



---

## High-Dynamic Laser Scan Heads **AGV-XPO**

---

### **Excellent Dynamics and Superior Accuracy**

AGV-XPO, our premier two-axis laser scan head, helps to minimize the tradeoff between speed and precision. Its low-inertia, high-efficiency motors enable rapid acceleration profiles, while ultra-high resolution position feedback and optimized structural dynamics provide excellent part-profile tracking with minimal following error. Pair AGV-XPO with an Aerotech controller to enhance your process through advanced motion capabilities and coordination with other axes of motion.

### **Key Applications**

AGV-XPO is ideal for high-throughput applications that require superior dynamic precision, minimal following error and rapid move-and-settle performance, including:

- ◆ Display processing
- ◆ High-speed drilling & cutting
- ◆ Electronics manufacturing
- ◆ Large-field & long focal length scanning
- ◆ Femtosecond laser processing



### **KEY FEATURES:**

- ◆ **INCREASES PROCESS THROUGHPUT** with innovative, dynamically optimized design
- ◆ Provides superior dynamic accuracy & **IMPROVES PROCESS YIELD** with high-resolution feedback
- ◆ **ENHANCES THERMAL STABILITY** with optional air & water cooling
- ◆ **OFFERS SYSTEM DESIGN FLEXIBILITY** with a multitude of optical configurations
- ◆ Synchronizes easily with other motion axes, offering **SEAMLESS INTEGRATION & EASE OF USE**

## AGV-XPO SPECIFICATIONS

Specifications	AGV10XPO	AGV14XPO	AGV20XPO
<b>Optical Performance</b>			
Beam Aperture	10 mm	14 mm	20 mm
Maximum Scan Angle	±20°		
Beam Displacement	12.6 mm	16.5 mm	23.2 mm
Feedback Resolution	0.012 μrad (25 bit) (-E1) 0.00016 μrad (32 bit) (-E2)		
Dither (Min. Incremental Motion) <sup>(2)</sup>	0.4 μrad RMS (-E1) 0.02 μrad RMS (-E2)		
Accuracy	50 μrad pk-pk		
Repeatability <sup>(3)</sup>	0.4 μrad RMS		
Gain Error	0.05 mrad		
Non-Linearity	0.005%		
<b>Dynamic Performance</b>			
Tracking Error	0 μsec		
Peak Acceleration <sup>(4)(5)</sup>	355,000 m/s <sup>2</sup> (-E1) 300,000 m/s <sup>2</sup> (-E2)	262,000 m/s <sup>2</sup> (-E1) 231,000 m/s <sup>2</sup> (-E2)	95,000 m/s <sup>2</sup> (-E1) 88,000 m/s <sup>2</sup> (-E2)
Continuous Acceleration <sup>(4)(6)</sup>	95,000 m/s <sup>2</sup> (-E1) 80,000 m/s <sup>2</sup> (-E2)	66,000 m/s <sup>2</sup> (-E1) 58,000 m/s <sup>2</sup> (-E2)	25,000 m/s <sup>2</sup> (-E1) 23,000 m/s <sup>2</sup> (-E2)
Positioning Speed <sup>(4)</sup>	84 m/s (-E1) 32 m/s (-E2)	81 m/s (-E1) 32 m/s (-E2)	55 m/s (-E1) 32 m/s (-E2)
Jump & Settle Time, 1 mm Move <sup>(4)(7)</sup>	210 μs (-E1) 250 μs (-E2)	225 μs (-E1) 260 μs (-E2)	280 μs (-E1) 340 μs (-E2)
<b>Stability</b>			
Long-Term Drift-Offset <sup>(3)</sup>	10 μrad/12 hrs 15 μrad/24 hrs		
Long-Term Drift-Gain <sup>(3)</sup>	10 ppm/24 hrs		
Thermal Drift-Offset	10 μrad/°C		
Therman Drift-Gain	1 ppm/°C		
<b>Mechanical Specifications</b>			
Mass	2.5 kg (-E1) 3.1 kg (-E2)	2.6 kg (-E1) 3.2 kg (-E2)	2.9 kg (-E1) 3.5 kg (-E2)
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 °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. Settled to within 1% of move distance.
8. All specifications are per axis unless otherwise noted.

