been initialized by the [home \(T:1\)](#) command or by moving towards the home end of the axis, movement speed will be constrained to fail-safe values. The home status of the axis can be determined by reading the [limit.home.triggered \(T:53:103\)](#) setting.

Movement speed of the axis is specified below:

[move vel \(T:22\)](#)

The axis will move at the specified speed regardless of home status.

Knob movement in Velocity Mode

The axis will move at the specified speed regardless of home status.

The speed is specified by the [knob.speedprofile \(T:112\)](#) and [knob.maxspeed \(T:111\)](#) settings.

Other movement commands - when the axis has not been homed

The axis will move at the slower of the [maxspeed \(T:42\)](#) and [limit.approach.maxspeed \(T:41\)](#) settings.

Other movement commands - when the axis has been homed

The axis will move at the speed specified by the [maxspeed \(T:42\)](#) setting.

Warranty and Repair

For Zaber's policies on warranty and repair, please refer to the [Ordering Policies](#).

Standard products

Standard products are any part numbers that do not contain the suffix ENG followed by a 4 digit number. Most, but not all, standard products are listed for sale on our website. All standard Zaber products are backed by a one-month satisfaction guarantee. If you are not satisfied with your purchase, we will refund your payment minus any shipping charges. Goods must be in brand new saleable condition with no marks. Zaber products are guaranteed for one year. During this period Zaber will repair any products with faults due to manufacturing defects, free of charge.

Custom products

Custom products are any part numbers containing the suffix ENG followed by a 4 digit number. Each of these products has been designed for a custom application for a particular customer. Custom products are guaranteed for one year, unless explicitly stated otherwise. During this period Zaber will repair any products with faults due to manufacturing defects, free of charge.

How to return products

Customers with devices in need of return or repair should contact Zaber to obtain an RMA form which must be filled out and sent back to us to receive an RMA number. The RMA form contains instructions for packing and returning the device. The specified RMA number must be included on the shipment to ensure timely processing.

Email Updates

If you would like to receive our periodic email newsletter including product updates and promotions.

Contact Information

Contact Zaber Technologies Inc by any of the following methods:

Phone	1-604-569-3780 (direct) 1-888-276-8033 (toll free in North America)
Fax	1-604-648-8033
Mail	#2 - 605 West Kent Ave. N., Vancouver, British Columbia, Canada, V6P 6T7
Web	www.zaber.com
Email	Please visit our website for up to date email contact information.

The original instructions for this product are available at <https://www.zaber.com/manuals/NA>.

Appendix A: Default Settings

Please see [the Zaber Support Page](#) for default settings for this device.

Product Drawing

[Drawing for the NA](#)

Specifications

Specification	Value	Alternate Unit
Built-in Controller	No	
Recommended Controller	MCC (48 V) Recommended	
AutoDetect	Yes	
Encoder Type	None	
Motor Temperature Rise	75 °C	
Motor Steps Per Rev	200	
Motor Type	Stepper (2 phase)	
Motor Connection	D-sub 15	
Default Resolution	1/64 of a step	
Mechanical Drive System	Precision lead screw	
Limit or Home Sensing	Magnetic home sensor	
Axes of Motion	1	
CE Compliant	Yes	

Specification	Value	Alternate Unit
Vacuum Compatible	No	

Comparison

Part Number	Microstep Size (Default Resolution)	Travel Range	Accuracy (unidirectional)	Repeatability
NA08A16-T4A	0.047625 µm	16 mm (0.630")	20 µm (0.000787")	< 5 µm (< 0.000197")
NA11B30-T4A	0.09921875 µm	30 mm (1.181")	25 µm (0.000984")	< 5 µm (< 0.000197")
NA14B60-T4A	0.09525 µm	60 mm (2.362")	36 µm (0.001417")	< 5 µm (< 0.000197")
NA23C60-T4A	0.1984375 µm	60 mm (2.362")	36 µm (0.001417")	< 5 µm (< 0.000197")
NA34C60-T4A	0.1984375 µm	60 mm (2.362")	45 µm (0.001772")	< 10 µm (< 0.000394")

