High-Precision Two-Axis Laser Scan Head

AGV-HPO

Perfect Balance of Precision & Dynamics

The AGV-HPO two-axis laser scan head uses low inertia motors and mirrors with dual digital encoders for near-zero velocity and position tracking error. Its open housing design ensures low mass and a small installation footprint. Thermal drift performance is optimized via optional closed circuit water cooling for motors and the scanner housing. Optional forced-air mirror cooling increases laser power handling, allowing the AGV-HPO to maintain high precision for the most demanding laser processes. When calibrated via standard mark and measure procedures, the AGV-HPO provides valuable insight to path following error before a part is ever cut. High-reflectivity mirror coatings enable adequate power handling for both CW and pulsed laser applications.

Key Applications

The AGV-HPO is ideal for all types of 2D laser scanning applications where precision and throughput are critical to quality, including:

- Glass cutting
- Via drilling
- Surface texturing
- Micromachining

KEY FEATURES:

- Available in **10 MM, 14 MM, 20 MM & 30 MM** input apertures
- Standard **HIGH-PERFORMANCE REFLECTIVE COATINGS** range from UV (<300 nm) to CO2 (>10,600 nm)
- Digital position resolution of >24 bits
- Thermally stable open-housing design with **OPTIONAL CLOSED CIRCUIT WATER MOTOR COOLING** & gas mirror cooling
- Dual digital encoder feedback eliminates velocity error & enables **SINGLE-DIGIT, MICRON-LEVEL ACCURACY** throughout scanner Field of View (FOV)
- Easily integrated with traditional linear & servo motion to enable **INFINITE FIELD OF VIEW (IFOV)**

AGV-HPO SPECIFICATIONS

Mechanical Specifications		AGV10HPO	AGV14HPO	AGV20HPO	AGV30HPO
Optical Performance					
Beam Aperture		10 mm	14 mm	20 mm	30 mm
Maximum Scan Angle		±20°			
Beam Displacement		12.6 mm	16.5 mm	23.2 mm	35.7 mm
Feedback Resolution		0.012 µrad (25 bit)			
Dither (Min. Incremental Motion)[2]		<0.4 μrad_{rms}			
Accuracy		50 µrad pk-pk			
Repeatability[3]		0.4 μrad_{rms}			
Gain Error		0.05 mrad			
Non-Linearity		0.005%			
Dynamic Performance					
Tracking Error		0 µsec			
Peak Acceleration[4,5]		288,000 m/s^2	224,000 m/s^2	80,000 m/s^2	56,000 m/s^2
Continuous Acceleration[4,6]		75,200 m/s^2	56,000 m/s^2	20,800 m/s^2	19,200 m/s^2
Positioning Speed[4]		75 m/s	75 m/s	50 m/s	20 m/s
Marking Speed[4, 7, 8]		5 m/s	5 m/s	5 m/s	5 m/s
Jump & Settle Time, 1 mm Move[4,9]		270 µsec	270 µsec	450 µsec	700 µsec
Stability					
Long-Term Drift[3]	**Offset**	10 µrad/12 hrs			
		15 µrad/24 hrs			
	Gain	10 ppm/24 hrs			
Thermal Drift	**Offset**	10 µrad/°C			
	Gain	1 ppm/°C			
Mechanical Specifications					
Mass		2.5 kg	2.6 kg	2.9 kg	3.1 kg
Material		Aluminum (Black Anodize and Blue Paint)			
MTBF (Mean Time Between Failure)		20,000 Hours			

Notes:
1. All angles are optical unless otherwise specified
2. Without -AC air cooling option
3. After initial 3 hour warm-up, ambient temperature variation <±0.5 deg C
4. Typical performance with f = 160mm F-Theta objective
5. Based on maximum rated current of the motor
6. Based on rated rms current of the motor with -WC water cooling option; maximum continuous acceleration is 70% of this value without water cooling
7. Achievable with < 1% velocity error over continuous velocity portion of move
8. Marking speed is dependent on allowable tracking error
9. Settled to within 1% of move distance
10. All specifications are per axis unless otherwise noted

AGV-HP(O) ORDERING OPTIONS

AGV-HP(O) Series Galvanometer Scanner

AGV10HPO 2-axis galvanometer scanner with 10 mm diameter beam aperture and integral high-precision feedback

AGV14HPO 2-axis galvanometer scanner with 14 mm diameter beam aperture and integral high-precision feedback

AGV20HPO 2-axis galvanometer scanner with 20 mm diameter beam aperture and integral high-precision feedback

AGV30HPO 2-axis galvanometer scanner with 30 mm diameter beam aperture and integral high-precision feedback

Beam Entry (Required)

-BE1 Right-side laser beam entry (standard)

-BE2 Left-side laser beam entry

Note: -BE2 is not available with AGV30HP or AGV30HPO.

