

# AEROTECH

## Gear-Driven Rotary Stages

# AGR



### Rugged Construction, Reliable Performance

Our versatile AGR gear-driven rotary stages bring you significant advantages in load capacity, long-term positioning performance and reliability over other gear-driven rotary positioners. Available in five models with apertures ranging from 50 mm to 200 mm diameters, AGR stages are well equipped to address a wide range of single- and multi-axis applications for general-purpose positioning in industrial and laboratory settings.

### Key Applications

AGR stages are ideal for a variety of precision industrial and laboratory applications, including:

- ◆ Laser processing
- ◆ Measurement & inspection
- ◆ Sample positioning
- ◆ Nondestructive testing
- ◆ Pointing, scanning & tracking
- ◆ Integration into gimbal systems

### KEY FEATURES:

- ◆ Features **LARGE, CLEAR APERTURE UP TO  $\varnothing 200$  mm** for mounting optics, cameras, process equipment, cabling & more
- ◆ Configurable with **DIRECT ENCODER OPTION** for enhanced positioning precision
- ◆ Accommodates **PAYLOADS UP TO 425 kg**
- ◆ Offers **CONTINUOUS 360° ROTATION** with **CONFIGURABLE TRAVEL LIMITS** available
- ◆ Integrates easily in **MULTI-AXIS CONFIGURATIONS**

## AGR SERIES SPECIFICATIONS

Mechanical Specifications		AGR50	AGR75	AGR100	AGR150	AGR200
Travel		360° (Limited Travel Versions Available)				
Accuracy	Uncalibrated	0.87 mrad (180 arc sec)		0.58 mrad (120 arc sec)		
	Calibrated	0.29 mrad (60 arc sec)	0.24 mrad (50 arc sec)			
	Calibrated with Direct Encoder Option	0.058 mrad (12 arc sec)	0.049 mrad (10 arc sec)			
Repeatability (Uni-Directional)	Standard	0.049 mrad (10 arc sec)				
	Direct Encoder <sup>(1)</sup>	0.024 mrad (5 arc sec)				
Repeatability (Bi-Directional)	Standard <sup>(2)</sup>	0.22 mrad (45 arc sec)				
	Direct Encoder <sup>(1)</sup>	0.039 mrad (8 arc sec)	0.029 mrad (6 arc sec)			
Tilt Error Motion		0.049 mrad (10 arc sec)				
Axial Error Motion		5 µm				
Radial Error Motion		10 µm				
Gear Ratio		51:1	67:1	85:1	117:1	126:1
Maximum Speed with Brushless Servomotor <sup>(3)</sup>		180°/s				
Maximum Acceleration <sup>(4)</sup>		720°/s <sup>2</sup>				
Aperture		50 mm	75 mm	100 mm	150 mm	200 mm
Load Capacity	Axial	40 kg	100 kg	200 kg	300 kg	425 kg
	Radial	20 kg	50 kg	100 kg	125 kg	200 kg
	Moment	See Moment Load Curves				
Maximum Torque Load to Stage Shaft		2.5 N·m	3.5 N·m	12 N·m	20 N·m	80 N·m
Rotor Inertia (Unloaded)		0.00052 kg·m <sup>2</sup>	0.0013 kg·m <sup>2</sup>	0.0035 kg·m <sup>2</sup>	0.011 kg·m <sup>2</sup>	0.076 kg·m <sup>2</sup>
Stage Mass (No Motor)	Standard	1.9 kg	2.4 kg	4.5 kg	6.1 kg	18.6 kg
	Direct Encoder	2.5 kg	3.1 kg	5.6 kg	7.6 kg	21.7 kg
Material		Aluminum				

Notes:

- Direct encoder repeatability specifications are for systems using the -E3 direct encoder option. Requires -PL2 calibration option.
- Requires the use of an Aerotech controller. Consult factory if using a third-party controller.
- Maximum speed is load dependent. Contact an Aerotech Application Engineer if imbalanced loads are present.
- Unloaded acceleration.
- On-axis loading is listed.
- Specifications are for single-axis systems measured 25 mm above the tabletop. Performance of multi-axis systems is payload and workpoint dependent. Consult factory for multi-axis or non-standard applications.

Electrical Specifications		AGR50	AGR75	AGR100	AGR150	AGR200
Drive System		Precision Worm-Gear with Brushless Servomotor				
Feedback	Standard	Noncontact Rotary Encoder Contained Within Motor; See Motor Description Under "Ordering Options" Section for Details				
	Direct Encoder	Noncontact Rotary Encoder Directly Mounted to AGR Stage Shaft				
		15744 Lines/Rev	18000 Lines/Rev	23600 Lines/Rev	31488 Lines/Rev	40000 Lines/Rev
Maximum Bus Voltage with Brushless Servomotor (BM Models)		80 VDC		320 VDC		
Limit Switches		5 V, Normally Closed				
Home Switch		Near Limit (for Limited Travel Stage Version)				

## AGR SERIES ORDERING OPTIONS

### Model (Required)

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<b>AGR50</b>	Gear-driven rotary stage, 50 mm diameter clear aperture
<b>AGR75</b>	Gear-driven rotary stage, 75 mm diameter clear aperture
<b>AGR100</b>	Gear-driven rotary stage, 100 mm diameter clear aperture
<b>AGR150</b>	Gear-driven rotary stage, 150 mm diameter clear aperture
<b>AGR200</b>	Gear-driven rotary stage, 200 mm diameter clear aperture

### Motor (Optional)

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<b>-M5</b>	BM75 brushless servomotor and 2500-line TTL encoder (AGR100, AGR150) BM250 brushless servomotor and 2500-line TTL encoder (AGR200)
<b>-M6</b>	BM75 brushless servomotor and 2500-line TTL encoder with brake (AGR100, AGR150) BM250 brushless servomotor and 2500-line TTL encoder with brake (AGR200)
<b>-M7</b>	BM75 brushless servomotor and 1000-line 1 Vpp encoder (AGR100, AGR150) BM250 brushless servomotor and 1000-line 1 Vpp encoder (AGR200)
<b>-M8</b>	BM75 brushless servomotor and 1000-line 1 Vpp encoder with brake (AGR100, AGR150) BM250 brushless servomotor and 1000-line 1 Vpp encoder with brake (AGR200)
<b>-M11</b>	BM24 brushless servomotor and 2500-line TTL encoder (AGR50, AGR75)
<b>-M12</b>	BM24 brushless servomotor and 2500-line TTL encoder with brake (AGR50, AGR75)
<b>-M13</b>	BM24 brushless servomotor and 1000-line 1 Vpp encoder (AGR50, AGR75)
<b>-M14</b>	BM24 brushless servomotor and 1000-line 1 Vpp encoder with brake (AGR50, AGR75)