## AGV-XPO ORDERING OPTIONS

### AGV-XPO Series High-Dynamic Laser Scan Head

---

**AGV10XPO** 2-axis galvanometer scanner with 10 mm diameter beam aperture

**AGV14XPO** 2-axis galvanometer scanner with 14 mm diameter beam aperture

**AGV20XPO** 2-axis galvanometer scanner with 20 mm diameter beam aperture

Contact factory for additional aperture options.

### Feedback (Required)

---

**-E1** High-resolution encoder feedback

**-E2** Ultra high-resolution encoder feedback

### Beam Entry (Required)

---

**-BE1** Right-side laser beam entry (standard)

**-BE2** Left-side laser beam entry

### Wavelength of Mirror Coating (Required)

---

**-W001** 10.6  $\mu\text{m}$

**-W002** Durable Silver (450 nm - 10.6  $\mu\text{m}$ )

**-W003** 1552 nm

**-W004** 1064 nm

**-W005** 1030 nm

**-W006** 532 nm

**-W007** 515 nm

**-W008** 355 nm

**-W009** 343 nm

**-W012** 9.3  $\mu\text{m}$

Custom coatings available. Contact factory for details.

### F-Theta Lens (Optional)

---

**-Lxx** A variety of F-theta lenses with different focal length and wavelength combinations are available; inquire with factory

### Air Cooling (Optional)

---

**-AC** Air Cooling

### Water Cooling (Optional)

---

**-WC** Water Cooling

### Performance Grade (Required)

---

**-PL0** Standard performance grade

### Integration (Required)

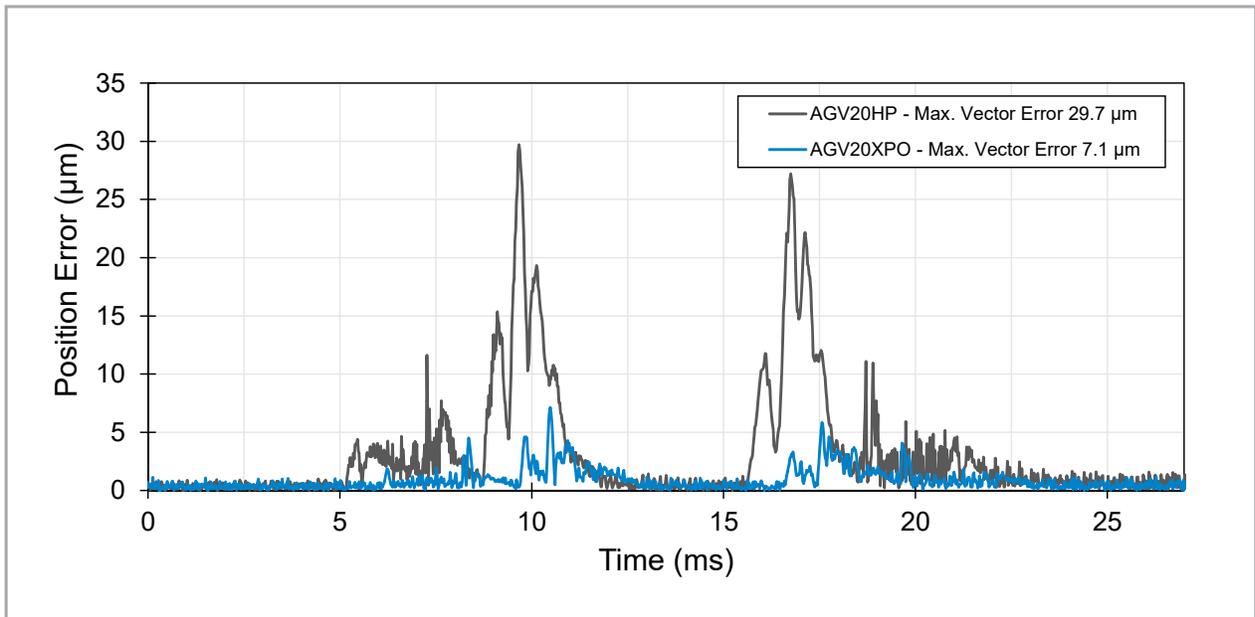
---

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.