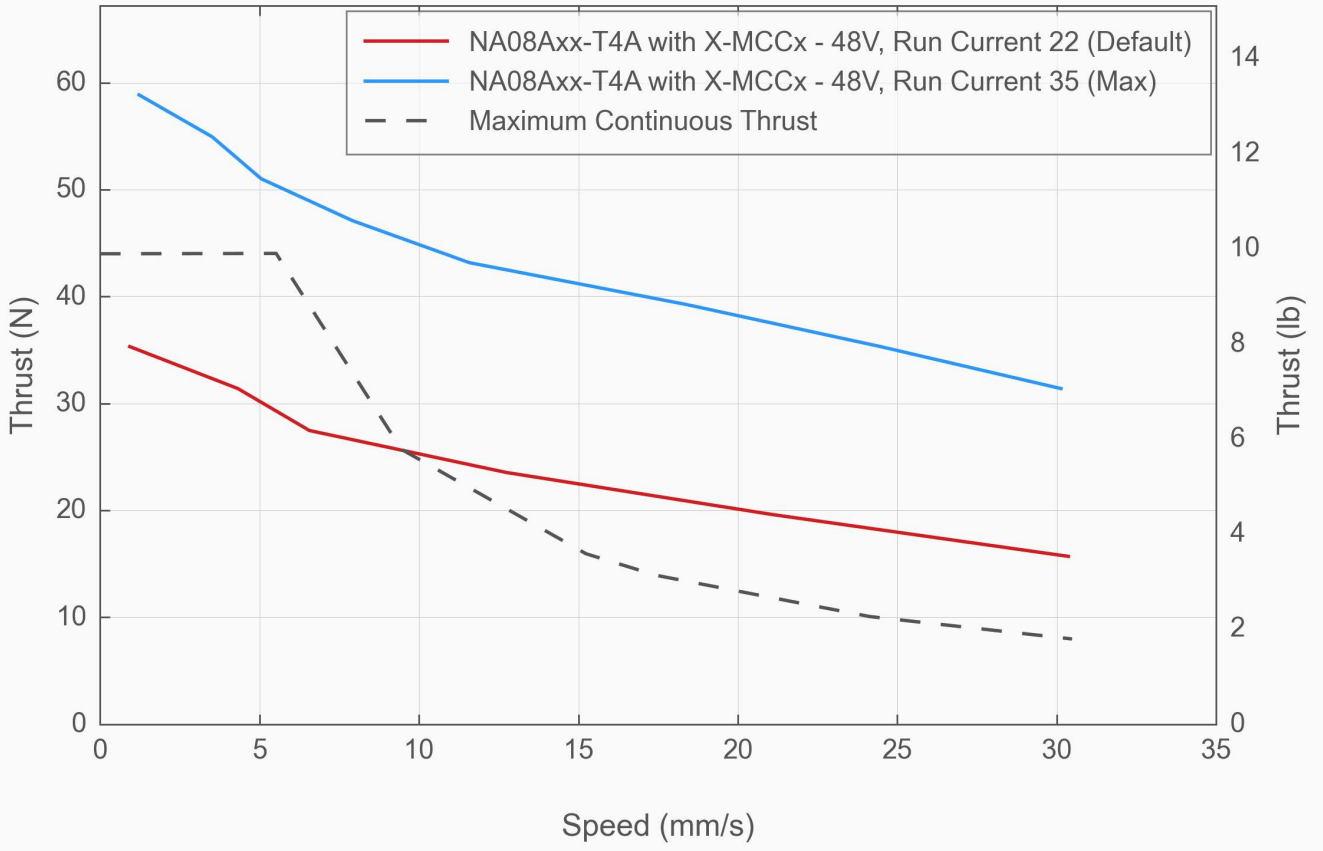
Part Number	Backlash	Maximum Speed	Minimum Speed	Speed Resolution
NA08A16-T4A	< 15 µm (< 0.000591")	30 mm/s (1.181"/s)	0.000029 mm/s (0.000001"/s)	0.000029 mm/s (0.000001"/s)
NA11B30-T4A	< 18 µm (< 0.000709")	63 mm/s (2.480"/s)	0.000061 mm/s (0.000002"/s)	0.000061 mm/s (0.000002"/s)
NA14B60-T4A	< 20 µm (< 0.000787")	60 mm/s (2.362"/s)	0.000058 mm/s (0.000002"/s)	0.000058 mm/s (0.000002"/s)
NA23C60-T4A	< 30 µm (< 0.001181")	80 mm/s (3.150"/s)	0.000121 mm/s (0.000005"/s)	0.000121 mm/s (0.000005"/s)
NA34C60-T4A	< 65 µm (< 0.002559")	55 mm/s (2.165"/s)	0.000121 mm/s (0.000005"/s)	0.000121 mm/s (0.000005"/s)