Wavelength of Mirror Coating (Required)

-W001 10.6 µm
-W002 Durable Silver (450 nm - 10.6 µm)
-W003 1552 nm
-W004 1064 nm
-W005 1030 nm
-W006 532 nm
-W007 515 nm
-W008 355 nm
-W009 343 nm
-W012 9.3 µm
-W011S* 1030/515/343 nm Tri-band

Notes: Custom coatings available. Contact factory for details.
**Dynamic performance specifications do not apply to this option. Contact the factory for more information.*

F-Theta Lenses Available (Optional)[1, 2]

-Lxx See Table AGV F-Theta Lenses

Air Cooling (Optional)

-AC Air cooling

Water Cooling (Optional)

-WC Water cooling

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.

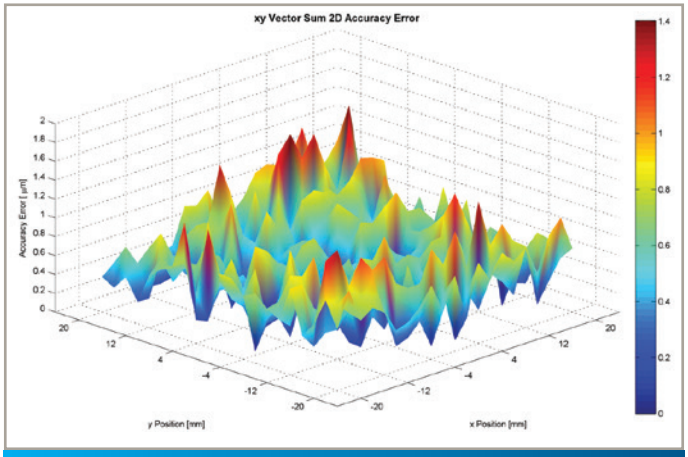
-TAS **Integration - Test as system**
Testing, integration and documentation of a group of components as a complete system that will be used together (ex: drive, controller and stage). This includes parameter file generation, system tuning and documentation of the system configuration.

continued on next page

AGV-HPO ORDERING OPTIONS

Lens Mounting Adapters (to be ordered as separate line item)

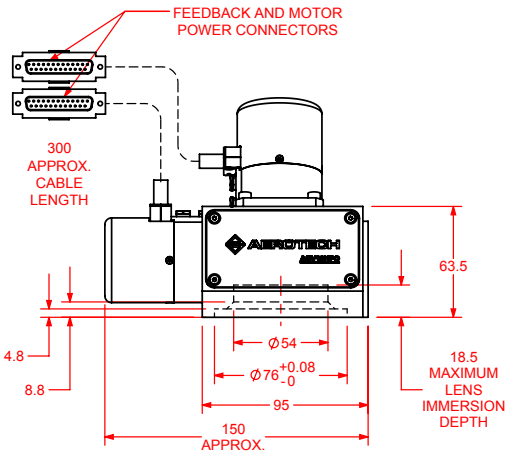
LM10HP-XXX	Lens mount adapter for AGV10HPO; standard versions support the lens configurations offered by Aerotech; custom versions available on request
LM14HP-XXX	Lens mount adapter for AGV14HPO; standard versions support the lens configurations offered by Aerotech; custom versions available on request
LM20HP-XXX	Lens mount adapter for AGV20HPO; standard versions support the lens configurations offered by Aerotech; custom versions available on request
LM30HP-XXX	Lens mount adapter for AGV30HPO; standard versions support the lens configurations offered by Aerotech; custom versions available on request

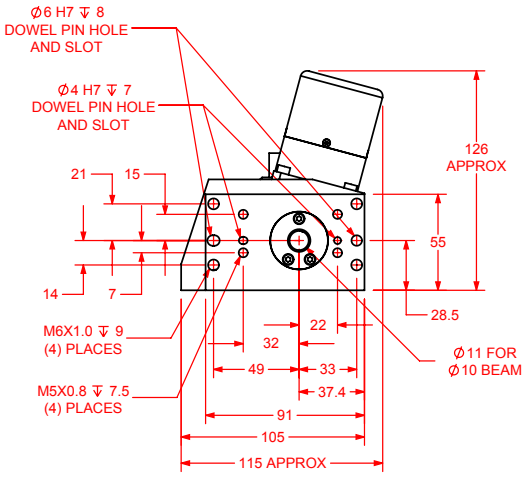


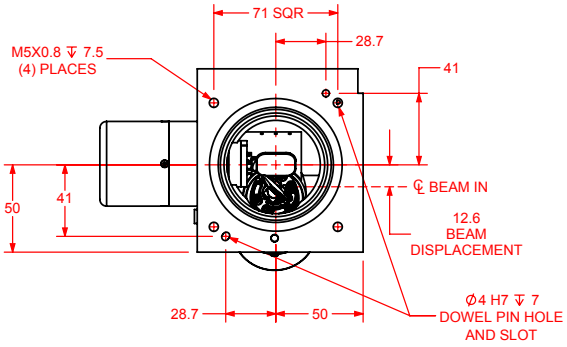
AGV-HPO provides industry-best micron-level 2D accuracy over the entire field of view.