*Other motor options are available upon request. Contact Aerotech for more information.*

### Motor Location (Required)

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<b>-ML1</b>	Motor located on right side of stage housing, standard (see diagram)
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*Other motor location and orientation options are available upon request. Contact Aerotech for more information.*

### Motor Orientation (Optional)

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<b>-2</b>	Motor orientation 2
<b>-3</b>	Motor orientation 3, standard
<b>-4</b>	Motor orientation 4
<b>-5</b>	Motor orientation 5

*Note: See diagram for details.*

### Travel (Required)

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	Continuous travel (standard)
<b>-TR015</b>	Limited travel, $\pm 7.5$ degrees
<b>-TR030</b>	Limited travel, $\pm 15$ degrees
<b>-TR045</b>	Limited travel, $\pm 22.5$ degrees
<b>-TR060</b>	Limited travel, $\pm 30$ degrees
<b>-TR075</b>	Limited travel, $\pm 37.5$ degrees
<b>-TR090</b>	Limited travel, $\pm 45$ degrees

*Travel options continued on next page*

## AGR SERIES ORDERING OPTIONS

<b>-TR105</b>	Limited travel, $\pm 52.5$ degrees
<b>-TR120</b>	Limited travel, $\pm 60$ degrees
<b>-TR135</b>	Limited travel, $\pm 67.5$ degrees
<b>-TR150</b>	Limited travel, $\pm 75$ degrees
<b>-TR165</b>	Limited travel, $\pm 82.5$ degrees
<b>-TR180</b>	Limited travel, $\pm 90$ degrees
<b>-TR195</b>	Limited travel, $\pm 97.5$ degrees
<b>-TR210</b>	Limited travel, $\pm 105$ degrees
<b>-TR225</b>	Limited travel, $\pm 112.5$ degrees
<b>-TR240</b>	Limited travel, $\pm 120$ degrees
<b>-TR255</b>	Limited travel, $\pm 127.5$ degrees
<b>-TR270</b>	Limited travel, $\pm 135$ degrees

*Note: -TRxxx limited travel options contain an extra 2 degrees of overtravel between the nominal travel and the electrical limit on each side (Ex: -TR270 contains  $\pm 135$  degrees of nominal travel, with  $\pm 137$  degrees of travel between electrical limits).*

### Limits (Required)

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**-LI1** Normally-closed, end-of-travel limit switches with 9-pin connector

*Note: Limits option is only available with limited-travel configurations.*

*Other limit options are available upon request. Contact Aerotech for more information.*

### Direct Rotary Feedback (Optional)

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**-E3** Direct, square-wave TTL output encoder, X50 multiplication

*Note: AGR stages configured with direct rotary feedback require calibration and therefore must include the -PL2 metrology option.*

*Other direct rotary feedback options are available upon request. Contact Aerotech for more information.*

### Tabletop (Optional)

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**-TT1** Metric tabletop

*Other tabletop options are available upon request. Contact Aerotech for more information.*

### Mounting Plate (Optional)

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**-MP1** Universal English/metric mounting plate

**-MP2** Metric Spacer Plate, Side Mounting Option

### Metrology (Required)

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**-PL0** No metrology performance plots

**-PL1** Metrology, uncalibrated with performance plots

**-PL2** Metrology, calibrated (HALAR) with performance plots

*Continued on next page*

## AGR SERIES ORDERING OPTIONS

### Integration (Required)

Aerotech offers both standard and custom integration services to help you get your system fully operational as quickly as possible. The following standard integration options are available for this system. Please consult Aerotech if you are unsure what level of integration is required, or if you desire custom integration support with your system.

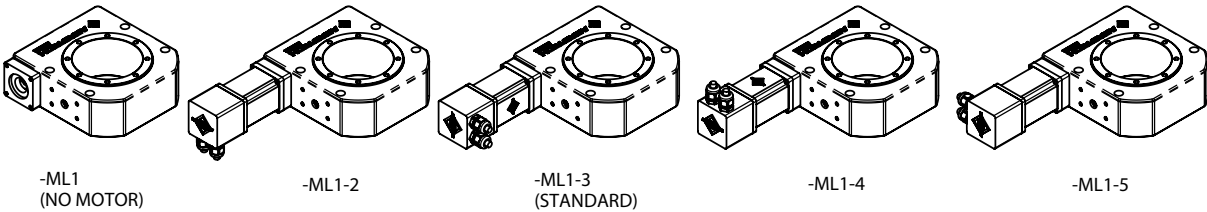
#### **-TAS Integration - Test as system**

Testing, integration, and documentation of a group of components as a complete system that will be used together (ex: drive, controller, and stage). This includes parameter file generation, system tuning, and documentation of the system configuration.