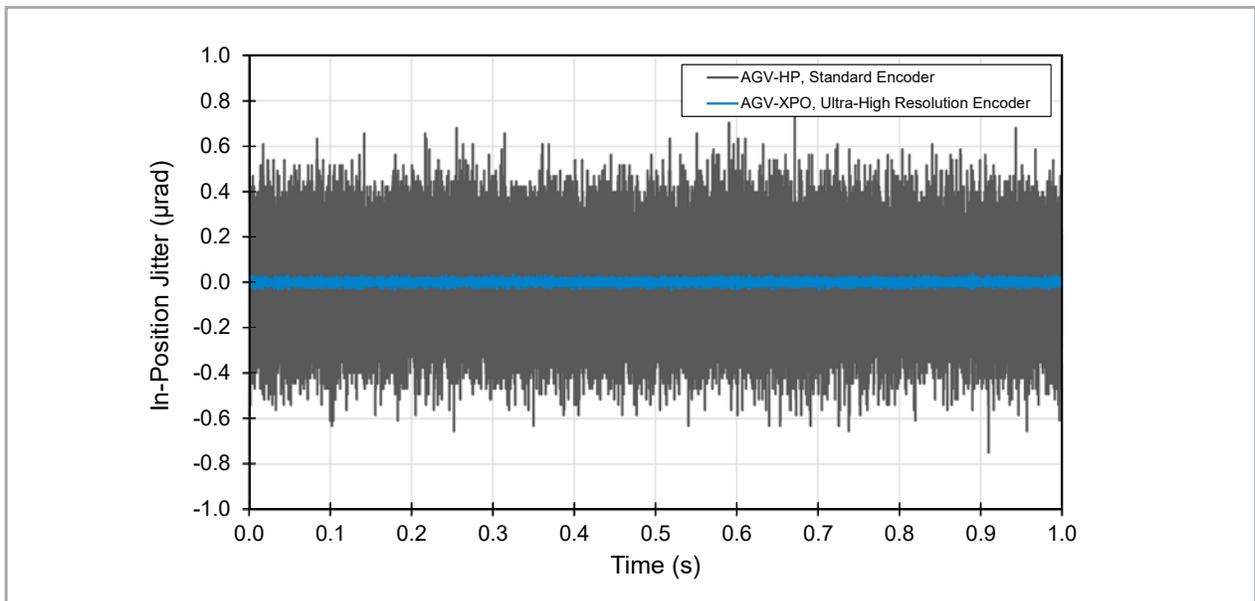
**-TAS** **Integration - Test as system**

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.

