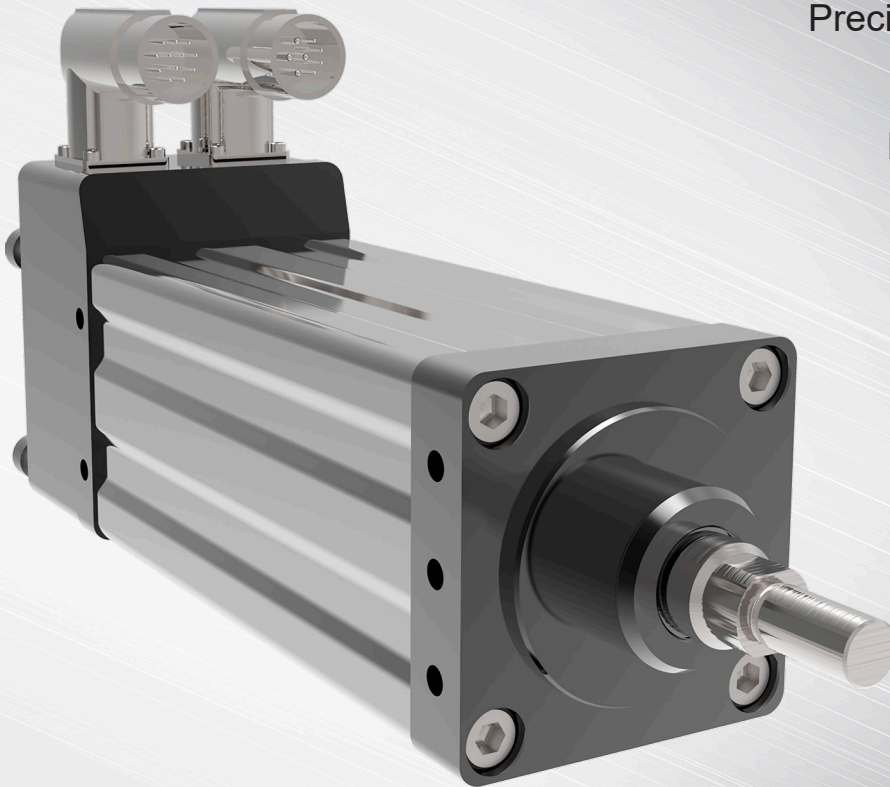


GTX Series

INTEGRATED SERVO MOTOR AND ACTUATOR



Ideal hydraulic replacement

Precise and programmable

Rugged and reliable

Powerful and compact

GTX Series

Description

For applications that require long life and continuous duty, even in harsh environments, the GTX Series actuator offers a robust solution. The life of these actuators can exceed that of a ball screw actuator by 15 times, all while delivering high speeds and high forces.

Operating Conditions and Usage		
Accuracy:		
Screw Lead Error	µm / 300 mm	25
	in/ft	0.001
Screw Travel Variation	µm / 300 mm	30
	in/ft	0.0012
Standard Ambient Temperature	°C	0 to 65
	°F	32 to 149
Friction Torque (typical)	Frame Size (Nm)	080 (0.23) 100 (0.34)
IP Rating		IP65S

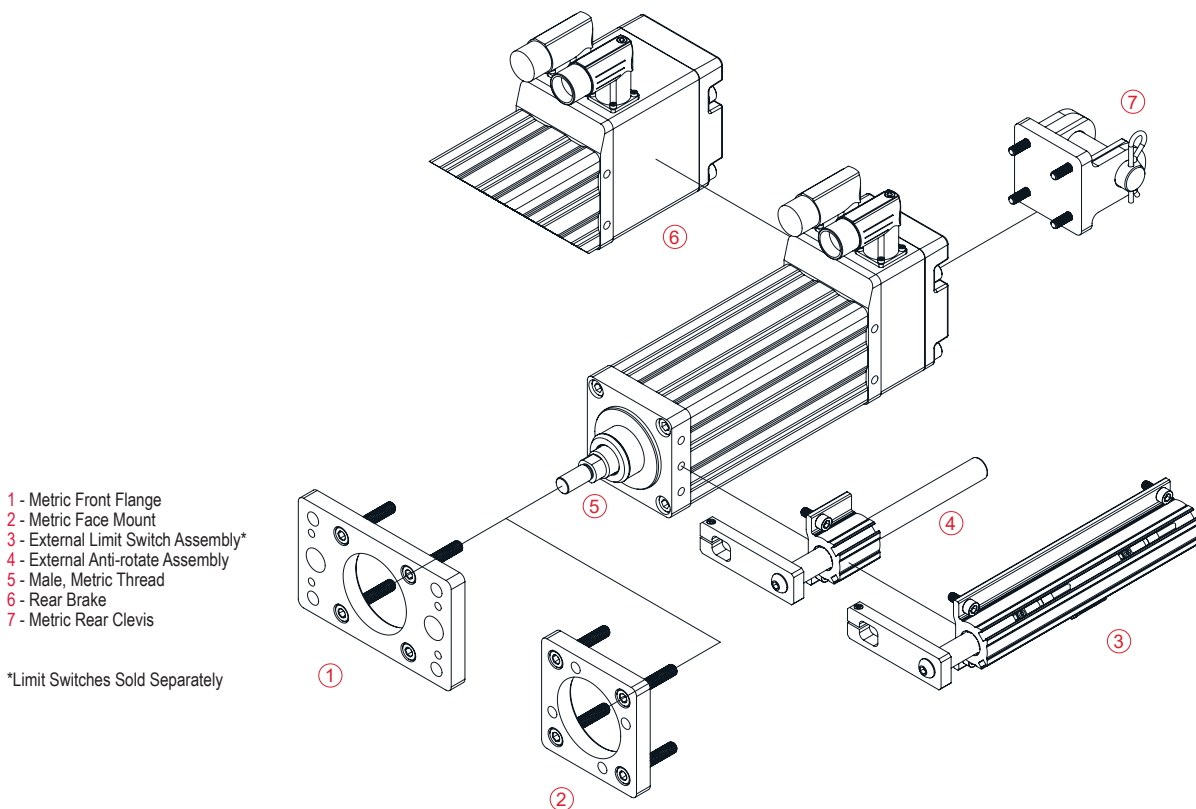
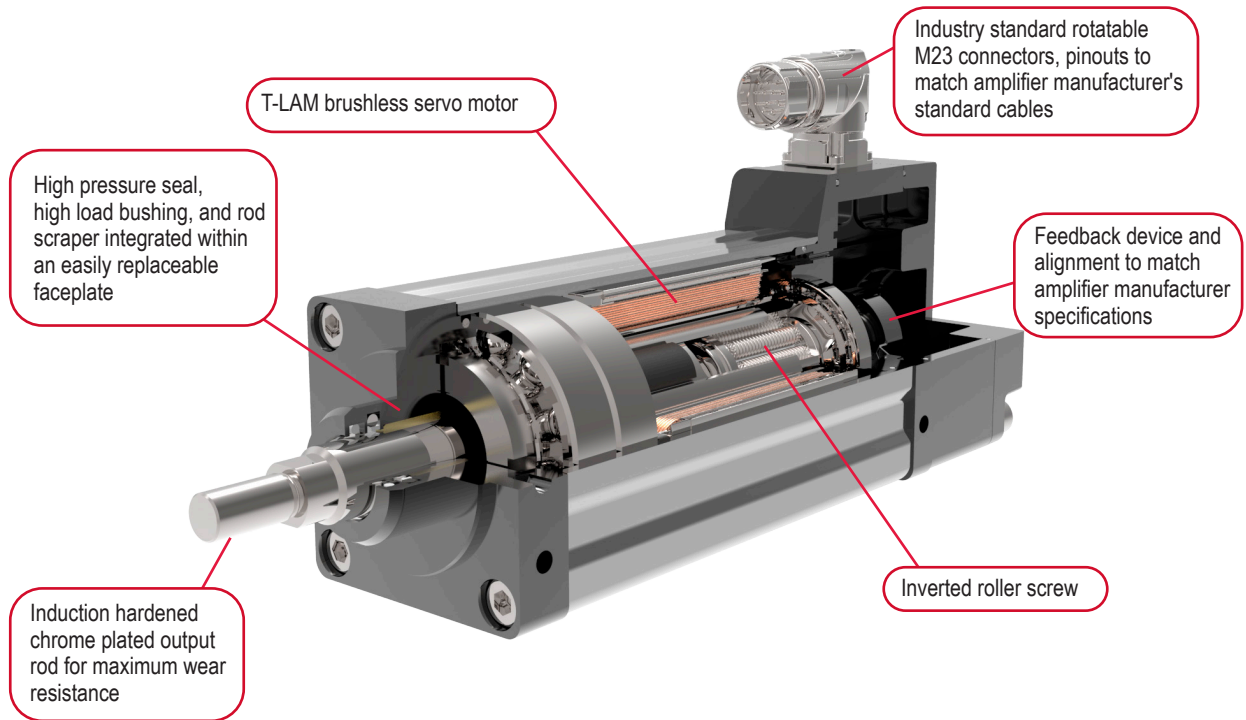
Sealed for Long Life with Minimum Maintenance

GTX Series actuators have strong advantages wherever outside contaminants are an issue. In most rotary-to-linear devices, critical mechanisms are exposed to the environment. Thus, these actuators must be frequently inspected, cleaned and lubricated.

In contrast, the converting components in all Exlar GTX units are mounted within sealed motor housing. With a simple bushing and seal on the smooth extending rod, abrasive particles or other contaminants are prevented from reaching the actuator's critical mechanisms. This assures trouble-free operation even in the most harsh environments.