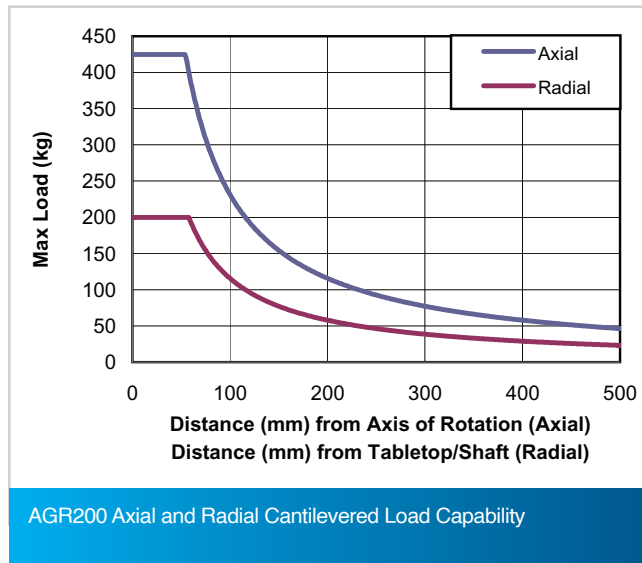
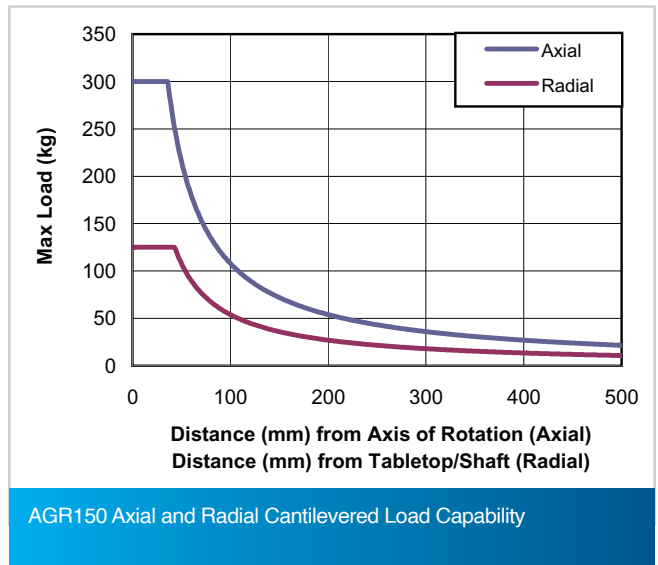
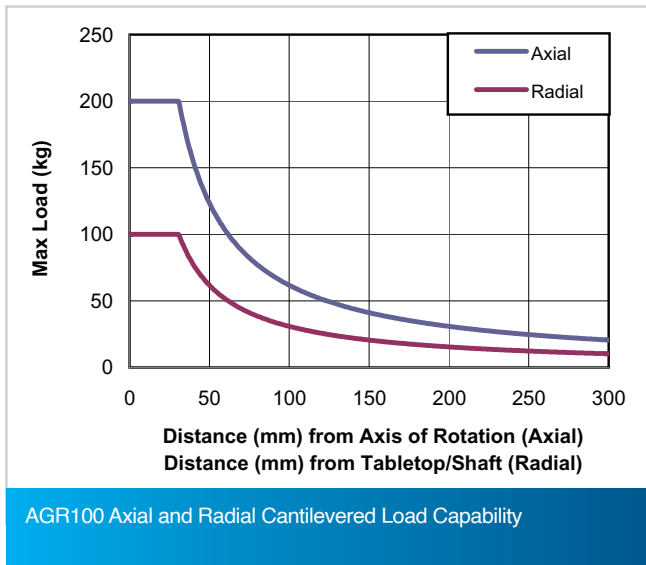
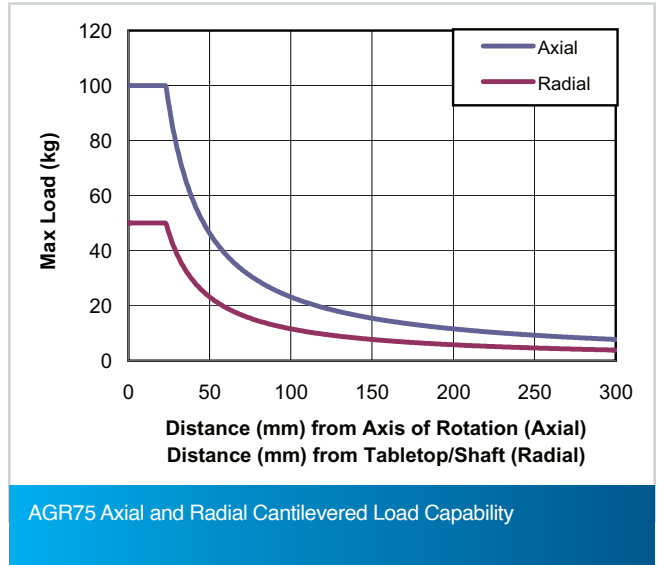
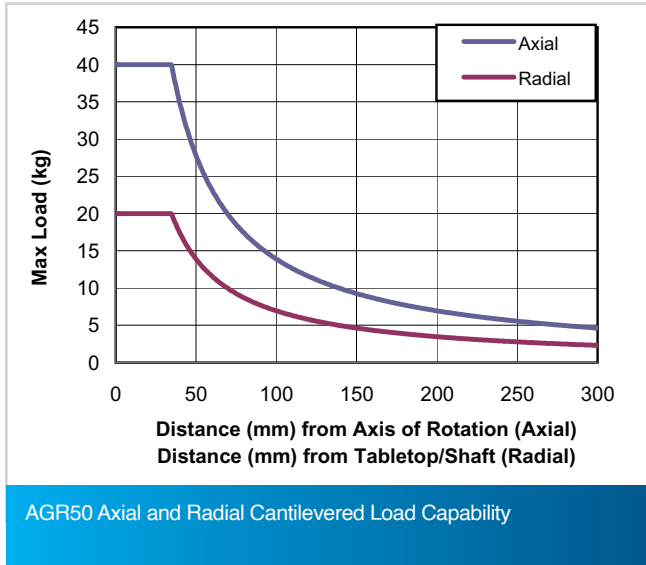
#### **-TAC Integration - Test as components**

Testing and integration of individual items as discrete components that ship together. This is typically used for spare parts, replacement parts, or items that will not be used together. These components may or may not be part of a larger system.