## AGV-XPO SPECIFICATIONS



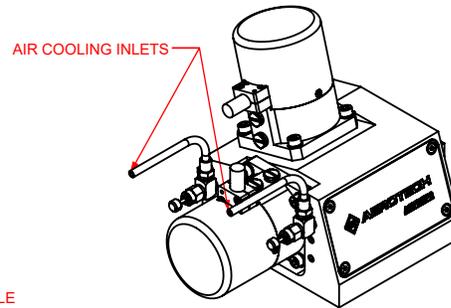
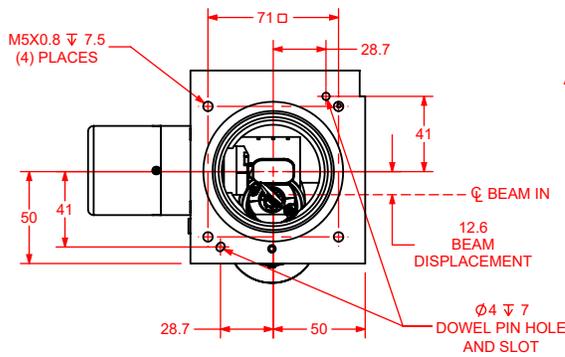
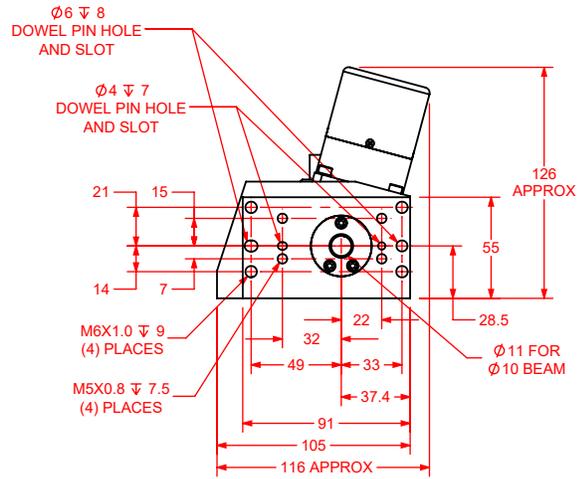
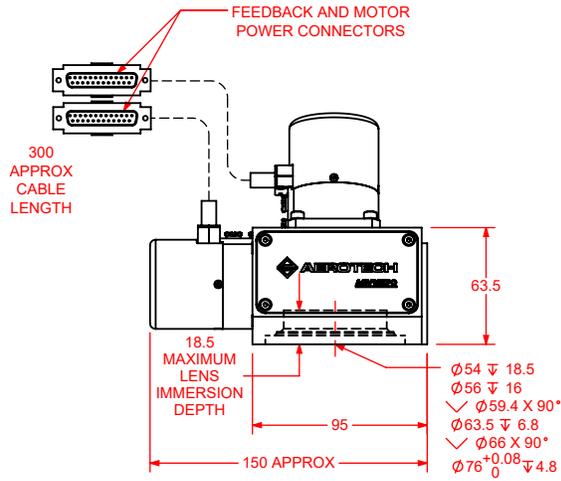
AGV-XPO is capable of extremely high accelerations and processing speeds with minimal trajectory error, resulting in the highest throughput and the best part quality. As demonstrated in this vector position error plot, the AGV-XPO provides superior part-path accuracy at high processing speeds. Comparison data is based on a semi-rectangular trajectory with a processing speed of 5 m/s and effective focal length of 250 mm.



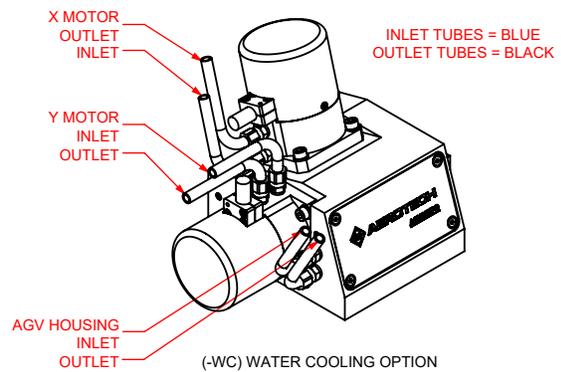
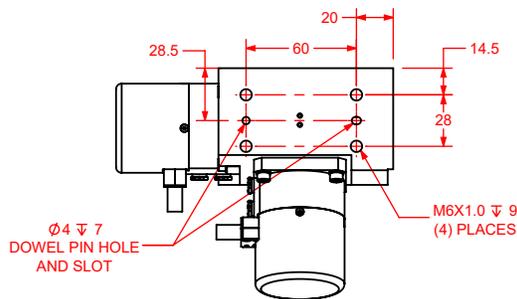
Ultra-high resolution feedback (-E2 option) provides the lowest noise levels for applications that require extremely fine trajectory accuracy or utilize long effective focal lengths.