Agency Standards & Approvals		
UL		UL 1004-1
		UL 1004-6
CSA		CSA C22.2 NO. 100
CE	EMC	EN 55014-1
		EN 55014-2
	Safety	IEC/EN 60034-1
	RoHS	RoHS 2011/65/EU and amended with directive 2015/863

Product Features



Mechanical Specifications

GTX080

	Stroke Length mm (in)	Screw Lead mm (in)	Continuous Force Rating N (lbf)		Max Velocity mm/s (in/s)		Dynamic Load Rating N (lbf)	Armature Inertia kg-m ² (in-lb-s ²)	
			4 (VAC)	D (VDC)	4 (VAC)	D (VDC)			
GTX080-100-01	100 (3.9)	2.54 (0.1)	8,365 (1,881)	7,101 (1,596)	254 (10.0)	102 (4.0)	24,535 (5,516)	0.000340 (0.003013)	
GTX080-100-02		5.08 (0.2)	4,740 (1,066)	4,024 (905)	508 (20.0)	203 (8.0)			25,798 (5,800)
GTX080-100-05		12.7 (0.5)	2,008 (451)	1,704 (383)	1,270 (50.0)	508 (20.0)			21,795 (4,900)
GTX080-150-01	150 (5.9)	2.54 (0.1)	8,365 (1,881)	7,101 (1,596)	254 (10.0)	102 (4.0)	24,535 (5,516)	0.000369 (0.003267)	
GTX080-150-02		5.08 (0.2)	4,740 (1,066)	4,024 (905)	508 (20.0)	203 (8.0)			25,798 (5,800)
GTX080-150-05		12.7 (0.5)	2,008 (451)	1,704 (383)	1,270 (50.0)	508 (20.0)			21,795 (4,900)
GTX080-300-01	300 (11.8)	2.54 (0.1)	8,365 (1,881)	7,101 (1,596)	254 (10.0)	102 (4.0)	24,535 (5,516)	0.000455 (0.004029)	
GTX080-300-02		5.08 (0.2)	4,740 (1,066)	4,024 (905)	508 (20.0)	203 (8.0)			25,798 (5,800)
GTX080-300-05		12.7 (0.5)	2,008 (451)	1,704 (383)	1,270 (50.0)	508 (20.0)			21,795 (4,900)
GTX080-450-01	450 (17.7)	2.54 (0.1)	8,365 (1,881)	7,101 (1,596)	254 (10.0)	102 (4.0)	24,535 (5,516)	0.000541 (0.004790)	
GTX080-450-02		5.08 (0.2)	4,740 (1,066)	4,024 (905)	508 (20.0)	203 (8.0)			25,798 (5,800)
GTX080-450-05		12.7 (0.5)	2,008 (451)	1,704 (383)	1,270 (50.0)	508 (20.0)			21,795 (4,900)

Maximum velocities listed at maximum voltages

Do not exceed 2X the continuous force rating during operation
Continuous force rating based upon 25° C ambient conditions

GTX100

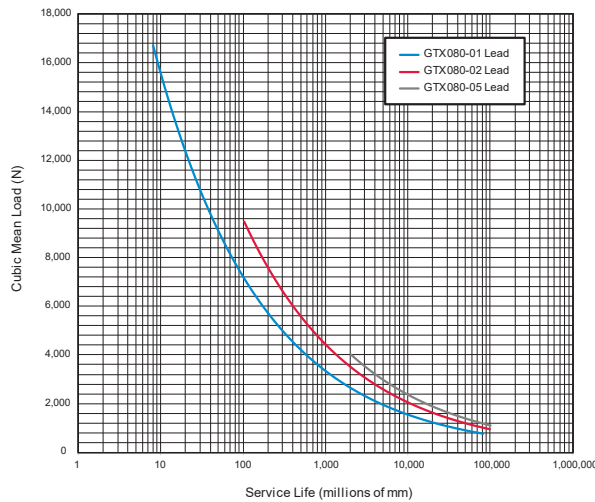
	Stroke Length mm (in)	Screw Lead mm (in)	Continuous Force Rating N (lbf)	Max Velocity mm/s (in/s)	Dynamic Load Rating N (lbf)	Armature Inertia kg-m ² (in-lb-s ²)	
			4 (VAC)	4 (VAC)			
GTX100-150-01	150 (5.9)	2.54 (0.1)	15,392 (3,460)	191 (7.5)	54,557 (12,266)	0.0014085 (0.012467)	
GTX100-150-02		5.08 (0.2)	12,098 (2,720)	381 (15.0)			55,972 (12,584)
GTX100-150-05		12.7 (0.5)	5,444 (1,224)	953 (37.5)			37,141 (8,350)
GTX100-300-01	300 (11.8)	2.54 (0.1)	15,392 (3,460)	191 (7.5)	54,557 (12,266)	0.0017399 (0.015399)	
GTX100-300-02		5.08 (0.2)	12,098 (2,720)	381 (15.0)			55,972 (12,584)
GTX100-300-05		12.7 (0.5)	5,444 (1,224)	953 (37.5)			37,141 (8,350)

Maximum velocities listed at maximum voltages

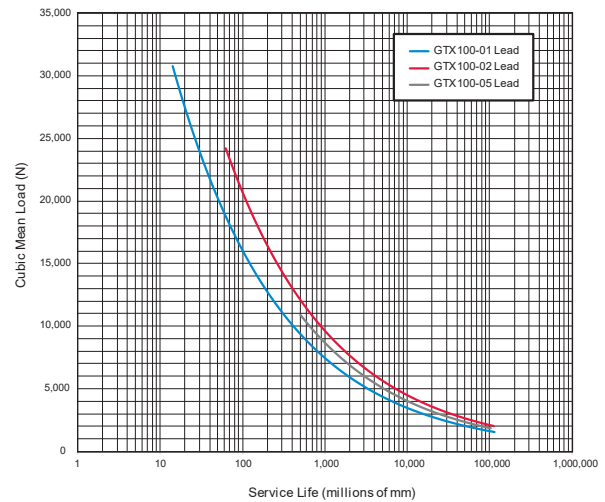
Do not exceed 2X the continuous force rating during operation
Continuous force rating based upon 25° C ambient conditions

Estimated Service Life

GTX080



GTX100



Service Life Estimate Assumptions:

- Sufficient quality and quantity of lubrication is maintained throughout service life.
- No mechanical hard stops (external or internal) or impact loads
- No external side loads
- Does not apply to short stroke, high frequency applications such as fatigue testing or short stroke, high force

applications such as pressing. If your application requires high force over a stroke length shorter than the length of the rollers/nut, please contact Exlar for additional details on calculating estimated service life. You may also download the article “Calculating Life Expectancy” at www.exlar.com.

The L_{10} expected life of a roller screw linear actuator is expressed as the linear travel distance that 90% of properly maintained roller screws manufactured are expected to meet or exceed. This is not a guarantee and these charts should be used for estimation purposes only.

The underlying formula that defines this value is:
Travel life in millions of inches, where:

$$L_{10} = \left(\frac{C_a}{F_{cml}} \right)^3 \times \ell$$

C_a = Dynamic load rating (lbf)
 F_{cml} = Cubic mean applied load (lbf)
 ℓ = Roller screw lead (inches)

For additional details on calculating estimated service life, please refer www.exlar.com.

Electrical Specifications

GTX080

Motor Voltage		4 (AC)	D (DC)
Max Bus Voltage	V	460 Vrms	48 VDC
Speed @ Bus Voltage	RPM	6000	2400
RMS Sinusoidal Commutation			
Continuous Motor Torque	Nm	4.51	3.83
	lbf-in	39.9	33.9
Continuous Current Rating	A	4.9	24.2
Peak Current Rating	A	9.9	48.5
Torque Constant (Kt) (+/- 10% @ 25°C)	Nm/A	1.02	0.18
	lbf-in/A	9.0	1.6
Voltage Constant (Ke) (+/- 10% @ 25°C)	V/kRPM	61.6	10.7
0 - Peak Sinusoidal Commutation			
Continuous Motor Torque	Nm	4.51	3.83
	lbf-in	39.9	33.9
Continuous Current Rating	A	6.6	34.6
Peak Current Rating	A	13.3	69.2
Torque Constant (Kt) (+/- 10% @ 25°C)	Nm/A	0.72	0.13
	lbf-in/A	6.4	1.1
Voltage Constant (Ke) (+/- 10% @ 25°C)	V/kRPM	87.1	15.1
Pole Configuration	Number of Poles	8	8
Resistance (L-L) (+/- 5% @ 25°C)	Ohms	2.5	0.1
Inductance (L-L)(+/- 15%)	mH	17.3	0.46
Electrical Time Constant	ms	6.8	6.9
Insulation Class	460 VAC Max, 180°C (Class H)		

Specifications subject to change without notice

Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4" at 25°C ambient

VAC Class winding operational compatible with drive voltages up to 460 VAC
 VDC Class winding operational compatible with drive voltages up to 48 VDC
 Rotational speed approximately proportional to drive input voltage

GTX080 Weights

Description	kg (lb)
GTX080-100	4.6 (10.0)
GTX080-150	5.2 (11.4)
GTX080-300	7.0 (15.4)
GTX080-450	8.9 (19.5)
Brake Adder	1.1 (2.5)
Front Flange (1)	1.0 (2.2)
Tapped Face (3)	0.6 (1.2)
Rear Clevis (5)	0.4 (0.8)
Imperial Flange (F)	0.8 (1.8)
Imperial Clevis (C)	0.8 (1.7)
Anti Rotate (100 mm stroke)	0.5 (1.1)
Anti Rotate (150 mm stroke)	0.6 (1.3)
Anti Rotate (300 mm stroke)	0.8 (1.8)
Anti Rotate (450 mm stroke)	1.1 (2.4)
Limit Switch Assembly w/Anti-Rotate (100 mm stroke)	0.9 (1.9)
Limit Switch Assembly w/Anti-Rotate (150 mm stroke)	1.0 (2.3)
Limit Switch Assembly w/Anti-Rotate (300 mm stroke)	1.6 (3.5)
Limit Switch Assembly w/Anti-Rotate (450 mm stroke)	2.1 (4.7)

Brake Specifications

Brake Holding Torque (minimum)	Nm	4.5
	lbf-in	40
Brake Voltage	VDC	24 (-10%/+6%)
Nominal Brake Current at 24 VDC	A	0.5
Brake Engage/Disengage Time (typical)	ms	18/35

GTX100

Motor Voltage		4 (AC)
Max Bus Voltage	V	460 Vrms
Speed @ Bus Voltage	RPM	4500
RMS Sinusoidal Commutation		
Continuous Motor Torque	Nm	12.23
	lbf-in	108.2
Continuous Current Rating*	A	12.3
Peak Current Rating*	A	24.7
Torque Constant (Kt) (+/- 10% @ 25°C)	Nm/A	1.11
	lbf-in/A	9.8
Voltage Constant (Ke) (+/- 10% @ 25°C)	V/kRPM	67.0
0 - Peak Sinusoidal Commutation		
Continuous Motor Torque	Nm	12.23
	lbf-in	108.2
Continuous Current Rating	A	17.4
Peak Current Rating	A	34.8
Torque Constant (Kt) (+/- 10% @ 25°C)	Nm/A	0.78
	lbf-in/A	6.92
Voltage Constant (Ke) (+/- 10% @ 25°C)	V/kRPM	94.8
Pole Configuration	Number of Poles	8
Resistance (L-L) (+/- 5% @ 25°C)	Ohms	0.65
Inductance (L-L)(+/- 15%)	mH	4.9
Electrical Time Constant	ms	7.6
Insulation Class	460 VAC Max, 180°C (Class H)	