### AGR SERIES MOTOR LOCATION AND ORIENTATION OPTIONS



## AGR SERIES PERFORMANCE

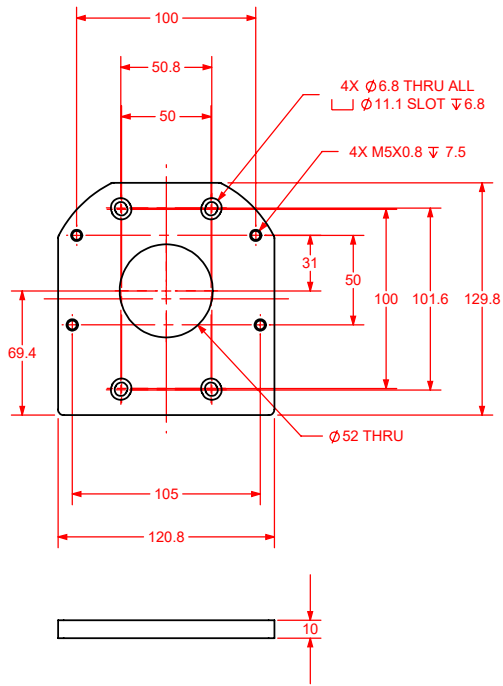




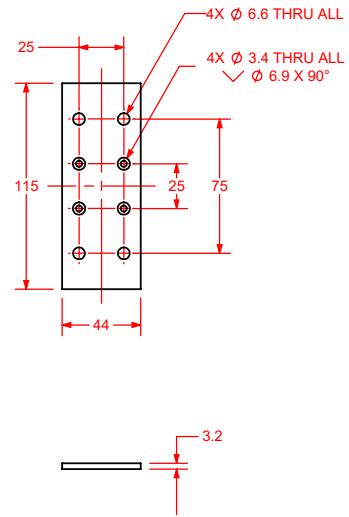
# AGR DIMENSIONS

## AGR50 ACCESSORIES

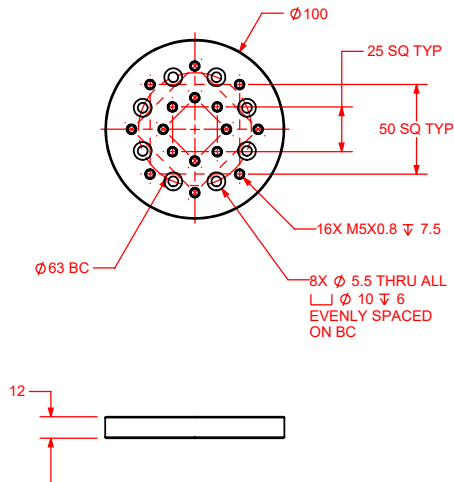
-MP1 MOUNTING PLATE



-MP2 METRIC SPACER PLATE, SIDE MOUNTING OPTION



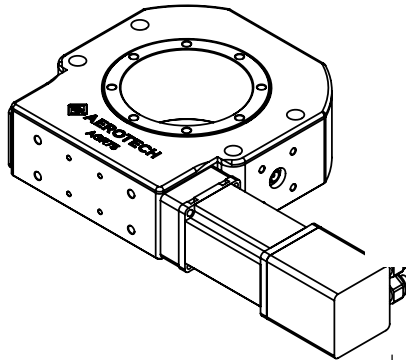
-TT1 TABLETOP



DIMENSIONS: MILLIMETERS

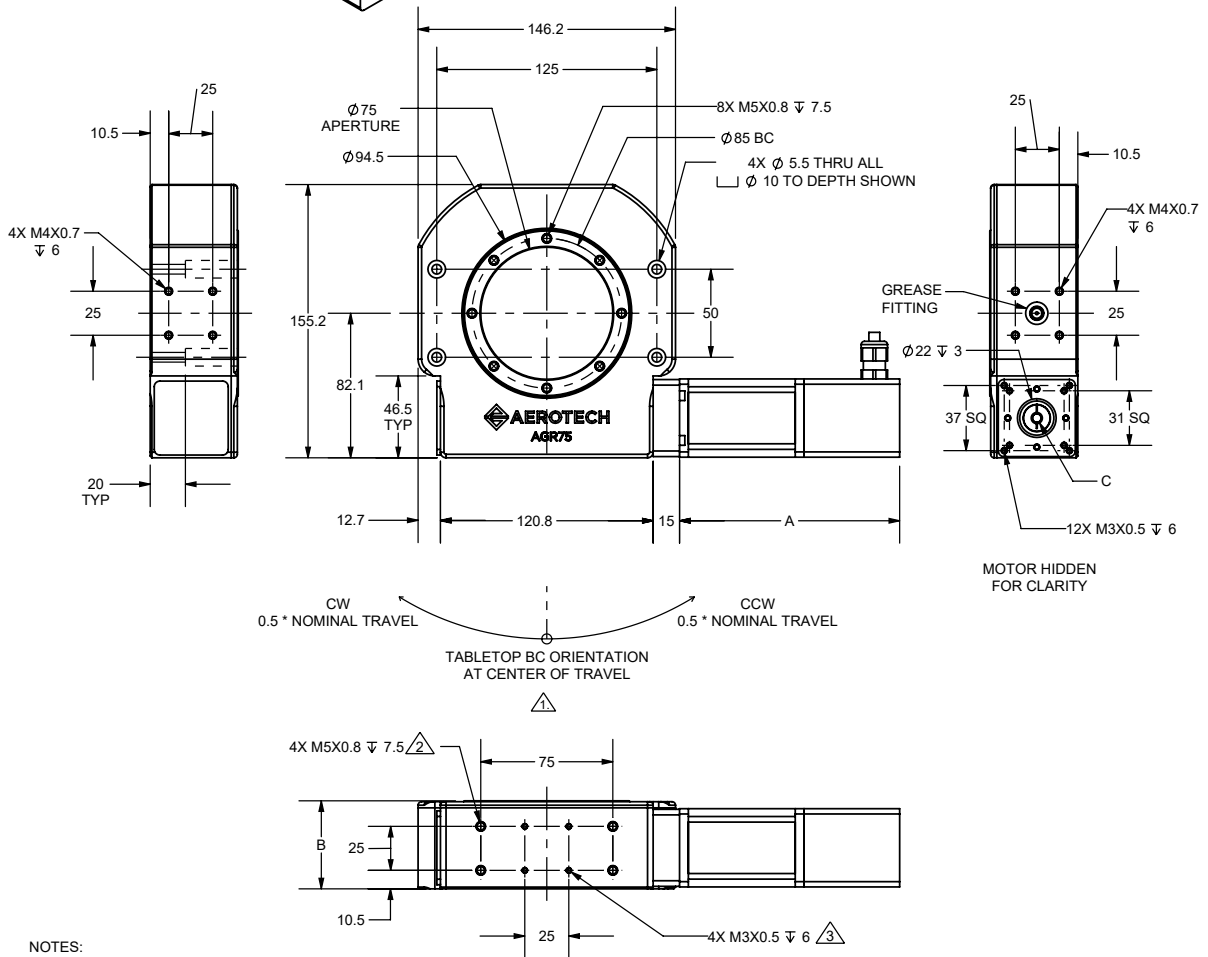
# AGR DIMENSIONS

## AGR75



MOTOR	LENGTH "A"	SHAFT INPUT DIAMETER "C"
NO MOTOR	-	Ø 6.35 [0.25]
-M1, -M3	125	Ø 6.35 [0.25]
-M2, -M4	153	Ø 6.35 [0.25]

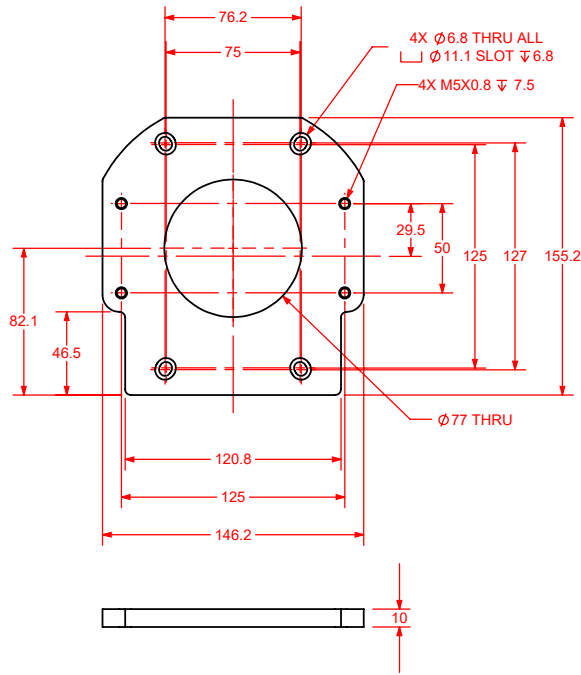
OPTION	HEIGHT "B"
DEFAULT	50
-E1, -E2, -E3	66.4