Part Number	Peak Thrust	Maximum Continuous Thrust	Linear Motion Per Motor Rev	Motor Rated Current
NA08A16-T4A	44 N (9.9 lb)	19 N (4.3 lb)	0.6096 mm (0.024")	490 mA/phase
NA11B30-T4A	85 N (19.1 lb)	58 N (13.0 lb)	1.27 mm (0.050")	1000 mA/phase
NA14B60-T4A	225 N (50.5 lb)	225 N (50.5 lb)	1.2192 mm (0.048")	570 mA/phase
NA23C60-T4A	700 N (157.0 lb)	700 N (157.0 lb)	2.54 mm (0.100")	1300 mA/phase
NA34C60-T4A	1300 N (291.5 lb)	1300 N (291.5 lb)	2.54 mm (0.100")	3120 mA/phase

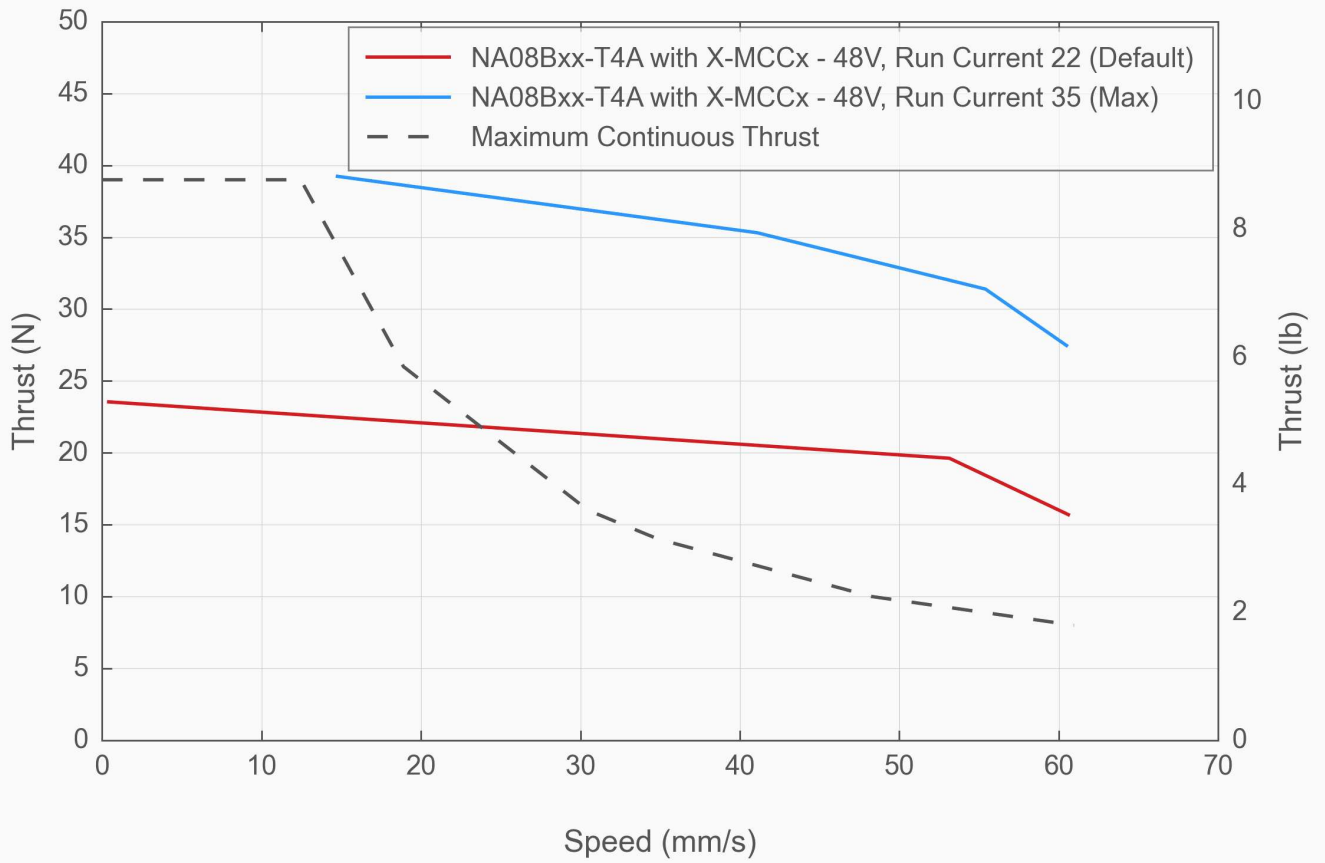
Part Number	Motor Winding Resistance	Inductance	Motor Rated Power	Motor Frame Size
NA08A16-T4A	5.1 ohms/phase	1.5 mH/phase	2.45 Watts	08
NA11B30-T4A	2.1 ohms/phase	1.5 mH/phase	4.2 Watts	11
NA14B60-T4A	8.8 ohms/phase	13 mH/phase	5.7 Watts	14
NA23C60-T4A	3.85 ohms/phase	10.5 mH/phase	13 Watts	23
NA34C60-T4A	1.6 ohms/phase	8.8 mH/phase	31.2 Watts	34