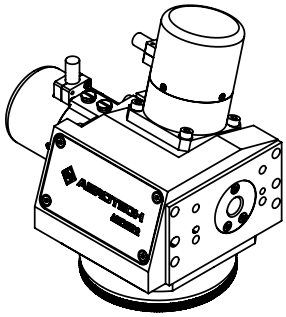
AGV-HPO DIMENSIONS

AGV10HPO-BE1

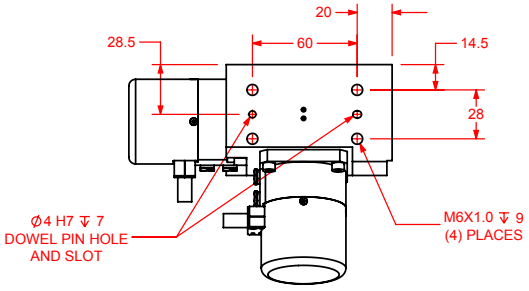


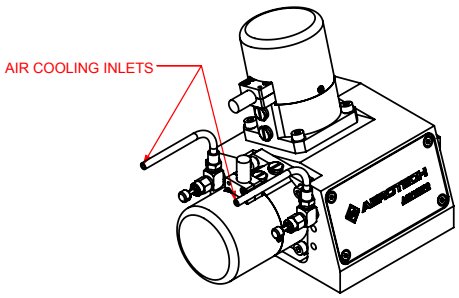




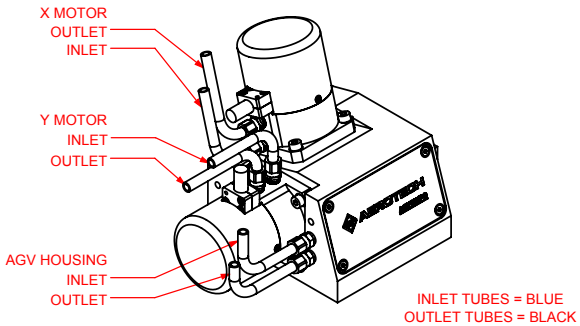


(-L3) F-THETA LENS
NO COOLING OPTIONS





(-AC) AIR COOLING OPTION

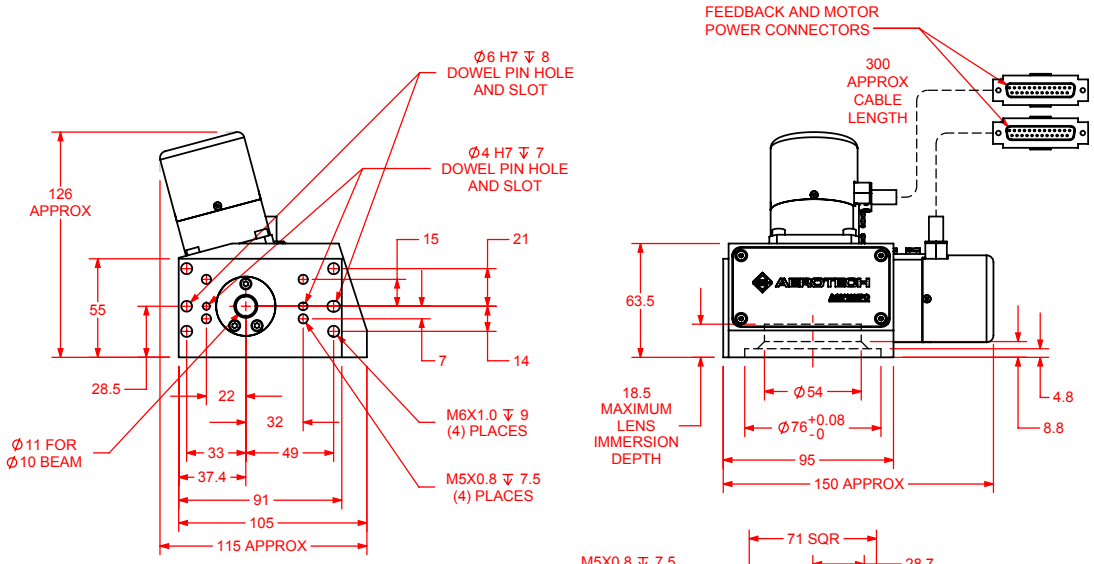


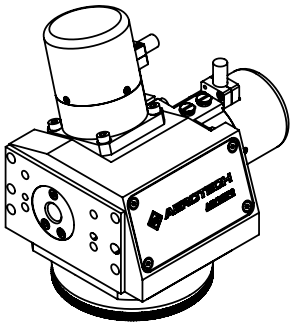
(-WC) WATER COOLING OPTION

DIMENSIONS: MILLIMETERS

AGV-HPO DIMENSIONS

AGV10HPO-BE2





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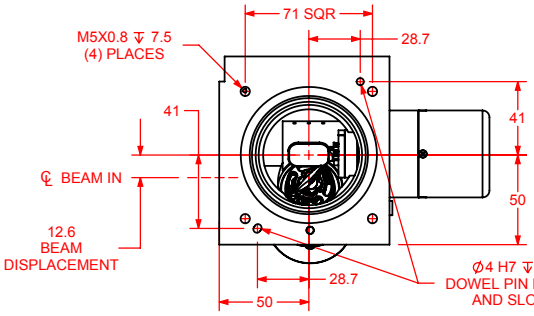
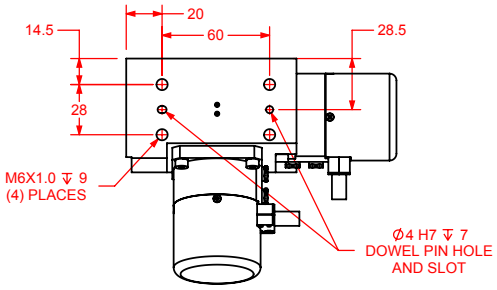
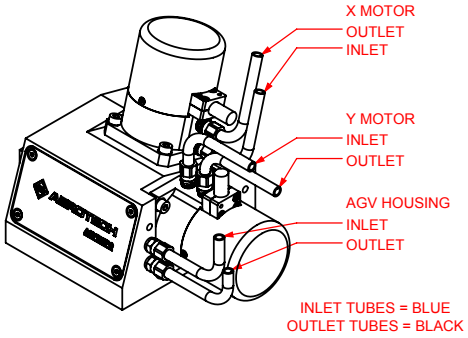
NO COOLING OPTIONS







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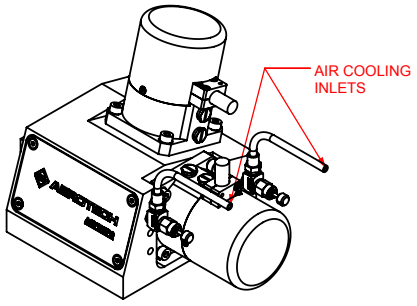
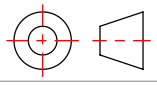