Specifications subject to change without notice

Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" at 25°C ambient

VAC Class winding operational compatible with drive voltages up to 460 VAC

Rotational speed approximately proportional to drive input voltage

* For actuators with a 0.1" lead, the torque and current must be limited to 8.89 Nm/9.0 A not to exceed the continuous force rating specified in the mechanical specifications table on page 6. Peak torque and current values would be 2x the continuous values

GTX100 Weights

Description	kg (lb)
GTX100-150	13.1 (28.8)
GTX100-300	16.0 (35.2)
Brake Adder	1.2 (2.7)
Front Flange (1)	2.2 (4.7)
Tapped Face (3)	1.1 (2.4)
Rear Clevis (5)	0.8 (1.8)
Imperial Flange (F)	1.9 (4.1)
Imperial Clevis (C)	1.1 (2.5)
Anti Rotate (150 mm stroke)	1.5 (3.2)
Anti Rotate (300 mm stroke)	2.0 (4.5)
Limit Switch Assembly w/Anti-Rotate (150 mm stroke)	2.0 (4.5)
Limit Switch Assembly w/Anti-Rotate (300 mm stroke)	2.8 (6.2)

Brake Specifications

Brake Holding Torque (minimum)	Nm	11
	lbf-in	97
Brake Voltage	VDC	24 (-10%/+6%)
Nominal Brake Current at 24 VDC	A	0.75
Brake Engage/Disengage Time (typical)	ms	25/40

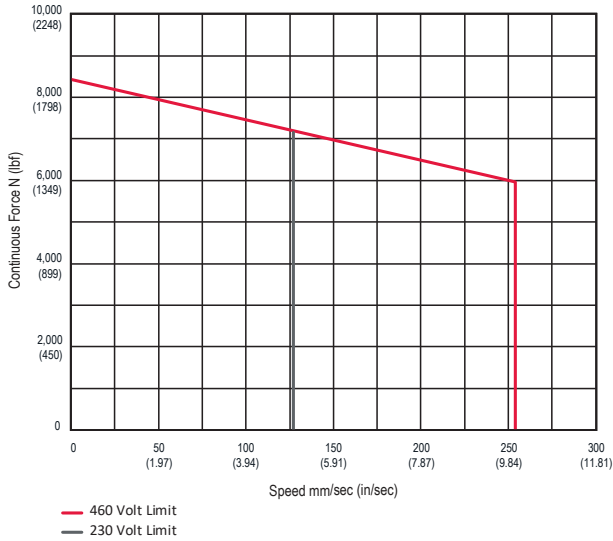
Speed vs. Force Curves

These charts represent typical linear speed versus linear force curves for the GTX actuators using common brushless motor amplifiers. The GTX Series are compatible with many different brushless motor amplifiers; any differences in the performance

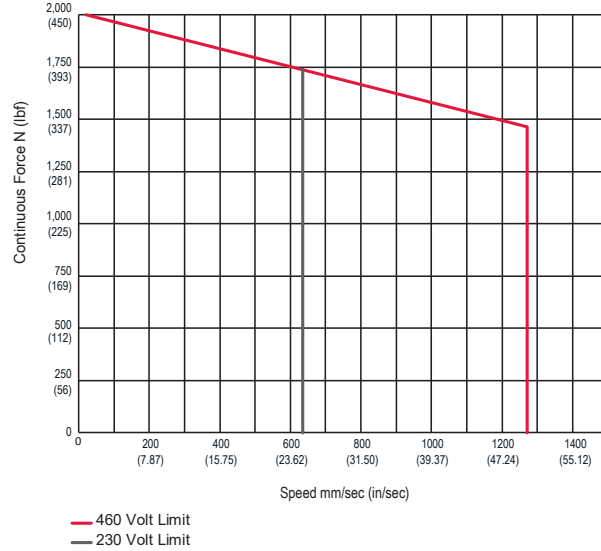
ratings of these amplifiers can alter the actuator's performance. Thus, the curves below should be used for estimation only. (Further information is available by contacting your local sales representative.)

AC Voltage Winding

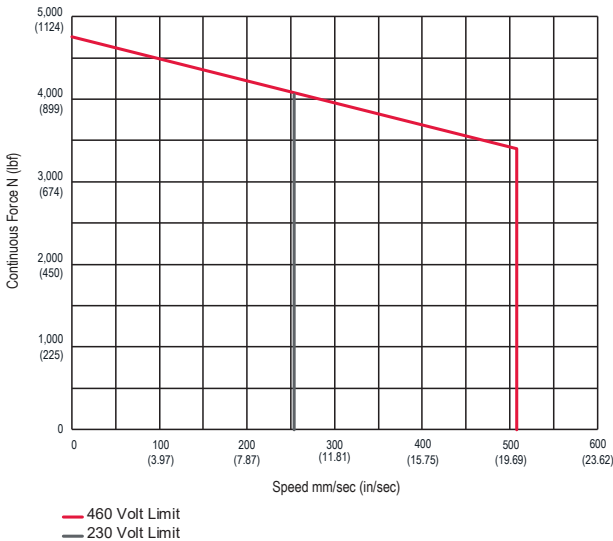
GTX080 (0.1 In Lead)



GTX080 (0.5 In Lead)



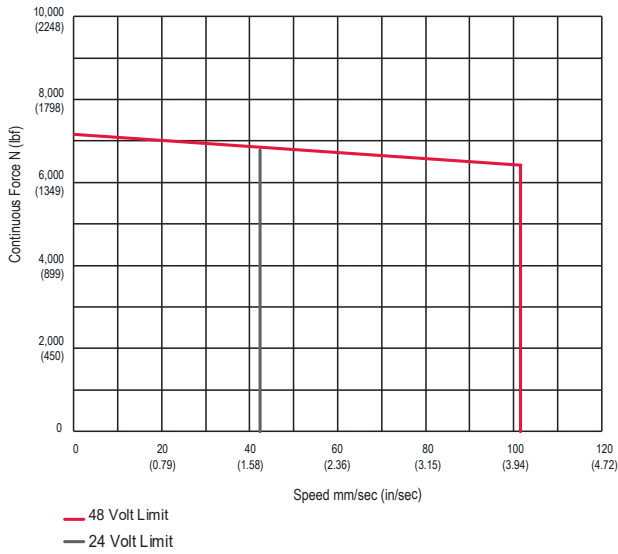
GTX080 (0.2 In Lead)



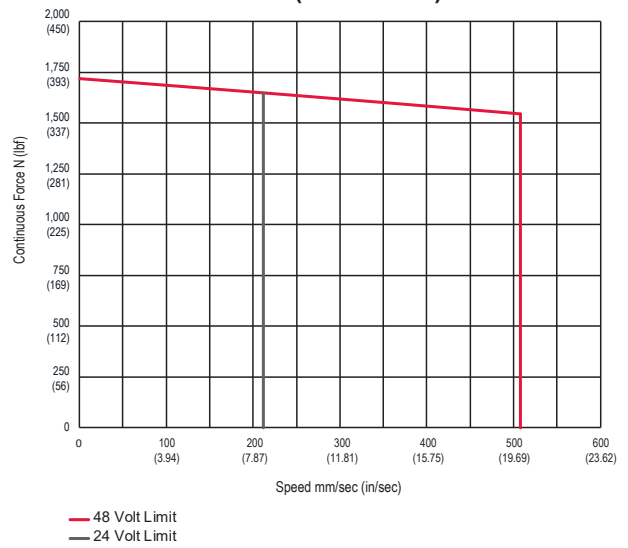
Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4" for GTX080.

DC Voltage Winding

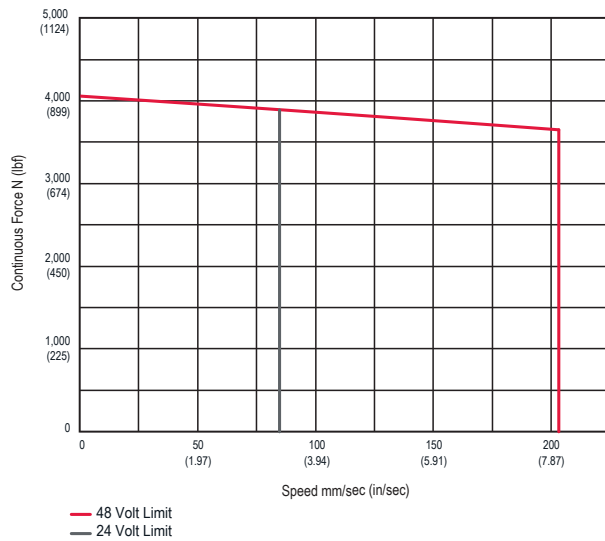
GTX080 (0.1 In Lead)



GTX080 (0.5 In Lead)



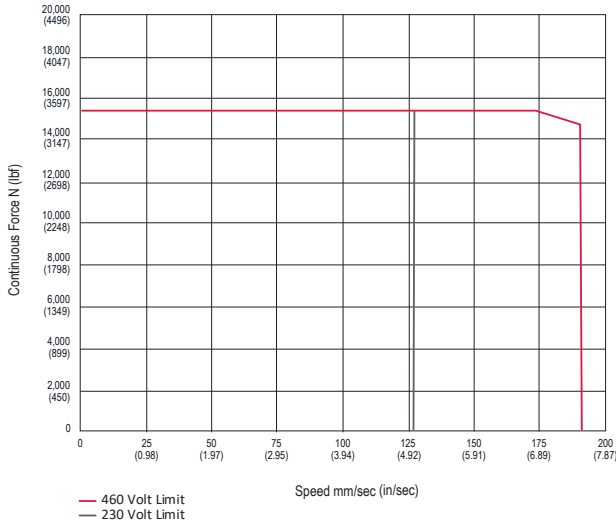
GTX080 (0.2 In Lead)



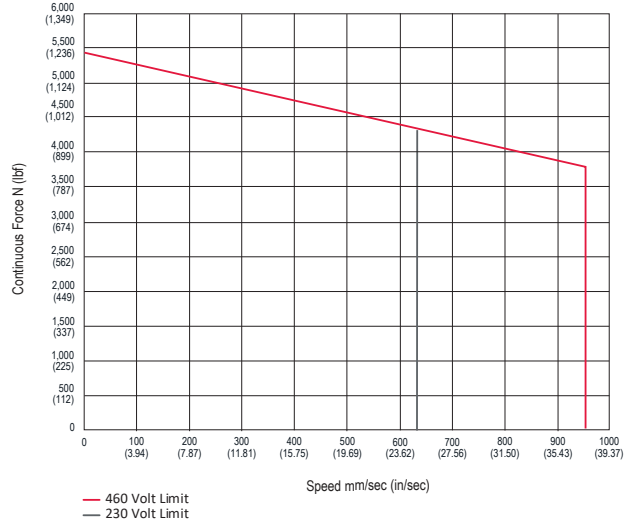
Test data derived using NEMA recommended aluminum heatsink 10" x 10" x 1/4" for GTX080.