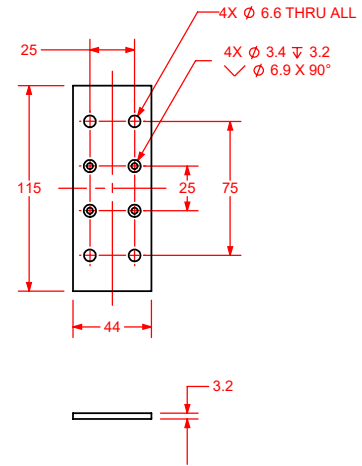
# AGR DIMENSIONS

## AGR75 ACCESSORIES

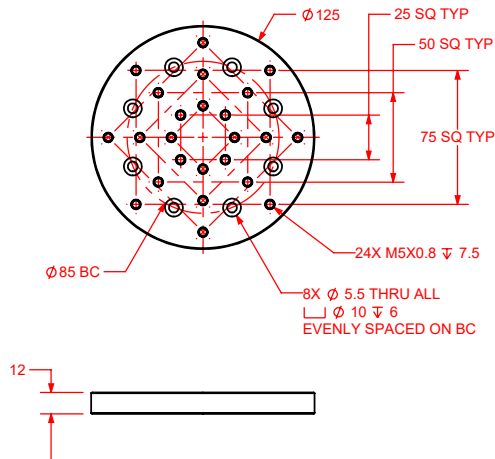
-MP1 MOUNTING PLATE



-MP2 METRIC SPACER PLATE, SIDE MOUNTING OPTION



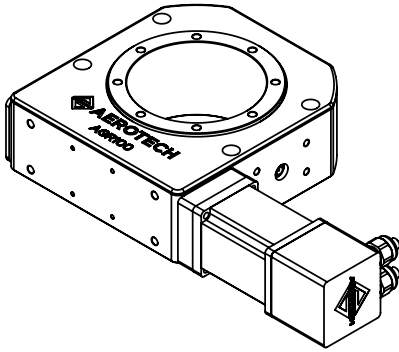
-TT1 TABLETOP



DIMENSIONS: MILLIMETERS

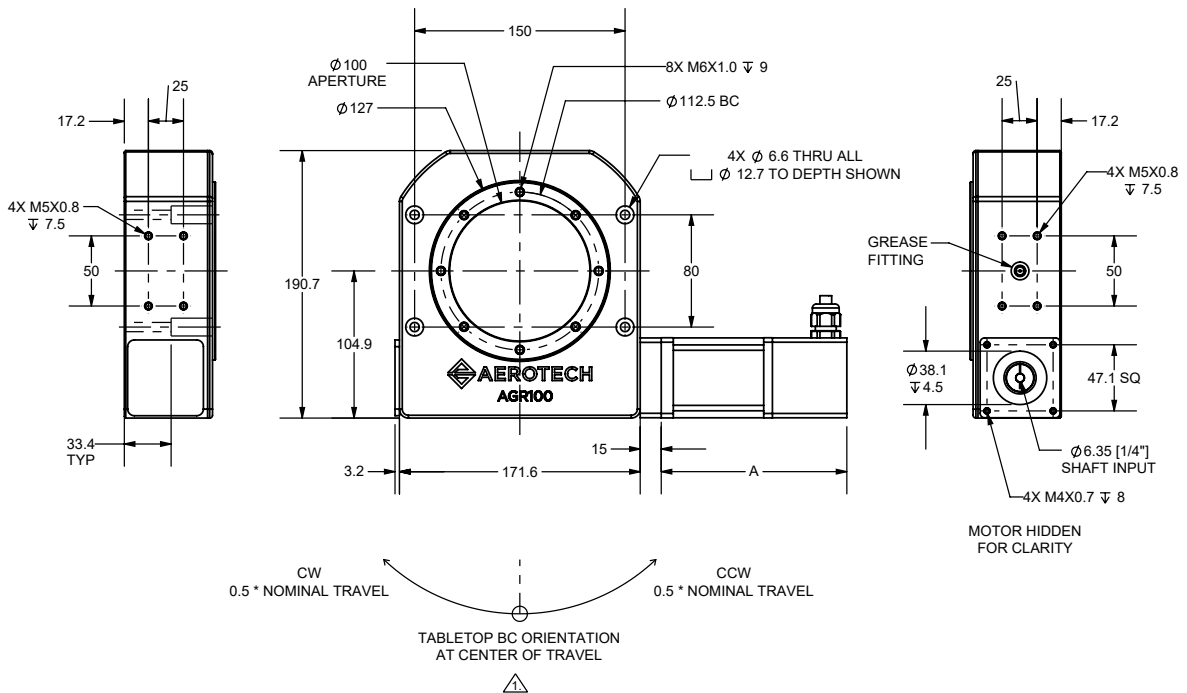
# AGR DIMENSIONS

## AGR100



MOTOR	LENGTH "A"
-M1, -M3, -M5, -M7	132.3
-M2, -M4, -M6, -M8	209.5

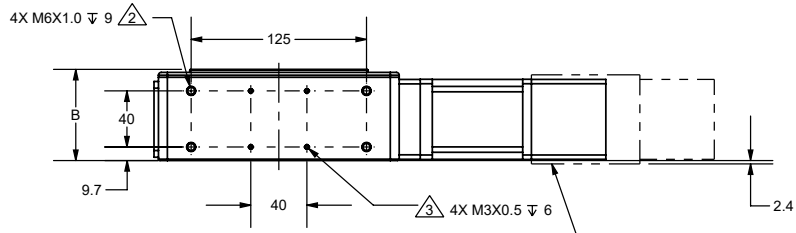
OPTION	HEIGHT "B"
DEFAULT	65
-E1, -E2, -E3	81



CW  
0.5 \* NOMINAL TRAVEL

CCW  
0.5 \* NOMINAL TRAVEL

TABLETOP BC ORIENTATION  
AT CENTER OF TRAVEL



**NOTES:**

- ⚠️ CW AND CCW TRAVEL LIMITATIONS APPLY TO -TRXXX LIMITED TRAVEL OPTION ONLY. ORIENTATION OF TABLETOP BC AT CENTER OF TRAVEL IS CONSISTENT FOR ALL CONFIGURATIONS.
- ⚠️ MOTOR MAY PROTRUDE BELOW THIS SURFACE. -MP2 REQUIRED WHEN USING SIDE MOUNTING HOLES.
- ⚠️ MOUNTING PLATE HOLES. NOT FOR STAGE MOUNTING