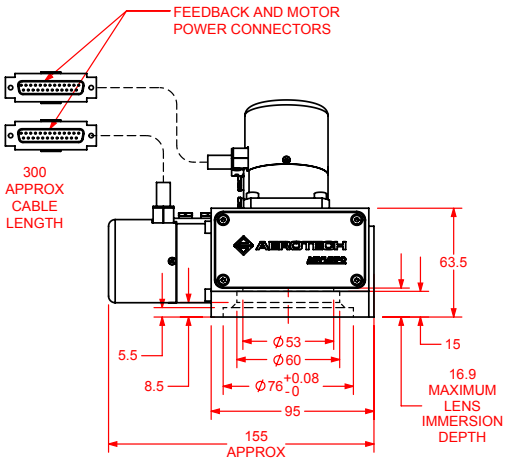
(-AC) AIR COOLING OPTION

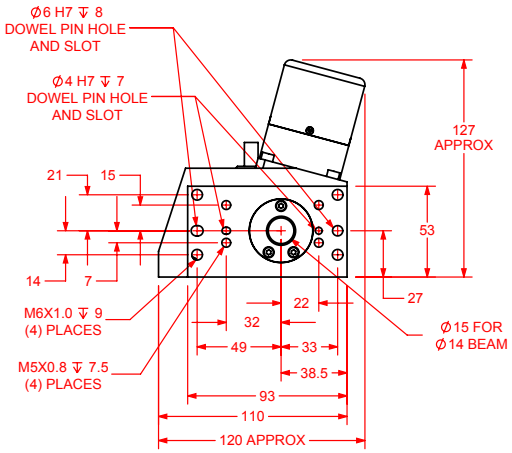
DIMENSIONS: MILLIMETERS

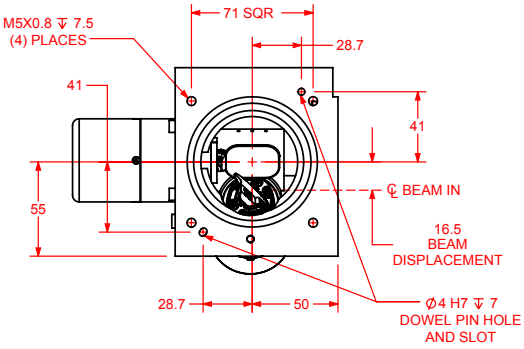


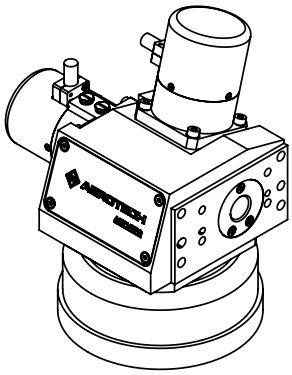
AGV-HP0 DIMENSIONS

AGV14HP0-BE1

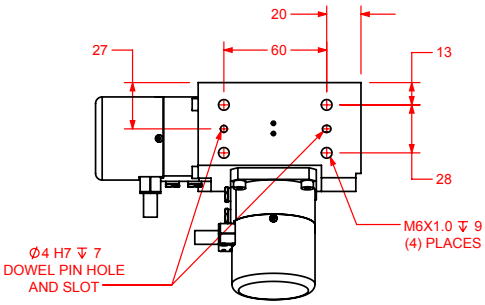


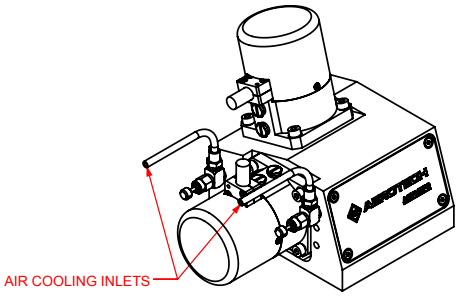






(-L9) F-THETA LENS OPTION
NO COOLING OPTIONS





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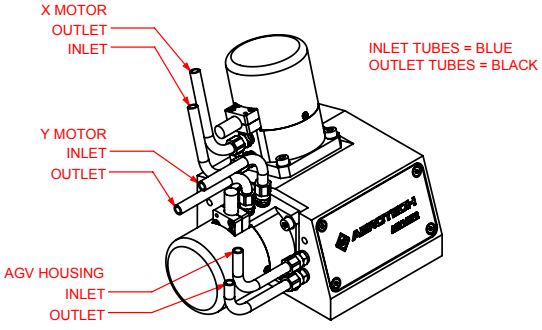
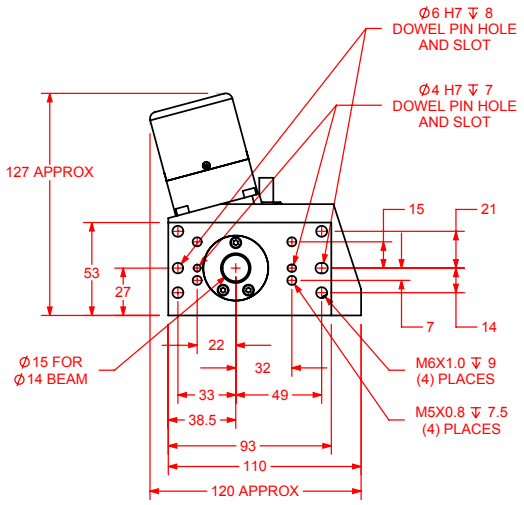