AC Voltage Winding

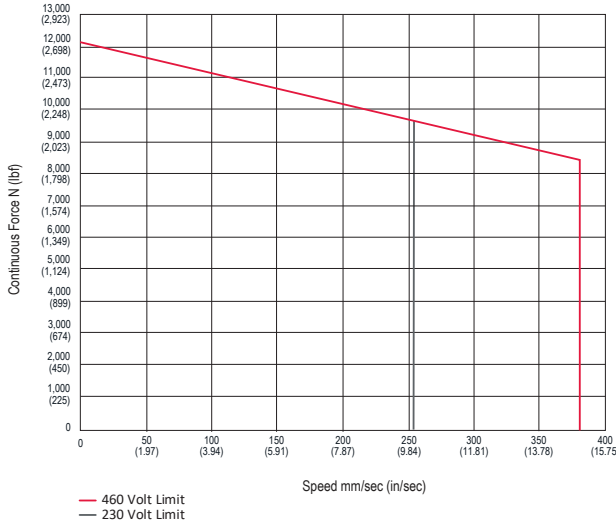
GTX100 (0.1 In Lead)



GTX100 (0.5 In Lead)



GTX100 (0.2 In Lead)



Elevated Ambient Temperature Operation

The speed/torque curves are based on 25° C ambient conditions. The actuators may be operated at ambient temperatures up to 85° C.

Elevated Ambient Temp Factor (%) =

$$100\% \times \sqrt{\frac{\text{Max Rated Temp } [\sim 130^{\circ} \text{ C}] - \text{Environment Temp } [\text{in } ^{\circ} \text{ C}]}{\text{Max Rated Temp } [\sim 130^{\circ} \text{ C}] - \text{Rated Ambient } [\sim 25^{\circ} \text{ C}]}} =$$

$$100\% \times \sqrt{\frac{130^{\circ} \text{ C} - \text{Environment Temp}}{105^{\circ} \text{ C}}} = \text{\% of published continuous @ } 25^{\circ} \text{ C}$$

Test data derived using NEMA recommended aluminum heatsink 12" x 12" x 1/2" at 25°C ambient for GTX100.

Options

Motor Winding / Voltage

GTX actuators can be operated at a wide range of voltages (up to 460 VAC). For DC voltage applications, please refer to the order guide "D" callout. Refer to the mechanical/electrical specifications for motor torque and actuator rated force.

4	460 VAC Max
D	48 VDC Max

Internal Holding Brake

This option provides an internal holding brake for GTX Series actuators. The brake is a permanent magnet brake that is normally engaged. Power must be applied to the brake to disengage the brake.

Feedback Device Options:

Resolvers

Incremental Encoders

Absolute Encoders

Exlar GTX actuators are compatible with a variety of drive platforms available today. Exlar installs, aligns, and wires feedback devices to mimic a typical motor's wiring and cabling commonly used with the listed amplifier manufacturer (see wiring and alignment section for details). If your wiring and alignment is not listed, please consult Exlar.

External Anti-rotate Assembly

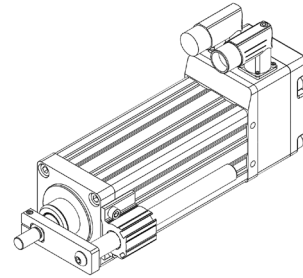
The unique design of the GTX Series of linear actuators permits the extending rod to rotate. This capability simplifies setup by allowing the user to rotate the rod in and out of the actuator for mechanical attachment or system testing.

However, this feature also requires that once setup and testing are completed, the rod be kept from rotating so proper linear motion will be maintained. In most applications the actuator's load is coupled to linear bearings, or some other support device. In these cases the load cannot rotate, so an anti-rotation on the actuator is not needed.

Mounting Options

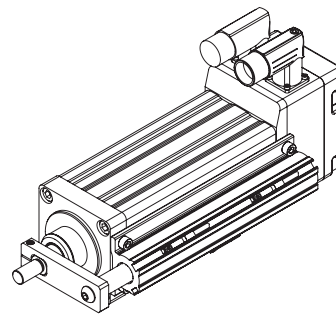
Both as part of the actuator model code and sold as accessory kits.

For applications in which the load is free to rotate, Exlar offers bolt-on anti-rotation systems.



External Limit Switch/ Anti-Rotate Assembly

This option allows external limit switches to be mounted to the GTX Series Actuator. These switches provide travel indication to the controller and are adjustable (Limit switches sold separately).



The external limit switch accessory for the GTX Series of linear actuators allows the user to externally mount adjustable switches for use as the end of travel limit switches or home position sensors.

(Limit switches sold separately from actuator)

NOTE: Accessory option "L" required in model mask to order

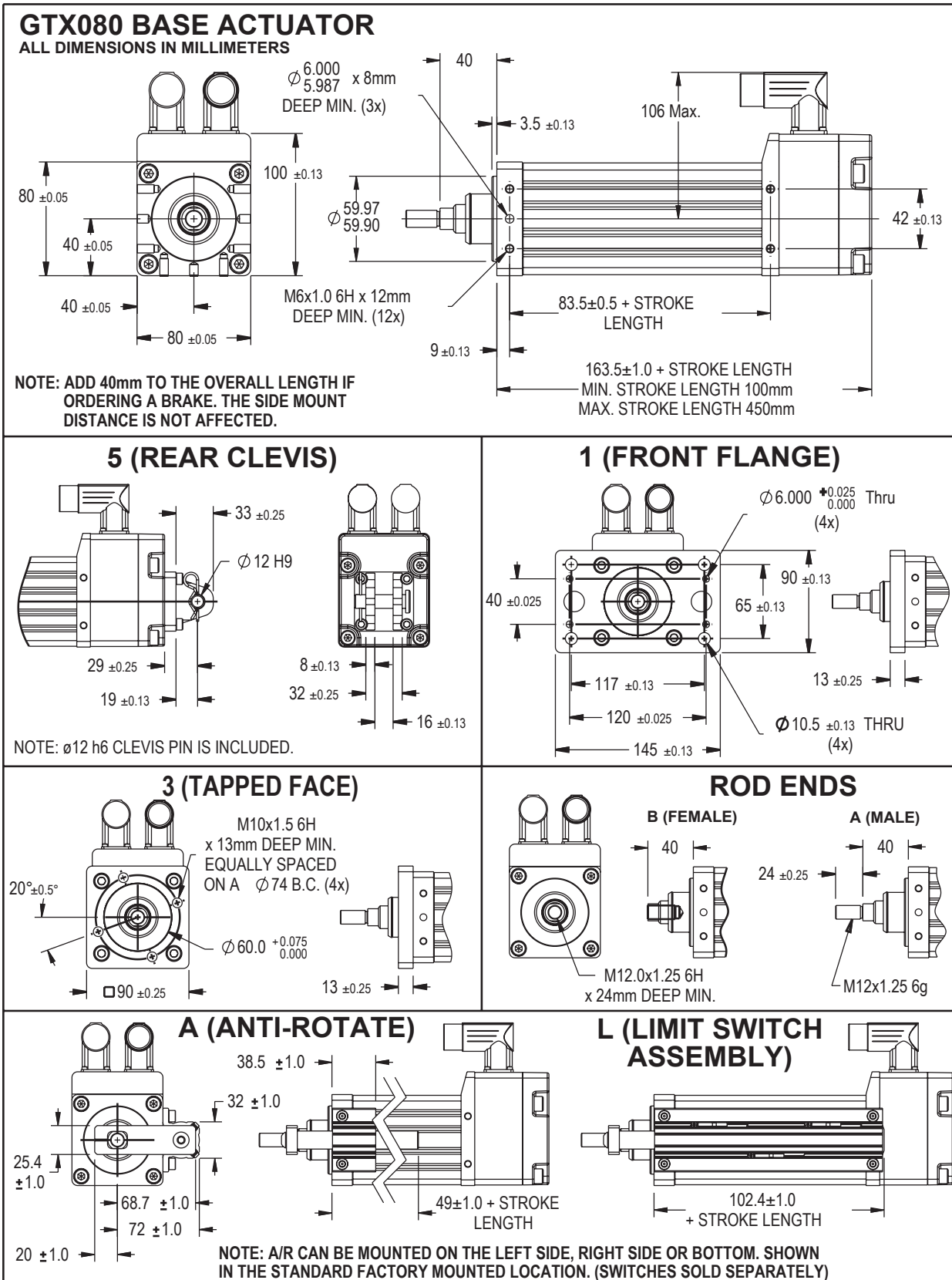
Switch Type	Exlar Part Number	Turck Part Number
Normally Closed Switch, PNP	43404	BIM-UNT-RP6X
Normally Open Switch, PNP	43403	BIM-UNT-AP6X
Normally Closed Switch, NPN	67635	BIM-UNT-RN6X
Normally Open Switch, NPN	67634	BIM-UNT-AN6X

Rod End Accessories

Spherical Rod Eye Rod Clevis

Rod end attachments sold separately from actuator.

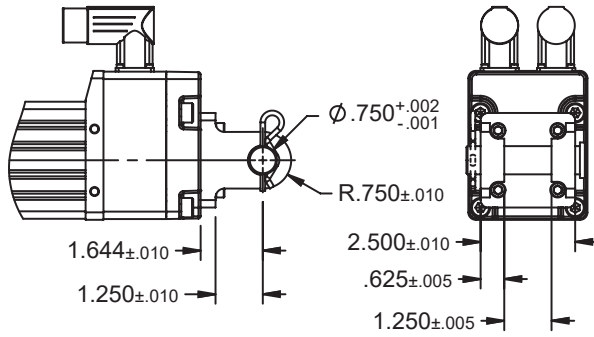
Dimensions



Pre-sale drawings and models are representative and are subject to change. Visit exlar.com to download a 3D model of your desired configuration.