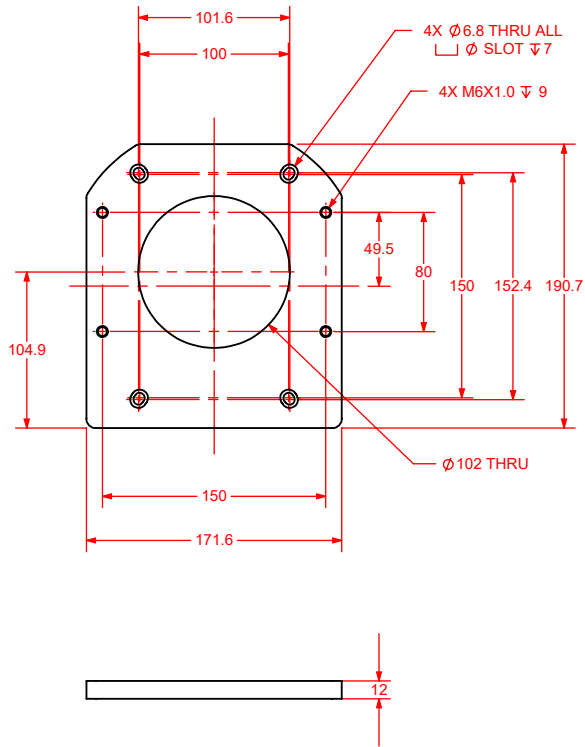
NOTE: BRAKE OPTIONS PROTRUDE BELOW MOUNTING SURFACE

DIMENSIONS: MILLIMETERS

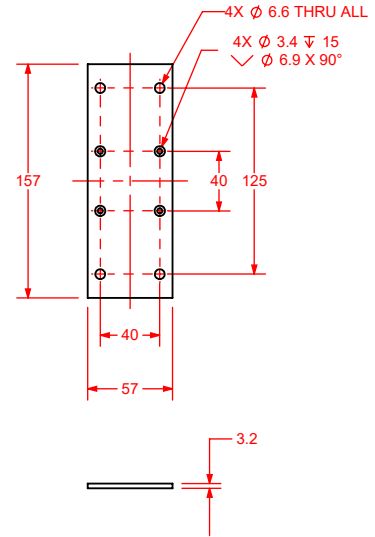
# AGR DIMENSIONS

## AGR100 ACCESSORIES

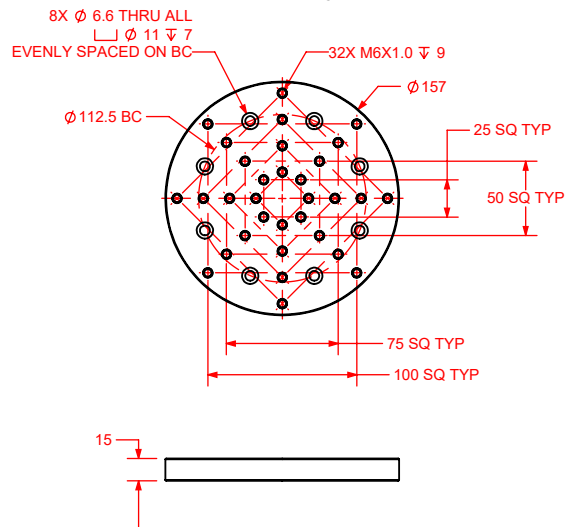
-MP1 MOUNTING PLATE



-MP2 METRIC SPACER PLATE, SIDE MOUNTING OPTION



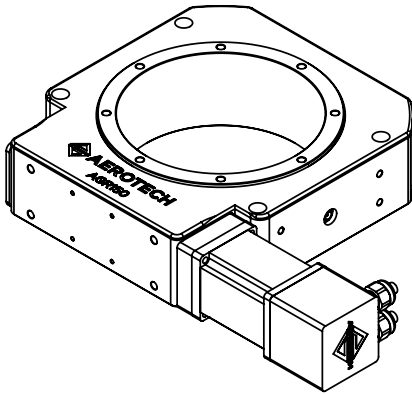
-TT1 TABLETOP



DIMENSIONS: MILLIMETERS

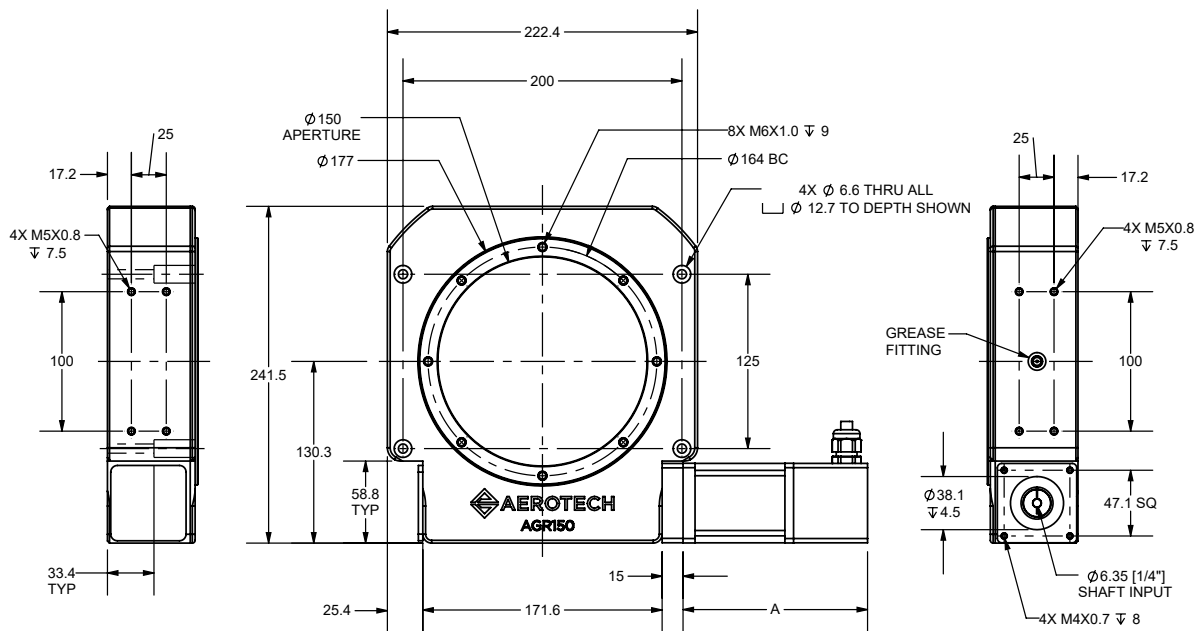
# AGR DIMENSIONS

## AGR150



MOTOR	LENGTH "A"
-M1, -M3, -M5, -M7	132.3
-M2, -M4, -M6, -M8	209.5

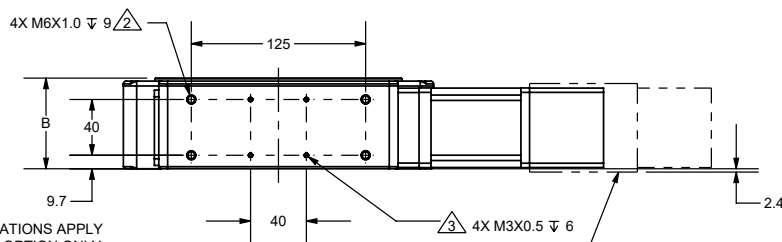
OPTION	HEIGHT "B"
DEFAULT	65
-E1, -E2, -E3	81