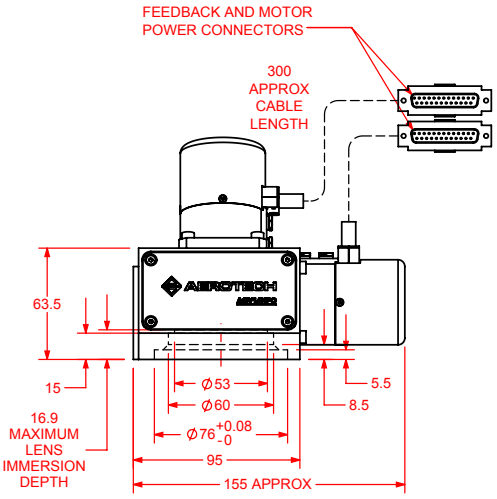
(-WC) WATER COOLING OPTION

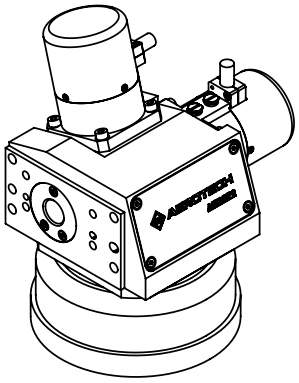
DIMENSIONS: MILLIMETERS

AGV-HPO DIMENSIONS

AGV14HPO-BE2







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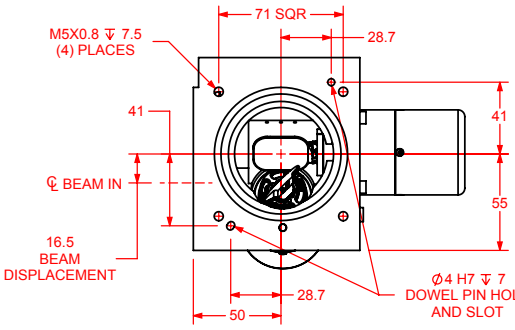
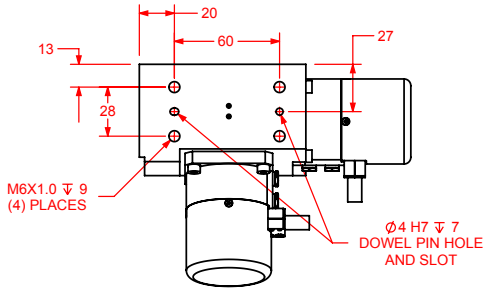
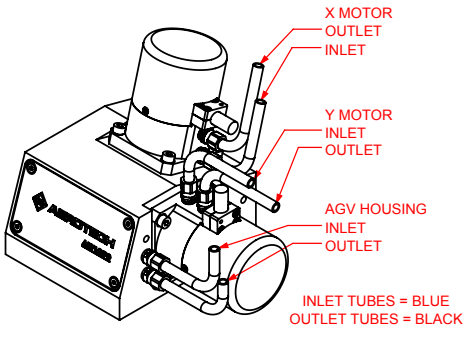
NO COOLING OPTIONS







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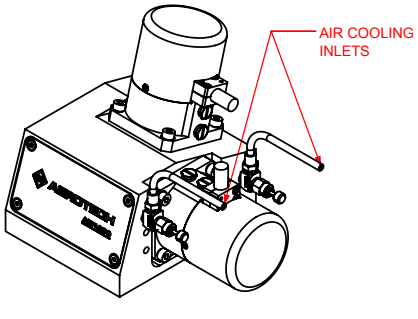
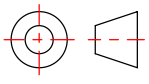