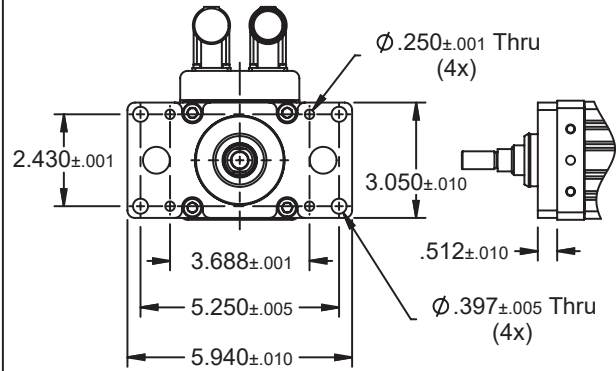
GTX080 IMPERIAL OPTIONS
ALL DIMENSIONS IN INCHES

C (GSX30 REAR CLEVIS)



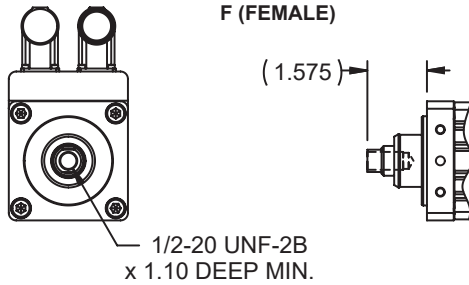
NOTE: ϕ 0.746/ ϕ 0.741 CLEVIS PIN IS INCLUDED.

F (GSX30 FRONT FLANGE)

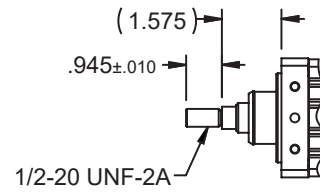


ROD ENDS

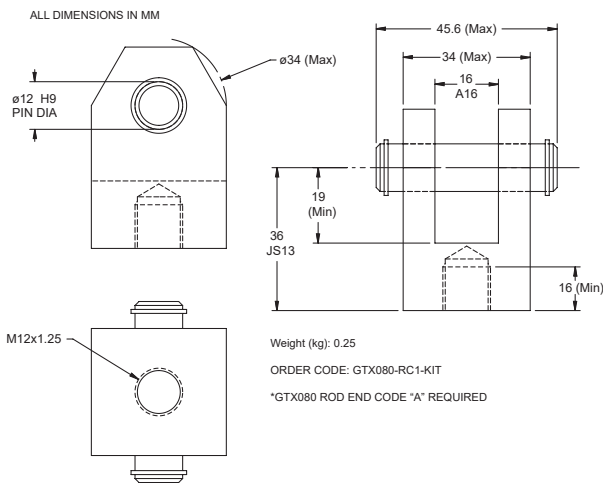
F (FEMALE)



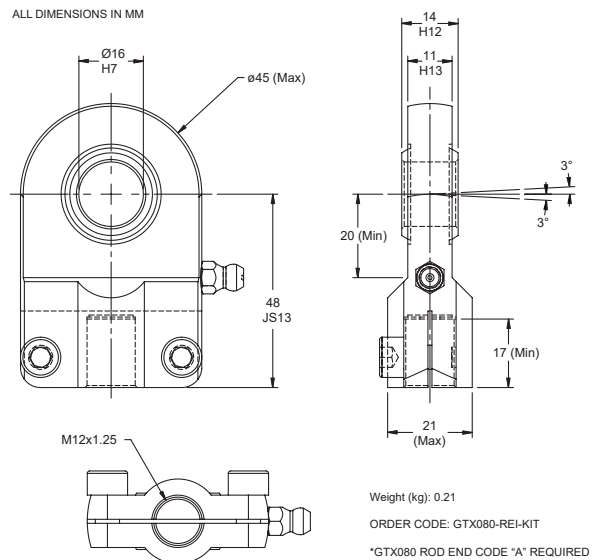
M (MALE)



ROD CLEVIS

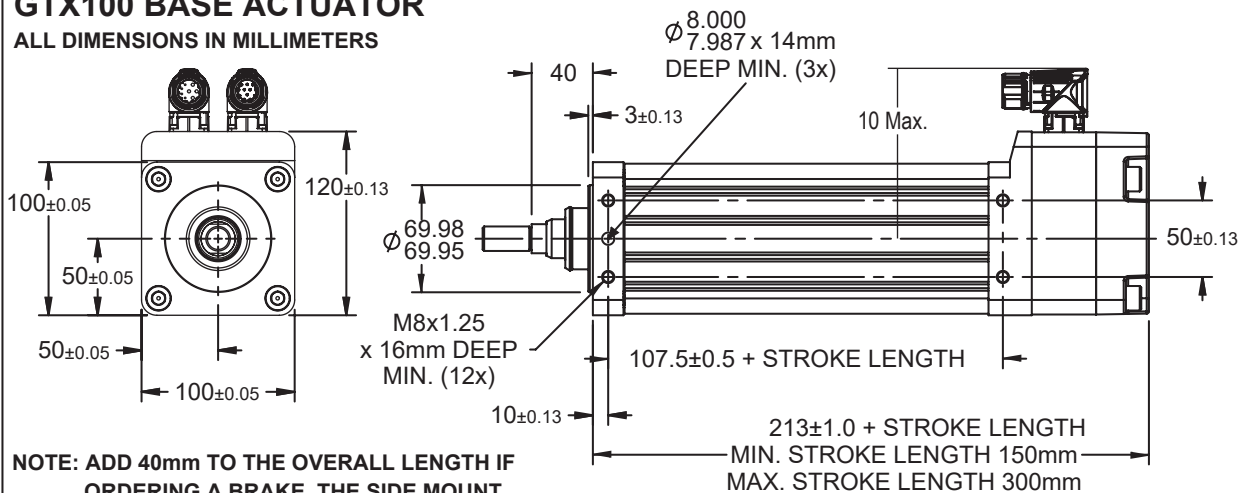


SPHERICAL ROD EYE



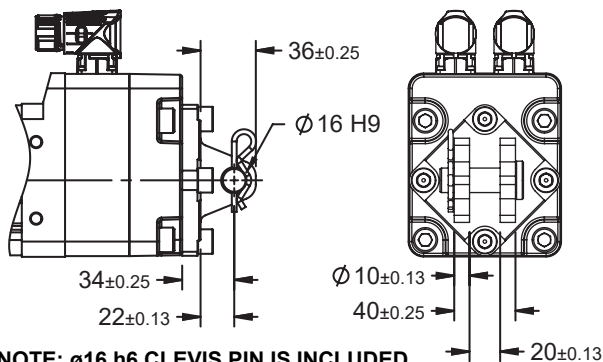
GTX100 BASE ACTUATOR

ALL DIMENSIONS IN MILLIMETERS



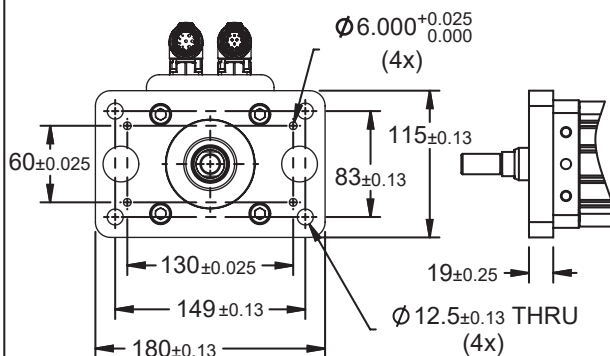
NOTE: ADD 40mm TO THE OVERALL LENGTH IF ORDERING A BRAKE. THE SIDE MOUNT DISTANCE IS NOT AFFECTED.

5 (REAR CLEVIS)

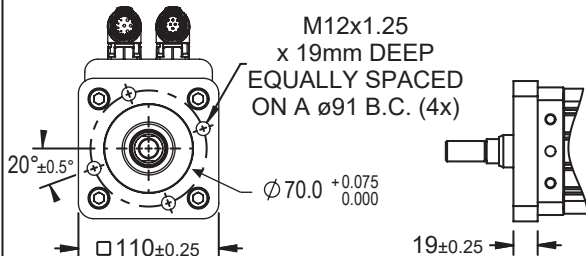


NOTE: $\phi 16$ h6 CLEVIS PIN IS INCLUDED

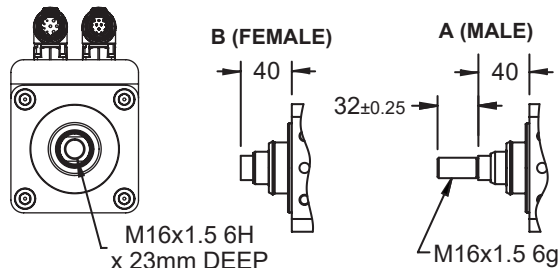
1 (FRONT FLANGE)



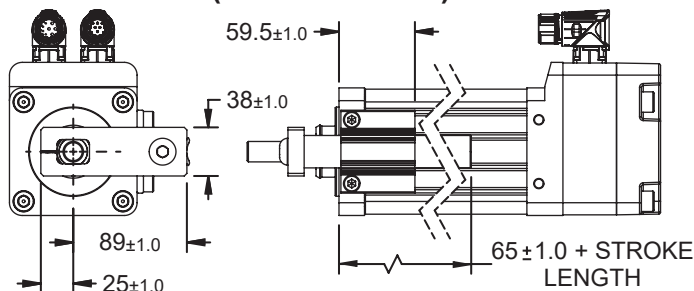
3 (TAPPED FACE)



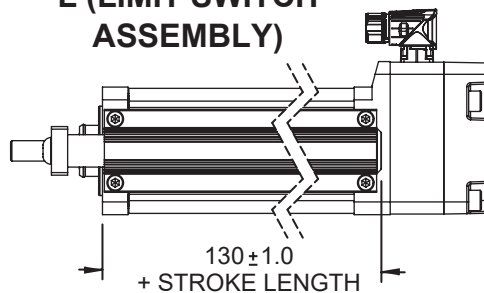
ROD ENDS



A (ANTI-ROTATE)



L (LIMIT SWITCH ASSEMBLY)

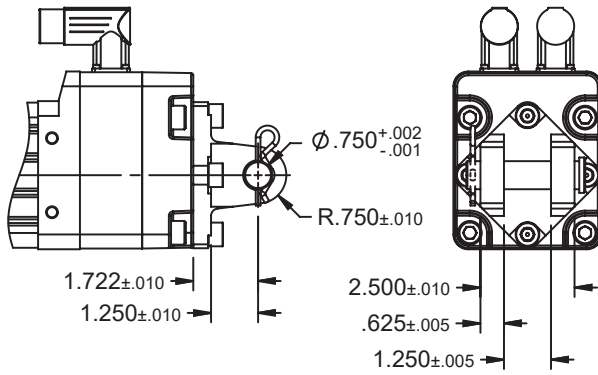


NOTE: A/R CAN BE MOUNTED ON THE LEFT SIDE, RIGHT SIDE OR BOTTOM. SHOWN IN THE STANDARD FACTORY MOUNTED LOCATION. (SWITCHES SOLD SEPARATELY)

Pre-sale drawings and models are representative and are subject to change. Visit exlar.com to download a 3D model of your desired configuration.