Part Number	Mounting Interface	Weight
NA08A16-T4A	4 M2 tapped holes 15.4 mm apart or 9 mm dia smooth shank	0.07 kg (0.154 lb)
NA11B30-T4A	4 M2.5 tapped holes 23 mm apart or 14 mm smooth shank	0.16 kg (0.353 lb)
NA14B60-T4A	4 M3 tapped holes 26 mm apart or 15 mm smooth shank	0.23 kg (0.507 lb)
NA23C60-T4A	5.2 mm holes	0.75 kg (1.653 lb)
NA34C60-T4A	6.5 mm hole	2.64 kg (5.820 lb)

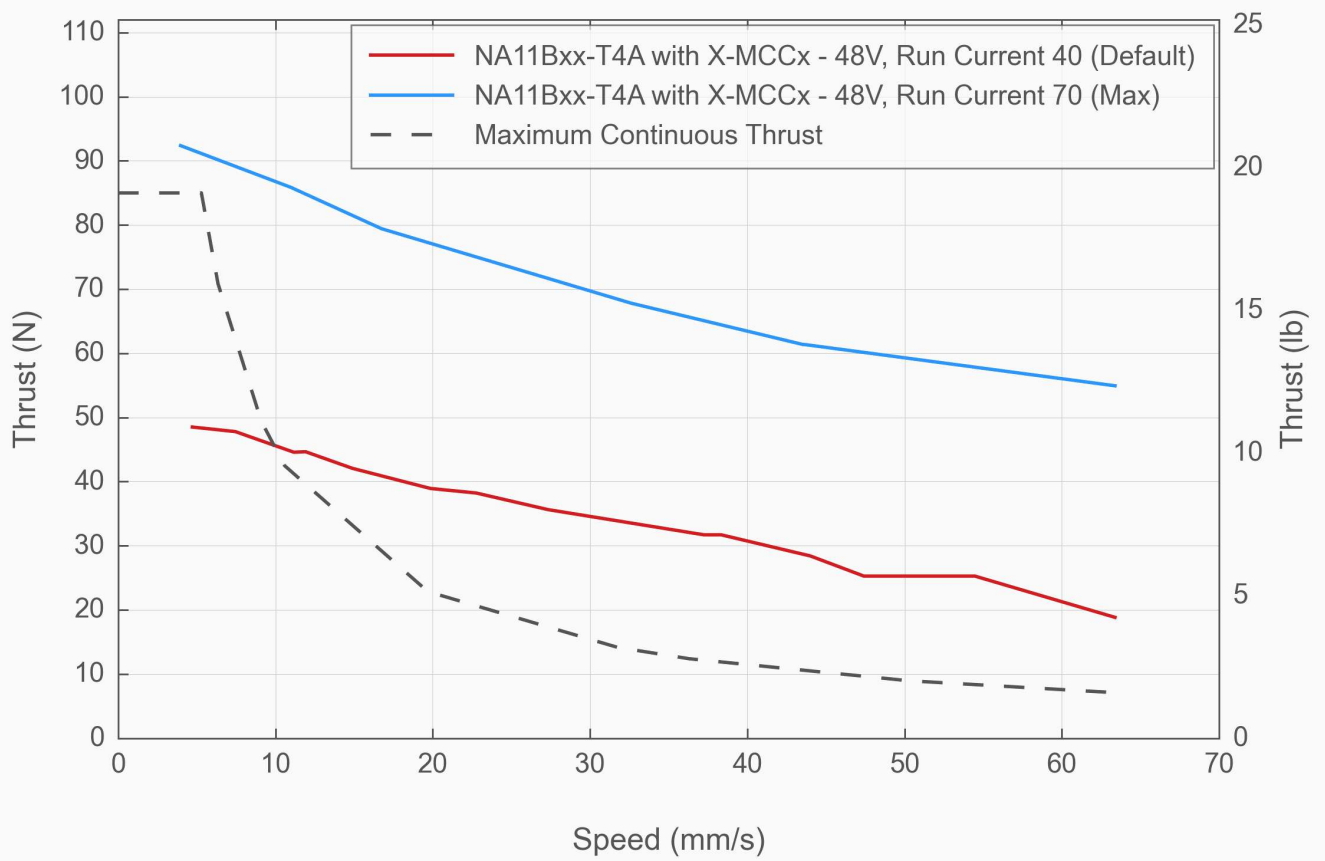
Thrust Speed Performance



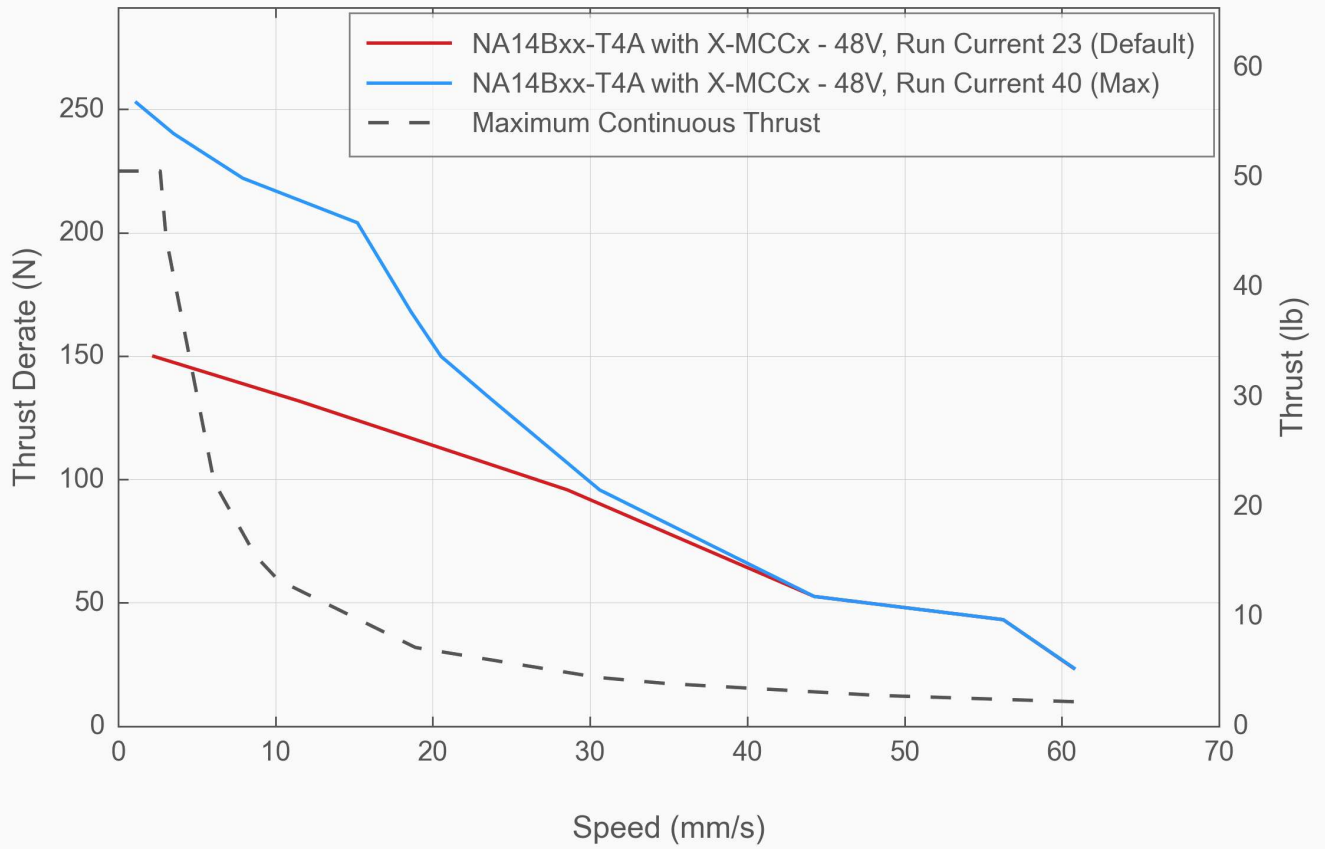
Thrust Speed Performance



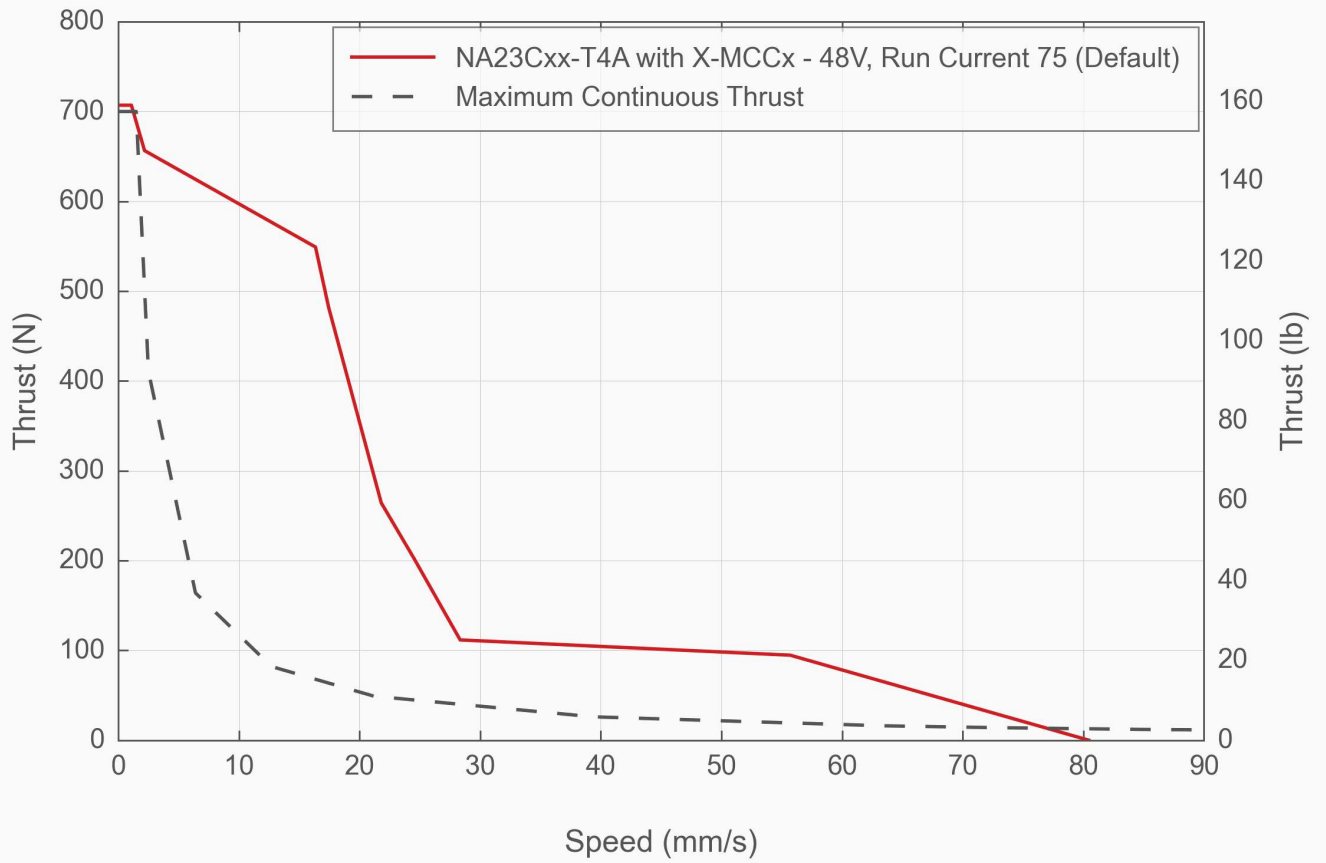
Thrust Speed Performance