MOTOR HIDDEN FOR CLARITY

CW 0.5 \* NOMINAL TRAVEL CCW 0.5 \* NOMINAL TRAVEL

TABLETOP BC ORIENTATION AT CENTER OF TRAVEL



### NOTES:

1. CW AND CCW TRAVEL LIMITATIONS APPLY TO -TRXXX LIMITED TRAVEL OPTION ONLY. ORIENTATION OF TABLETOP BC AT CENTER OF TRAVEL IS CONSISTENT FOR ALL CONFIGURATIONS.
2. MOTOR MAY PROTRUDE BELOW THIS SURFACE. -MP2 REQUIRED WHEN USING SIDE MOUNTING HOLES.
3. MOUNTING PLATE HOLES. NOT FOR STAGE MOUNTING

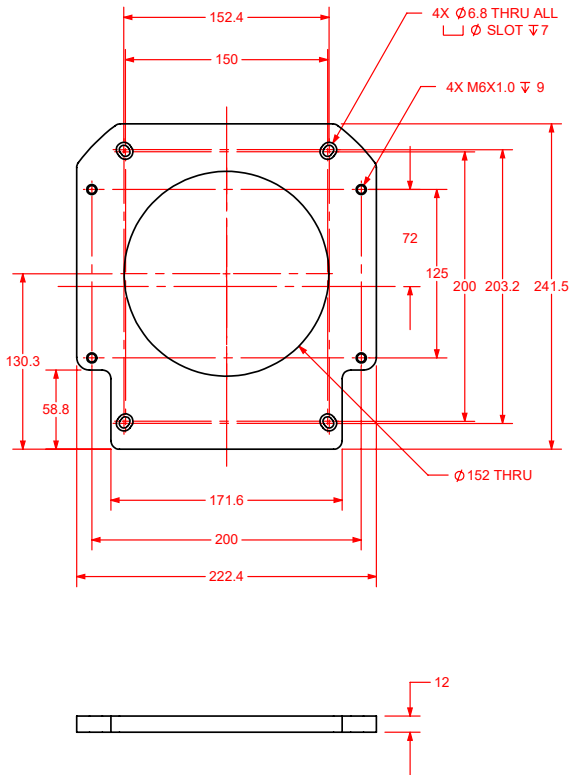
DIMENSIONS: MILLIMETERS

NOTE: BRAKE OPTIONS PROTRUDE BELOW MOUNTING SURFACE

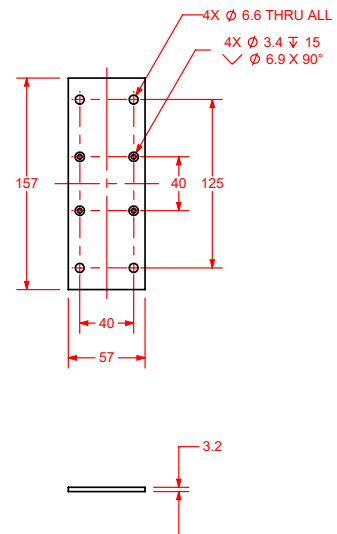
# AGR DIMENSIONS

## AGR150 ACCESSORIES

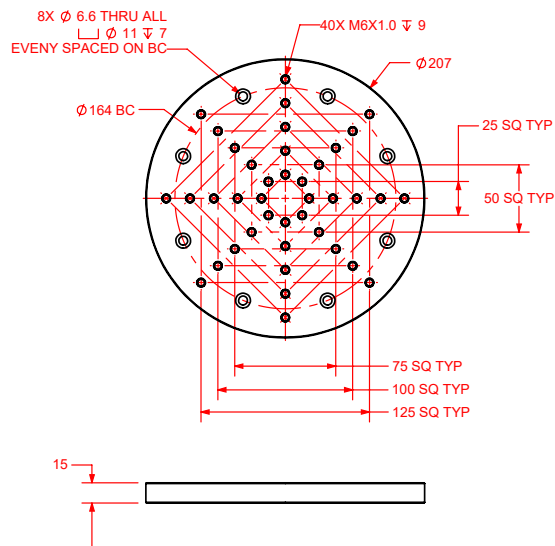
-MP1 MOUNTING PLATE



-MP2 METRIC SPACER PLATE, SIDE MOUNTING OPTION



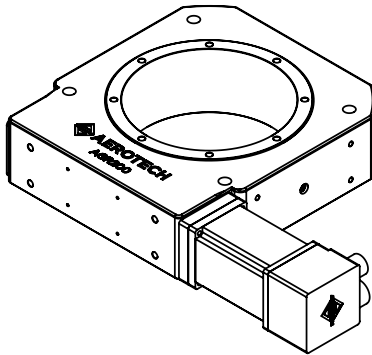
-TT1 TABLETOP



DIMENSIONS: MILLIMETERS

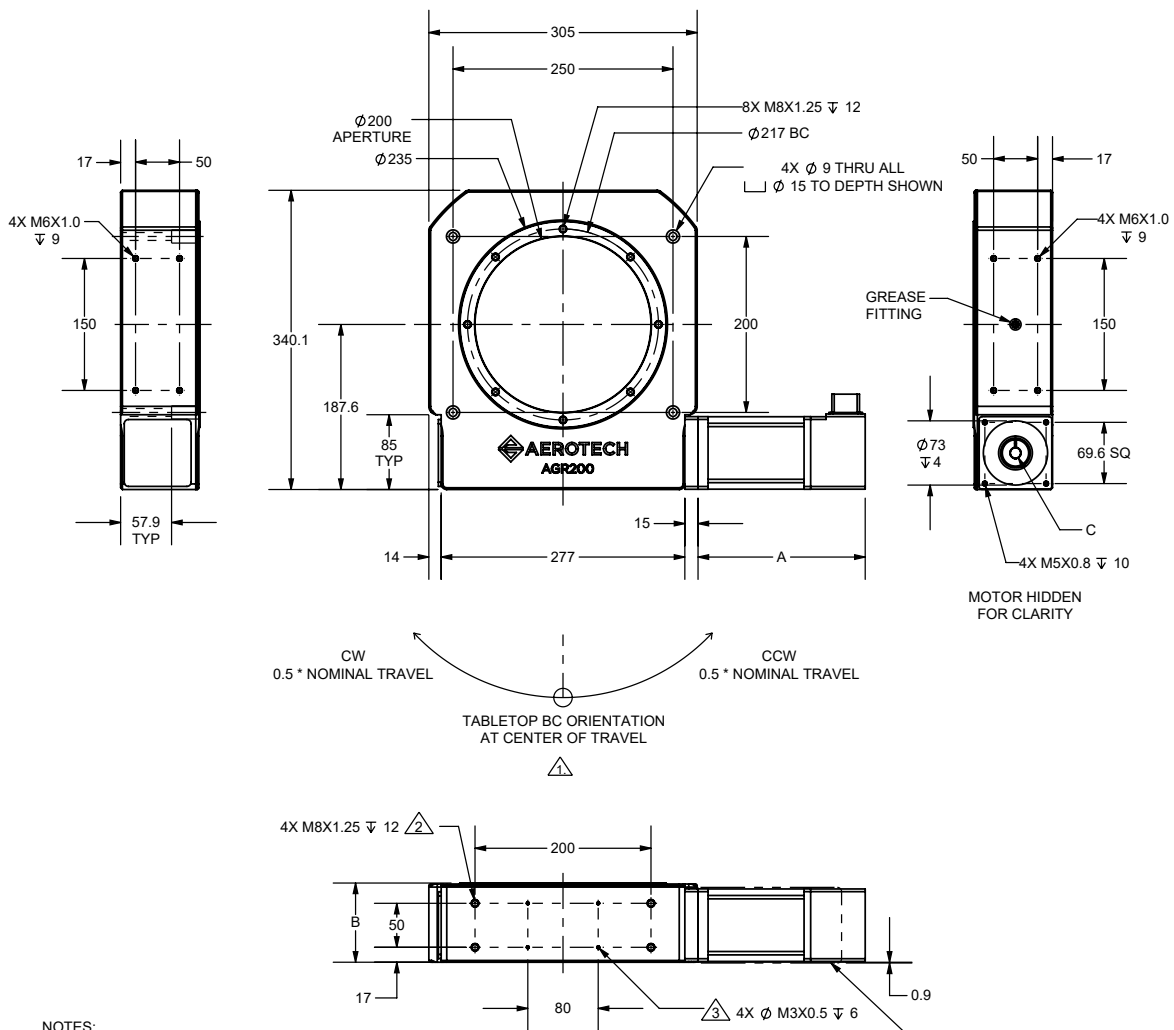