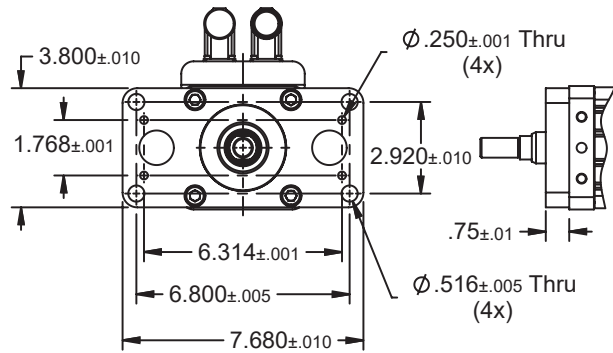
GTX100 IMPERIAL OPTIONS
ALL DIMENSIONS IN INCHES

C (GSX40 REAR CLEVIS)



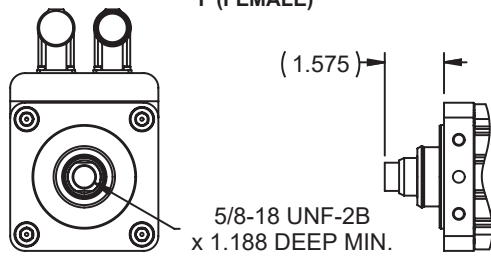
NOTE: $\phi 0.746/\phi 0.741$ CLEVIS PIN IS INCLUDED.

F (GSX40 FRONT FLANGE)

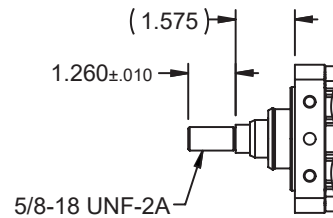


ROD ENDS

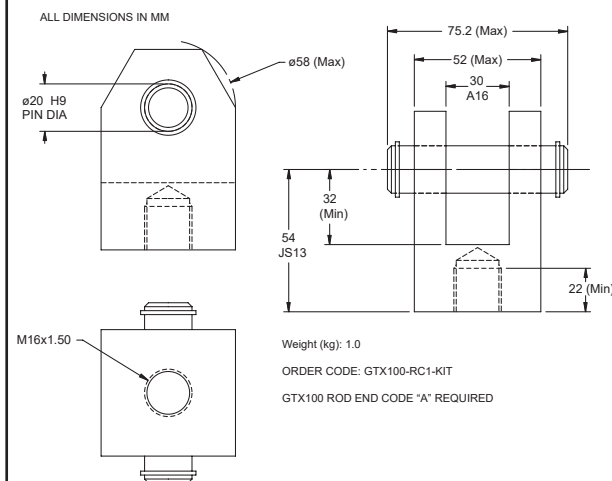
F (FEMALE)



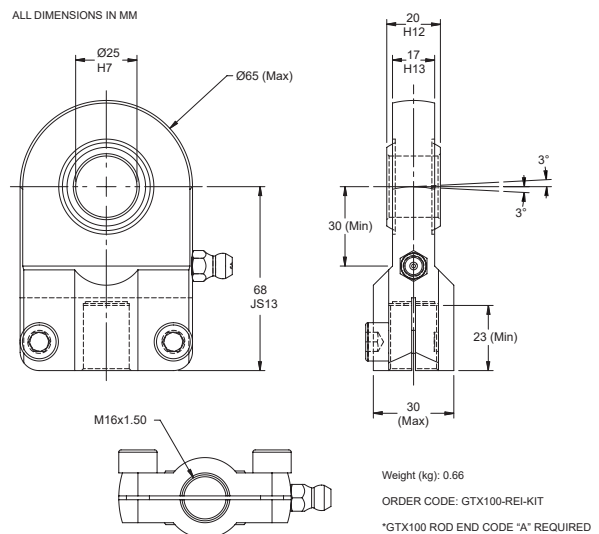
M (MALE)



ROD CLEVIS



SPHERICAL ROD EYE



Feedback Types for GTX

Drive / Feedback Designator Callouts

Drive Manufacturers	Manufacturer Code	Resolver	Incremental Encoder	Stegmann Absolute Encoder	Stegmann Absolute DSL Encoder	Heidenhain Absolute Encoder
B&R Automation	BR	R1A1				H1A2
Beckhoff	BE					H1A2
Bosch-Rexroth	IN			S2D3		H1D3
Elmo Motion Control	EL	R1B1	E1B2			H1B2
Exlar	EX	R1A1	E1A2	S1A2		H1A2
Kollmorgen	KM	R2A1	E1A2			
Lenze	LZ	R1B1		S1B1		
Nidec	CT	R2B1	E1B2	S1B1		H1B2
Parker	PC	R1B1	E1B2			
Rockwell Automation	RA	R3A4	E1C2	S1C2	S3C0	
Schneider	EU			S1A1		
Siemens	SM	R1B1				H1B2
Stober Drives	SB	R2A1				H1A1

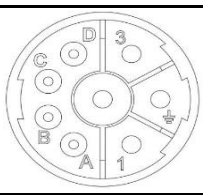
Feedbacks

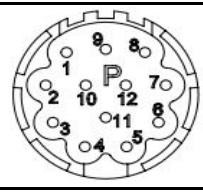
R1 – Standard Resolver – Size 15, 1024 line (2048 cts) per rev. two-pole resolver
R2 – Standard Resolver – Size 15, 1024 line (2048 cts) per rev. two-pole resolver
R3 – Standard Resolver – Size 15, 1024 line (2048 cts) per rev. two-pole resolver
E1 – Standard Incremental Encoder – 2048 line (8192 cts) per rev. index pulse, Hall commutation, 5VDC
S1 – Hiperface Stegmann, SKM36 multi-turn absolute encoder
S2 – Hiperface Stegmann, Bosch SKM36 multi-turn absolute encoder
S3 – Hiperface DSL Stegmann, EKM36 multi-turn absolute encoder
H1 – EnDat Heidenhain, EQN 1125 multi-turn absolute encoder

Power Connectors	Feedback Connectors
A = 8 pin M23 Size 1, Right Angle Connector	0 = feedback signal wired through power connector
B = 6 pin M23 Size 1, Right Angle Connector	1 = 12 pin M23 Size 1, P Type, Right Angle Connector
C = 9 pin M23 Size 1, Right Angle Connector	2 = 17 pin M23 Size 1, E Type, Right Angle Connector
D = Bosch 4+5 pin M23 size 1, Right Angle Connector	3 = 10 pin M23 Size 1, Right Angle Connector
	4 = 12 pin M23 Size 1, E Type, Right Angle Connector

Wiring and Alignment Options

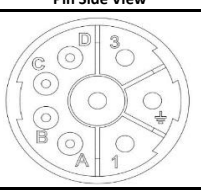
B & R Automation-Resolver (BR-R1A1) - Standard Resolver w/M23 connectors

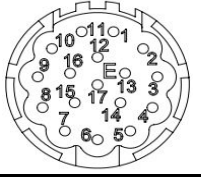
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	PE	
3	W	
4	V	
A	PT1000	
B	PT1000	
C	Brake+	
D	Brake-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	-	
2	-	
3	Cos+	
4	Sin+	
5	Ref+	
6	-	
7	Cos-	
8	Sin-	
9	Ref-	
10	-	
11	-	
12	-	
Actuator Case	-	

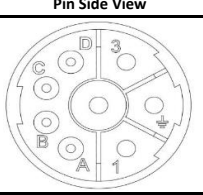
Mfg's Cable Part Number-
8CRXXX.12-1

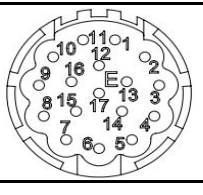
Beckhoff-Heidenhain (BE-H1A2) - EnDat Heidenhain EQN1125 multi-turn absolute encoder – AM5XX motor wiring w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	PE	
3	W	
4	V	
A	Brake+	
B	Brake-	
C	PT1000	
D	PT1000	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	B-	
2	0V voltage supply	
3	A-	
4	Up voltage supply	
5	Data	
6	-	
7	-	
8	Clock	
9	B+	
10	0V Sense	
11	A+	
12	Up Sense	
13	Data -	
14	-	
15	Clock -	
16	-	
17	-	
Actuator Case	-	

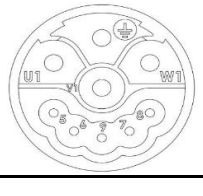
B & R Automation-Heidenhain (BR-H1A2) - EnDat Heidenhain EQN1125 multi-turn absolute encoder – 8LS/8LM motor wiring w/M23 connectors

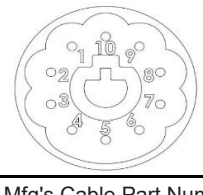
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	PE	
3	W	
4	V	
A	PT1000	
B	PT1000	
C	Brake+	
D	Brake-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Up Sense	
2	-	
3	-	
4	0V Sense	
5	-	
6	-	
7	Up voltage supply	
8	Clock	
9	Clock-	
10	0V voltage supply	
11	-	
12	B+	
13	B-	
14	Data	
15	A+	
16	A-	
17	Data-	
Actuator Case	-	

Mfg's Cable Part Number-
8CEXXX.12-1

Bosch-Rexroth-Stegmann (IN-S2D3)- Hiperface Stegmann multi-turn absolute encoder – MSK motor wiring w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
U1	Phase U	
V1	Phase V	
W1	Phase W	
PE	Earth	
5	PT1000	
6	PT1000	
7	Brake+	
8	Brake-	
9	-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Vcc_Encoder	
2	GND_Encoder	
3	A+	
4	A-	
5	B+	
6	B-	
7	EncData+	
8	EncData-	
9	-	
10	-	

Mfg's Cable Part Number-
RKG4200

Bosch-Rexroth-Heidenhain (IN-H1D3)- EnDat Heidenhain EQN1125 multi-turn absolute Indradrive wiring w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
U1	Phase U	
V1	Phase V	
W1	Phase W	
PE	Earth	
5	PT1000	
6	PT1000	
7	Brake+	
8	Brake-	
9	-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Vcc_Encoder	
2	GND_Encoder	
3	A+	
4	A-	
5	B+	
6	B-	
7	Data +	
8	Data -	
9	Clock	
10	Clock -	