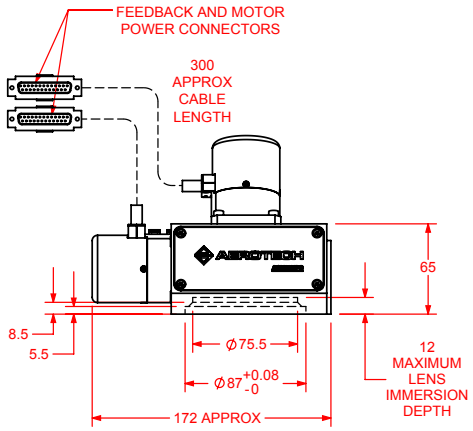
(-AC) AIR COOLING OPTION

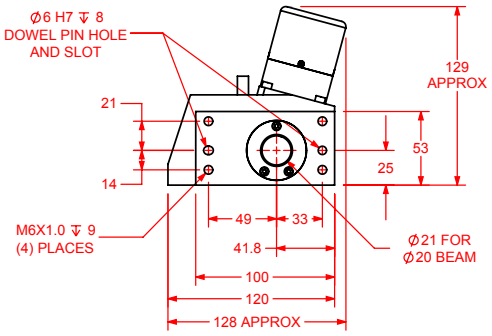
DIMENSIONS: MILLIMETERS

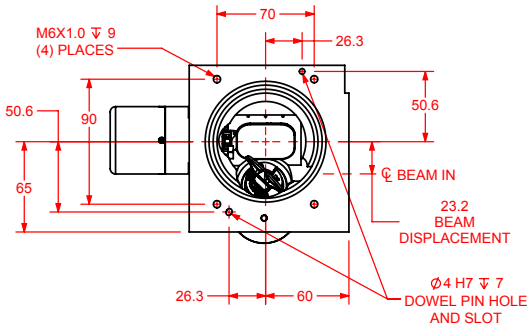


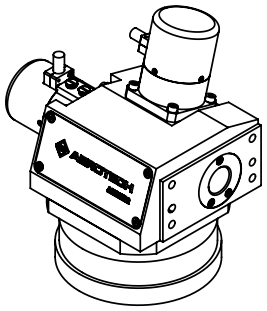
AGV-HPO DIMENSIONS

AGV20HPO-BE1

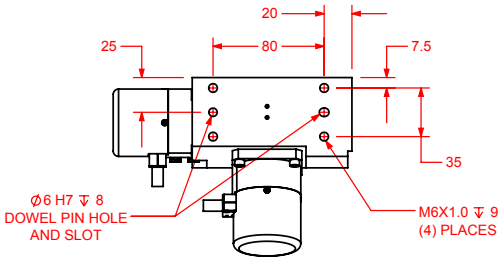


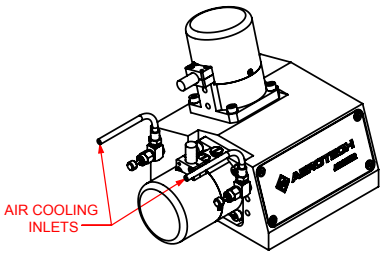






(-L7) F-THETA LENS
NO COOLING OPTIONS





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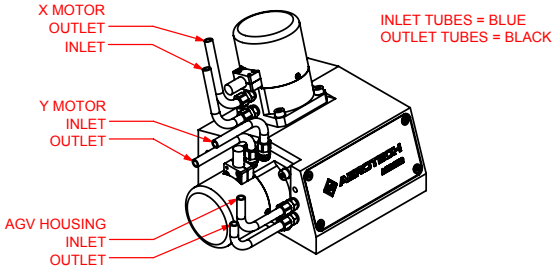
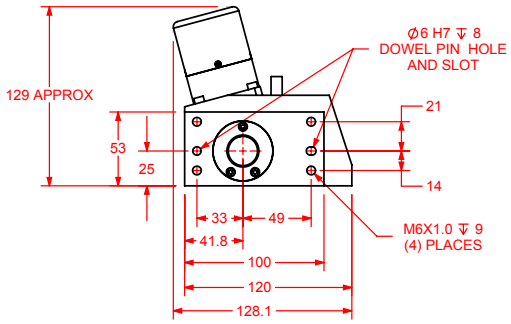