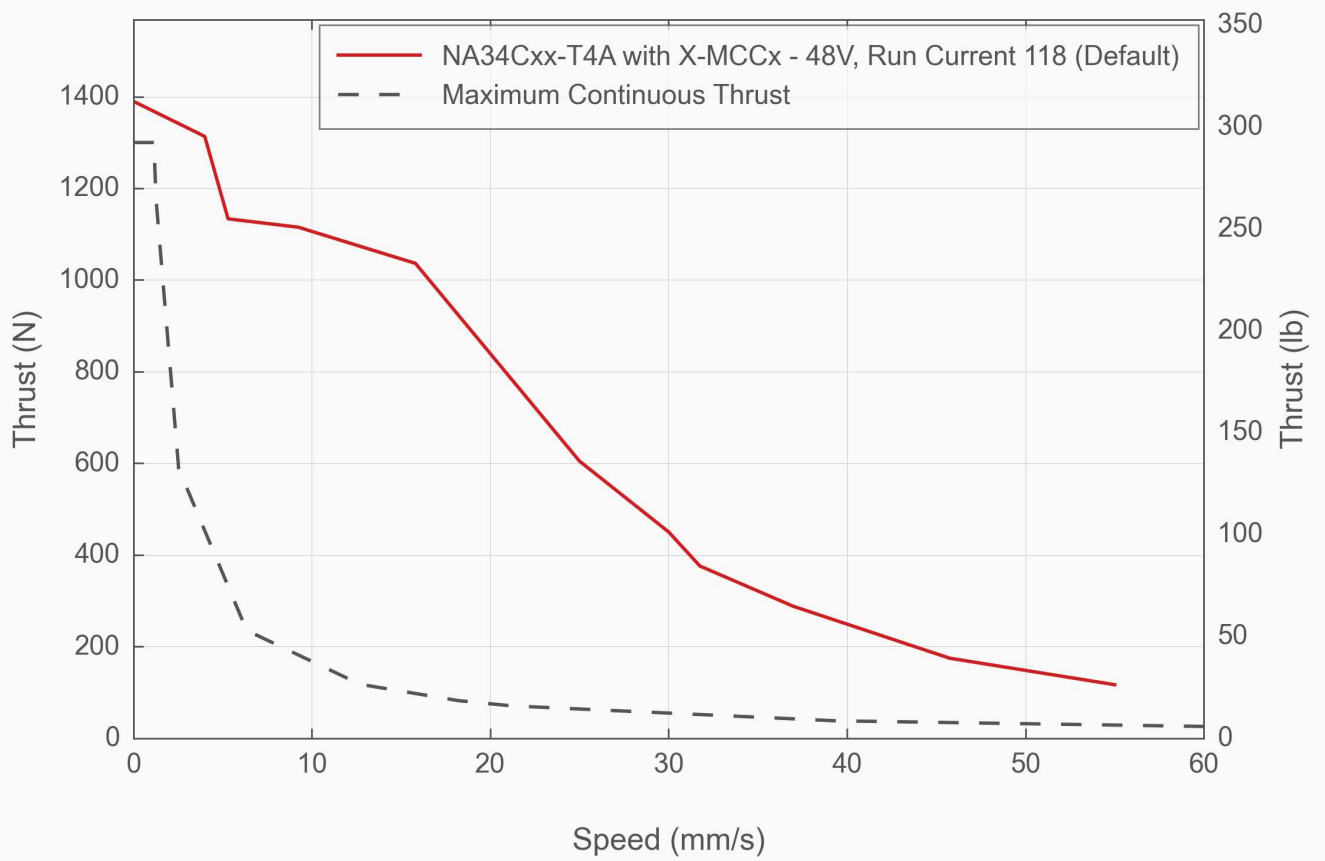
Thrust Speed Performance



Thrust Speed Performance



Thrust Speed Performance



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