Elmo-Encoder (EL-E1B2) - Standard Incremental Encoder w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	M1	
2	M3	
¥	PE	
4	Brake-	
5	M2	
6	Brake+	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Power Supply 5V	
2	Therm Switch	
3	Power Supply 0V	
4	HC +	
5	HC -	
6	HA +	
7	HA -	
8	HB +	
9	HB -	
10	A +	
11	A -	
12	B +	
13	B -	
14	Z +	
15	Z -	
16	-	
17	Therm Switch	
Actuator Case	-	

Elmo-Resolver (EL-R1B1) - Standard Resolver w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	M1	
2	M3	
¥	PE	
4	Brake-	
5	M2	
6	Brake+	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	-	
2	-	
3	Sin- S4	
4	Cos- S3	
5	Ref R2	
6	-	
7	Sin+ S2	
8	Cos+ S1	
9	Ref R1	
10	-	
11	-	
12	-	
Actuator Case	Shield	

Elmo-Heidenhain (EL-H1B2) - EnDat Heidenhain EQN1125 multi-turn absolute encoder w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	W	
¥	PE	
4	Brake-	
5	V	
6	Brake+	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	B-	
2	0V voltage supply	
3	A-	
4	Up voltage supply	
5	Data	
6	-	
7	Therm Switch	
8	Clock	
9	B+	
10	0V Sense	
11	A+	
12	Up Sense	
13	Data -	
14	Therm Switch	
15	Clock -	
16	-	
17	-	
Actuator Case	-	

Exlar-Resolver (EX-R1A1) - Standard Resolver w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	R	
2	GND	
3	T	
4	S	
A	Brake+	
B	Brake-	
C	-	
D	-	

CBL-PWRB1-SMI-XXX

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	-	
2	Therm Switch	
3	- Cos	
4	- Sin	
5	- Exc	
6	Therm Switch	
7	+ Cos	
8	+ Sin	
9	+ Exc	
10	-	
11	-	
12	-	
Actuator Case	Shield	

CBL-RESOL-SMI-XXX

Exlar-Stegmann (EX-S1A2) - Hiperface Stegmann SKM36 multi-turn absolute encoder w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	R	
2	GND	
3	T	
4	S	
A	Brake+	
B	Brake-	
C	-	
D	-	

CBL-PWRB1-SMI-XXX

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Sin +	
2	Com	
3	Cos +	
4	+5V	
5	Ref +	
6	-	
7	Therm Switch	
8	-	
9	Sin -	
10	-	
11	Cos -	
12	-	
13	Ref -	
14	Therm Switch	
15	-	
16	-	
17	-	
Actuator Case	-	

CBL-ENCOD-SMI-XXX

Exlar-Encoder (EX-E1A2) - Standard Incremental Encoder 2048 Line w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	R	
2	GND	
3	T	
4	S	
A	Brake+	
B	Brake-	
C	-	
D	-	

CBL-PWRB1-SMI-XXX

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	B-	
2	B	
3	A	
4	A-	
5	Z	
6	Z-	
7	GND	
8	Therm Switch	
9	Therm Switch	
10	+5VDC	
11	-	
12	W-	
13	V-	
14	U-	
15	W	
16	V	
17	U	
Actuator Case	-	

CBL-ENCOD-SMI-XXX

Exlar-Heidenhain (EX-H1A2) - EnDat Heidenhain EQN1125 multi-turn absolute encoder w/M23 connectors

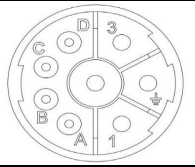
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	PE	
3	W	
4	V	
A	Brake+	
B	Brake-	
C	-	
D	-	

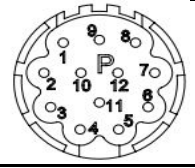
CBL-ENCOD-SMI-XXX

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	B-	
2	0V voltage supply	
3	A-	
4	Up voltage supply	
5	Data+	
6	-	
7	Therm Switch	
8	Clock	
9	B	
10	0V Sense	
11	A	
12	Up Sense	
13	Data -	
14	Therm Switch	
15	Clock -	
16	-	
17	-	
Actuator Case	-	

CBL-PWRB1-SMI-XXX

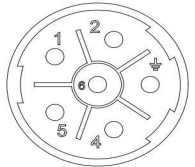
Kollmorgen-Resolver (KM-R2A1) - Standard Resolver
 – AKM motor wiring w/M23 connectors

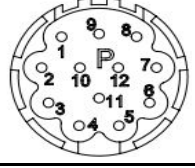
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	GND	
3	W	
4	V	
A	Brake+	
B	Brake-	
C	-	
D	-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	-	
2	Therm Switch	
3	Cos Lo (S4)	
4	Sin Lo (S3)	
5	Ref Lo (R2)	
6	Therm Switch	
7	Cos Hi (S2)	
8	Sin Hi (S1)	
9	Ref Hi (R1)	
10	-	
11	-	
12	-	
Actuator Case	Shield	

Mfg's Cable Part Number-
VF-RA2474N-XX

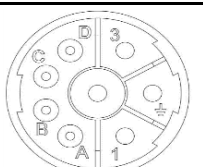
Lenze-Resolver (LZ-R1B1) - Standard Resolver – MCS
 motor wiring w/M23 connectors

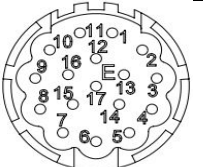
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Y1 / BD1	
2	Y2 / BD2	
3	PI	
4	U	
5	V	
6	W	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	+ Ref	
2	- Ref	
3	-	
4	+ Cos	
5	- Cos	
6	+ Sin	
7	- Sin	
8	-	
9	-	
10	-	
11	PT1000	
12	PT1000	
Actuator Case	-	

Mfg's Cable Part Number-
MCS Series Resolver Cable

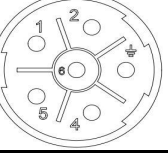
Kollmorgen-Encoder (KM-E1A2) -
 Standard Incremental Encoder – AKM motor wiring w/ M23 connectors

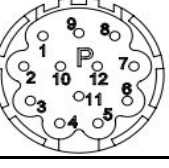
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	PE	
3	W	
4	V	
A	Brake+	
B	Brake-	
C	-	
D	-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	B+	
2	B-	
3	A+	
4	A-	
5	Z	
6	Z-	
7	GND	
8	Therm Switch	
9	Therm Switch	
10	Vcc	
11	-	
12	U-	
13	V-	
14	W-	
15	U	
16	V	
17	W	
Actuator Case	-	

Mfg's Cable Part Number-
CF-CB7374N-XX

Lenze-Encoder (LZ-S1B1) - Hiperface Stegmann SKM36
 multi-turn absolute encoder – FM/UM/EZ motor wiring w/M23 connectors

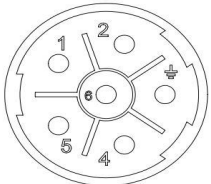
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Y1 / BD1	
2	Y2 / BD2	
3	PI	
4	U	
5	V	
6	W	

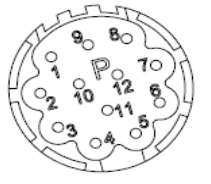
Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	+ SIN	
2	- COS	
3	+ COS	
4	+ 8 V	
5	Mass	
6	- RS485	
7	+ RS485	
8	-	
9	- SIN	
10	-	
11	PT1000	
12	PT1000	
Actuator Case	-	

Mfg's Cable Part Number-
MCS Series Absolute Encoder
Cable

Nidec-Resolver (CT-R2B1) -

Standard Resolver – FM/UM/EZ motor wiring w/M23 connectors

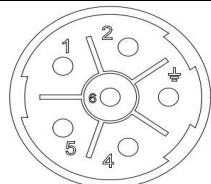
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	R	
2	S	
¥	GND	
4	T	
5	Brake+	
6	Brake-	

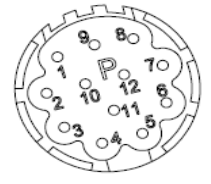
Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Excitation High	
2	Excitation Low	
3	Cos High	
4	Cos Low	
5	Sin High	
6	Sin Low	
7	Therm Switch	
8	Therm Switch	
9	-	
10	-	
11	-	
12	-	
Actuator Case	Shield	

Mfg's Cable Part Number-
SRBBBBXXXX /
SRBBABXXXX

Nidec-Stegmann (CT-S1B1)– Hiperface Stegmann SKM36

multi-turn absolute encoder – FM/UM/EZ motor wiring w/M23 connectors

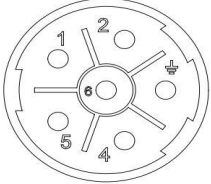
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	R	
2	S	
¥	GND	
4	T	
5	Brake+	
6	Brake-	

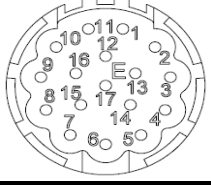
Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Ref Cos	
2	Daten +	
3	Daten -	
4	Cos	
5	Sin	
6	Ref Sin	
7	Therm Switch	
8	Therm Switch	
9	Screen	
10	Com	
11	-	
12	+V	
Actuator Case	-	

Mfg's Cable Part Number-
SSBCABXXXX

Nidec-Encoder (CT-E1B2) -

Standard Incremental Encoder – FM/UM/EZ motor wiring w/M23 connectors

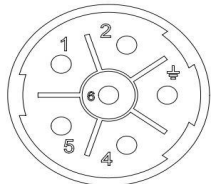
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	R	
2	S	
¥	GND	
4	T	
5	Brake+	
6	Brake-	

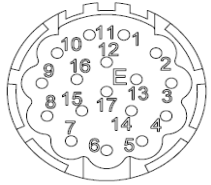
Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Therm Switch	
2	Therm Switch	
3	-	
4	U	
5	U/	
6	V	
7	V/	
8	W	
9	W/	
10	A	
11	Z	
12	Z/	
13	A/	
14	B	
15	B/	
16	+ 5 VDC	
17	0V	
Actuator Case	-	

Mfg's Cable Part Number-
S1BAAAXXXX

Nidec-Heidenhain (CT-H1B2) -

EnDat Heidenhain EQN1125 multi-turn absolute encoder undrive SP w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	R	
2	S	
¥	GND	
4	T	
5	Brake+	
6	Brake-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	PT1000	
2	PT1000	
3	-	
4	-	
5	-	
6	-	
7	-	
8	Clock +	
9	Clock -	
10	A+	
11	Data +	
12	Data -	
13	A-	
14	B+	
15	B-	
16	+ 5 VDC	
17	COM	
Actuator Case	Shield	