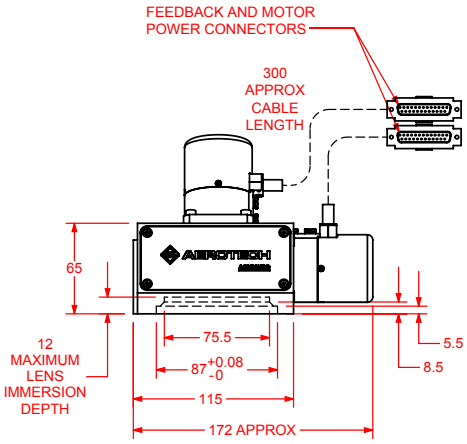
(-WC) WATER COOLING OPTION

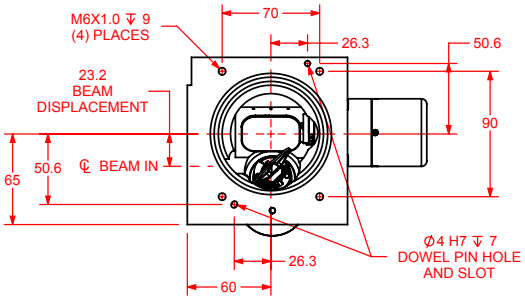
DIMENSIONS: MILLIMETERS

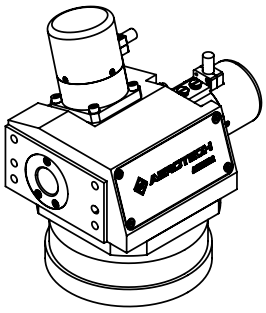
AGV-HPO DIMENSIONS

AGV20HPO-BE2

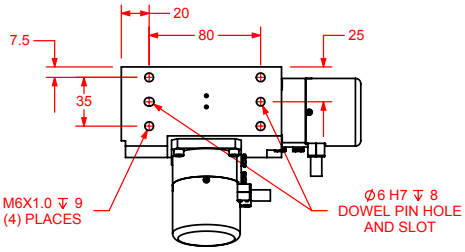


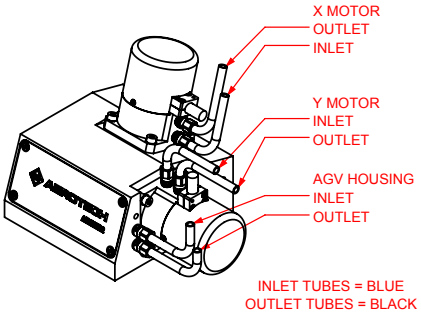






(-L7) F-THETA LENS
NO COOLING OPTIONS





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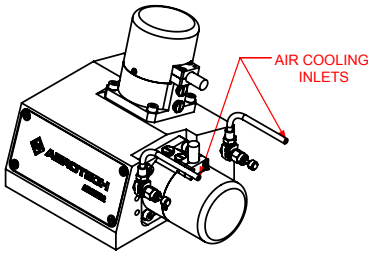
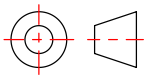