# AGR DIMENSIONS

## AGR200



MOTOR	LENGTH "A"	SHAFT INPUT DIAMETER "C"
-M1, -M3, -M5, -M7	190	Ø 12.7 [0.5]
-M2, -M4, -M6, -M8	245.6	Ø 12.7 [0.5]

OPTION	HEIGHT "B"
DEFAULT	90
-E1, -E2, -E3	108.5



### NOTES:

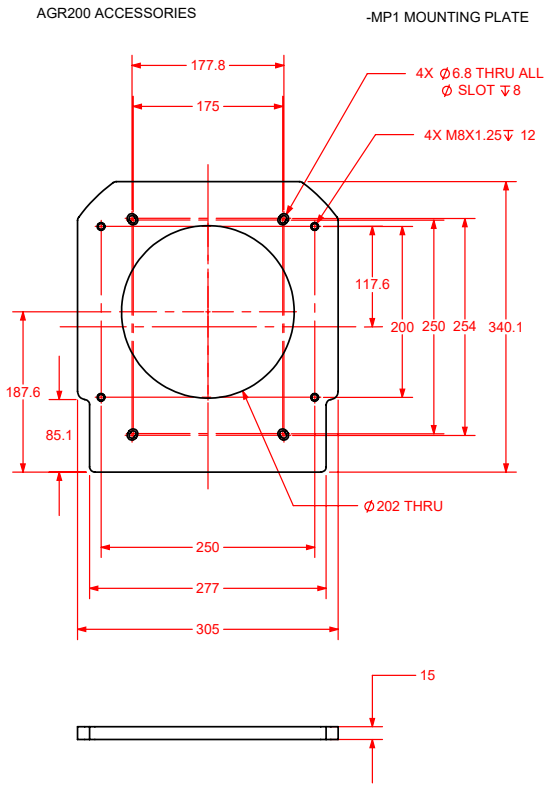
- 1. CW AND CCW TRAVEL LIMITATIONS APPLY TO -TRXXX LIMITED TRAVEL OPTION ONLY. ORIENTATION OF TABLETOP BC AT CENTER OF TRAVEL IS CONSISTENT FOR ALL CONFIGURATIONS.
- 2. MOTOR MAY PROTRUDE BELOW THIS SURFACE. -MP2 REQUIRED WHEN USING SIDE MOUNTING HOLES.
- 3. MOUNTING PLATE HOLES. NOT FOR STAGE MOUNTING

NOTE: STEPPER MOTOR OPTION PROTRUDES BELOW MOUNTING SURFACE

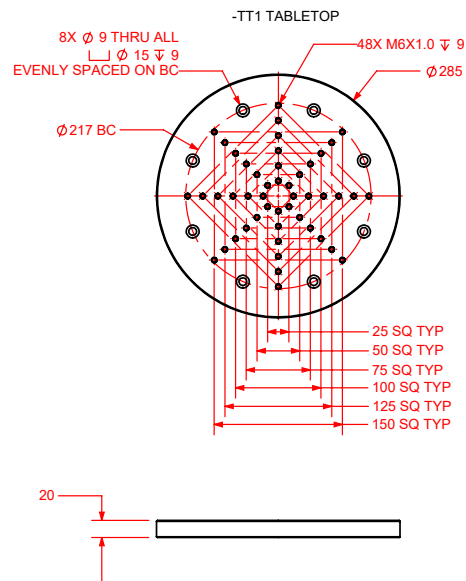
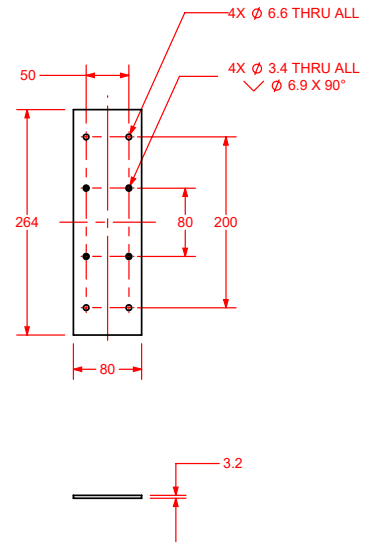
DIMENSIONS: MILLIMETERS [INCHES]

# AGR DIMENSIONS

## AGR200 ACCESSORIES



-MP2 METRIC SPACER PLATE, SIDE MOUNTING OPTION



DIMENSIONS: MILLIMETERS