Parker-Resolver (PC-R1B1) - Standard Resolver – SMH motor wiring w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	V	
¥	PE	
4	Brake+	
5	Brake-	
6	W	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Sin -	
2	Sin +	
3	-	
4	-	
5	-	
6	-	
7	Ref -	
8	PT1000	
9	PT1000	
10	Ref +	
11	Cos +	
12	Cos -	

Mfg's Cable Part Number-
SMH Series Incremental
Encoder Cable

Actuator Case	Shield
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Rockwell Automation-Encoder (RA-R3A4) - Standard Resolver - w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	GND	
3	V	
4	W	
A	Therm Switch	
B	Therm Switch	
C	Brake+	
D	Brake-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	S1	
2	S3	
3	S4	
4	S2	
5	R2	
6	R1	
7	-	
8	-	
9	-	
10	-	
11	-	
12	-	
Actuator Case	-	

Parker-Encoder (PC-E1B2) - Standard Incremental Encoder – MPP series motor wiring w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	W	
¥	PE	
4	Brake+	
5	Brake-	
6	V	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	A-	
2	A+	
3	-	
4	Hall 1	
5	Hall 3	
6	Hall 2	
7	Ground	
8	+5 vdc	
9	Therm Switch	
10	-	
11	B	
12	B-	
13	Therm Switch	
14	-	
15	Z+	
16	Z-	
17	-	
Actuator Case	-	

Mfg's Cable Part Number-
SMH Series Resolver Cable

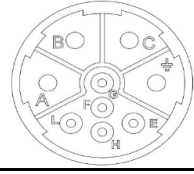
Rockwell Automation-Encoder (RA-E1C2) - Standard Incremental Encoder - MPL Type M feedback w/M23 connectors

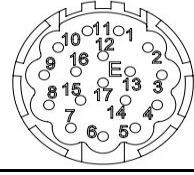
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
A	Phase U	
B	Phase V	
C	Phase W	
D	Ground	
E	-	
F	Brake+	
G	Brake-	
H	-	
L	-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	A(+)	
2	A(-)	
3	B(+)	
4	B(-)	
5	I(+)	
6	I(-)	
7	-	
8	-	
9	EPWR_5V	
10	Common	
11	-	
12	-	
13	Therm Switch	
14	Therm Switch	
15	S1	
16	S2	
17	S3	
Actuator Case	-	

Mfg's Cable Part Number-
2090-CFBM7DF-CDAxyy

RockwellAutomation-Stegmann (RA-S1C2) -
 Hiperface, SKM36 multi-turn absolute encoder. MPL Type V feedback
 (128 sin/cos) /M23 connectors¹

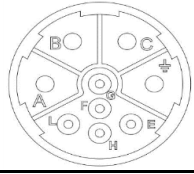
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
A	Phase U	
B	Phase V	
C	Phase W	
D	Ground	
E	-	
F	Brake+	
G	Brake-	
H	-	
L	-	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Sine +	
2	Sine -	
3	Cos +	
4	Cos -	
5	Data +	
6	Data -	
7	-	
8	-	
9	-	
10	ECOM	
11	+ 9 vdc	
12	-	
13	Therm Switch	
14	Therm Switch	
15	-	
16	-	
17	-	
Actuator Case	-	

Mfg's Cable Part Number-
2090-CFBM7DF-CDAXyy

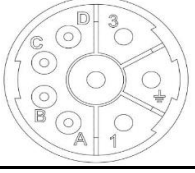
1. Not compatible with Kinetix
300 Drives.

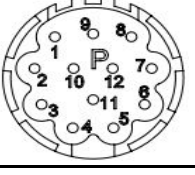
**RockwellAutomation-Stegmann Absolute DSL
Encoder (RA-S3C0) -** Hiperface, EKM36 multi-turn absolute
encoder w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
A	Phase U	
B	Phase V	
C	Phase W	
D	Ground	
E	Data +	
F	Brake+	
G	Brake-	
H	Data -	
L	-	

Mfg's Cable Part Number-
2090-CSBM1DE-14AA05

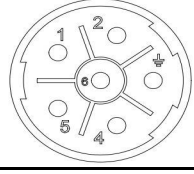
Schneider-Stegmann (EU-S1A1) - Hiperface Stegmann
SKM36 multi-turn absolute encoder – SH motor wiring w/M23 connectors

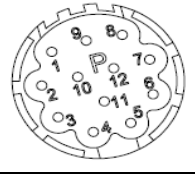
Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U (1)	
2	PE	
3	W (3)	
4	V (2)	
A	br+ (8)	
B	br- (7)	
C	PT1000	
D	PT1000	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	REFCOS	
2	RS485+	
3	-	
4	-	
5	SIN	
6	REFSIN	
7	RS485-	
8	COS	
9	-	
10	GND	
11	-	
12	Us	
Actuator Case	-	

Mfg's Cable Part Number-
SH Series Absolute Encoder
Cable

Siemens-Resolver (SM-R1B1) - Standard Resolver –
1FK7 motor wiring w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	V	
3	GNYE	
4	BD1+	
5	BD2-	
6	W	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	SIN	
2	*SIN	
3	-	
4	-	
5	-	
6	Shield	
7	-Vpp	
8	PT1000	
9	PT1000	
10	+Vpp	
11	COS	
12	*COS	
Actuator Case	Shield	

Mfg's Cable Part Number-
6FX5002-2CF02-...

Siemens-Heidenhain (SM-H1B2) - EnDat Heidenhain EQN1125 multi-turn absolute encoder – 1FK7 motor wiring w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	V	
3	GNYE	
4	BD1+	
5	BD2-	
6	W	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	A+	
2	A-	
3	+ data	
4	-	
5	+clock	
6	-	
7	M-Encoder	
8	PT1000	
9	PT1000	
10	P-Encoder	
11	B+	
12	B-	
13	- data	
14	-clock	
15	0 V Sense	
16	5 V Sense	
17	-	
Actuator Case	-	

Mfg's Cable Part Number-
6FX5002-EQ10-...

Stober-Heidenhain (SB-H1A1) - EnDat Heidenhain EQN1125 multi-turn absolute encoder – ED/EK motor wiring w/M23 connectors

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	R	
2	GND	
3	S	
4	T	
A	Brake	
B	Brake	
C	Therm Switch	
D	Therm Switch	

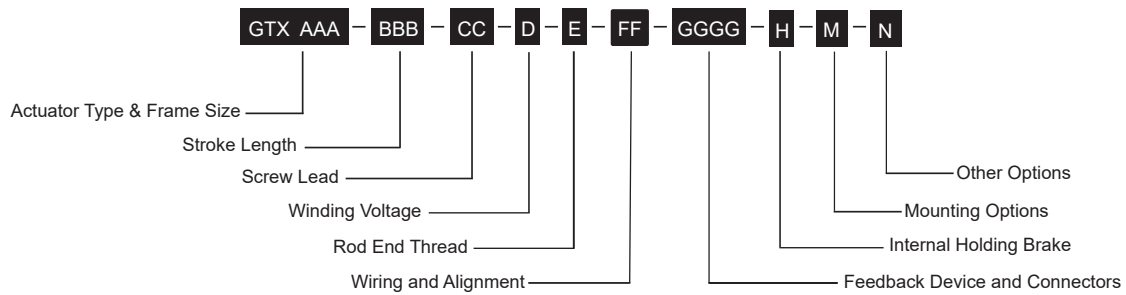
Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Clock +	
2	Up Sense	
3	-	
4	-	
5	Data -	
6	Data	
7	-	
8	Clock -	
9	-	
10	0V	
11	-	
12	Up	
Actuator Case	-	

Mfg's Cable Part Number-
Stober Absolute Encoder
Cable

Stober-Resolver (SB-R2A1) - Standard Resolver ED/EK motor wiring w/M23 connector

Power Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	U	
2	GND	
3	V	
4	W	
A	Brake	
B	Brake	
C	Therm Switch	
D	Therm Switch	

Feedback Connector Pin-Out		Pin Side View
M23 Connector	Drive Terminology	
1	Cos + (S3)	
2	Cos - (S1)	
3	Sin + (S4)	
4	Sin - (S2)	
5	-	
6	-	
7	Erreg+ (R2)	
8	Erreg- (R1)	
9	-	
10	-	
11	-	
12	-	
Actuator Case	-	



AAA = GTX Integrated Motor / Actuator

080 = 80 mm (3.15 in)
100 = 100 mm (3.94)

BBB = Stroke Length

100 = 100 mm (GTX080 only)
150 = 150 mm
300 = 300 mm
450 = 450 mm (GTX080 only)

CC = Screw Lead

01 = 0.10 in (2.54 mm)
02 = 0.20 in (5.08 mm)
05 = 0.50 in (12.7 mm)

D = Winding Voltage

4 = 460 VAC Max
D = 48 VDC Max (GTX080 only)

E = Rod End Thread

A = Male, Metric
B = Female, Metric²
M = Male, English²
F = Female, English²

FF = Wiring and Alignment

BE = Beckhoff
BR = B&R Automation
CT = Control Techniques/Nidec
EU = Elau/Schneider
EL = Elmo Motion Control
EX = Exlar
IN = Indramat/Bosch-Rexroth
KM = Kollmorgen/Danaher
LZ = Lenze/AC Tech
PC = Parker Compumotor
RA = Rockwell Automation
SM = Siemens
SB = Stober Drives

GGGG = Feedback Device and Connectors

For more detailed descriptions of available feedback types see page 16

Resolver
R1A1
R1B1
R2A1
R2B1
R3A4
Incremental Encoder
E1A1
E1A2
E1B2
E1C2

Absolute Encoder - Stegmann

S1A2
S1B1
S1C2
S2D3

Absolute DSL Encoder - Stegmann

S3C0

Absolute Encoder - Heidenhain

H1A1
H1A2
H1B2
H1D3

H = Internal Holding Brake

N = No Brake
B = Internal Holding Brake, Electronically Released

M = Mounting Options

N = None
1 = Front Flange, Metric
3 = Tapped Face, Metric
5 = Rear Clevis, Metric
F = Front Flange, English²
C = Rear Clevis, English²

N = Other Options

N = None
A = Anti-Rotate Assembly, External
L = Limit Switch Housing/ Anti-Rotate Assembly¹

¹Switches sold separately

²Available option. May add lead time.



For options or specials not listed above or for extended temperature operation, please contact Exlar