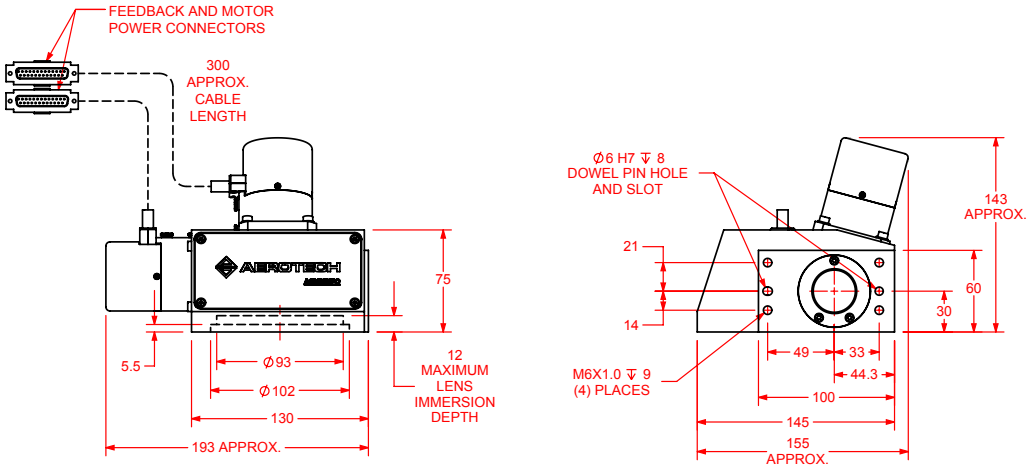
(-AC) AIR COOLING OPTION

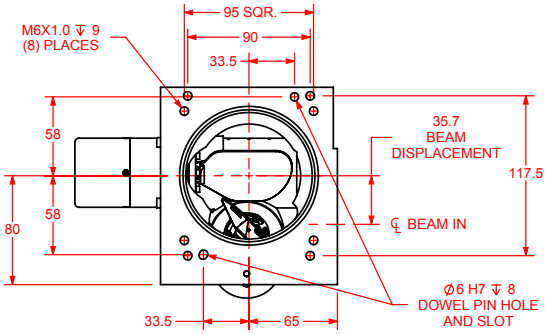
DIMENSIONS: MILLIMETERS

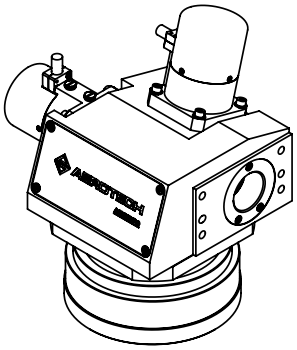


AGV-HPO DIMENSIONS

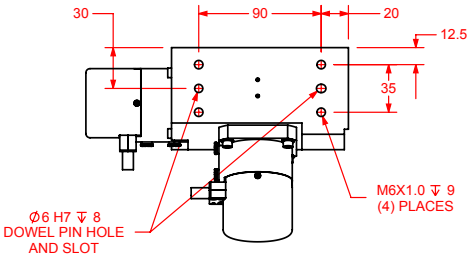
AGV30HPO-BE1

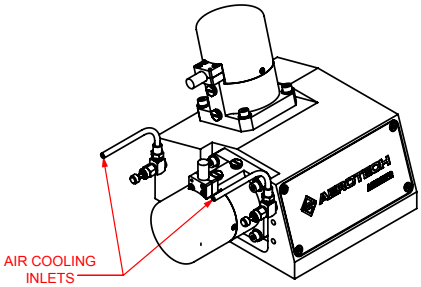




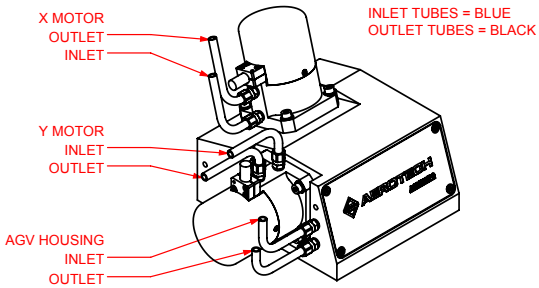


(-L3) F-THETA LENS
NO COOLING OPTIONS





(-AC) AIR COOLING OPTION



(-WC) WATER COOLING OPTION

DIMENSIONS: MILLIMETERS