# AGV-XPO DIMENSIONS

AGV10XPO-E1-BE1

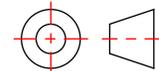


(-AC) AIR COOLING OPTION



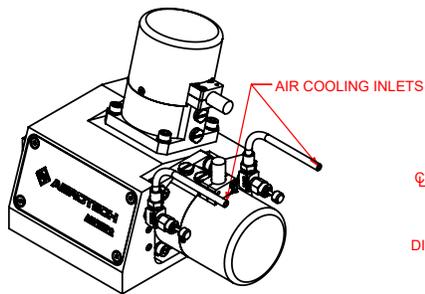
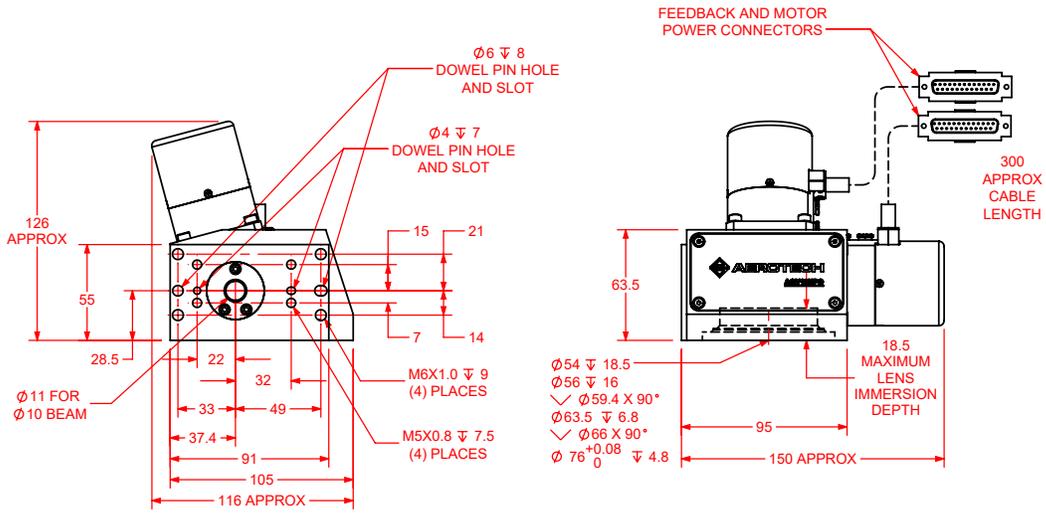
(-WC) WATER COOLING OPTION

DIMENSIONS: MILLIMETERS

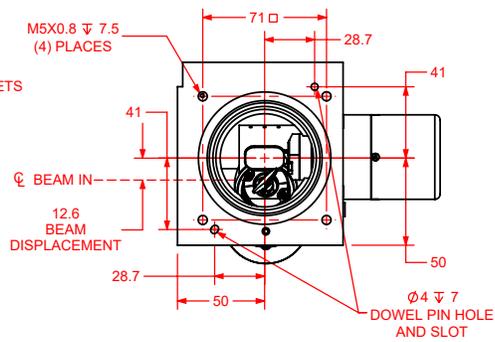


# AGV-XPO DIMENSIONS

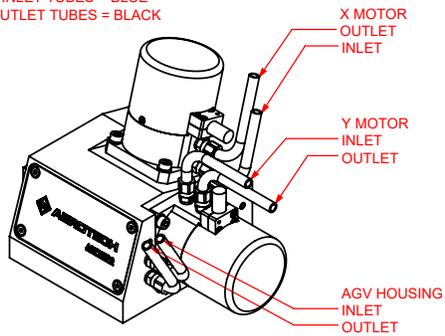
AGV10XPO-E1-BE2



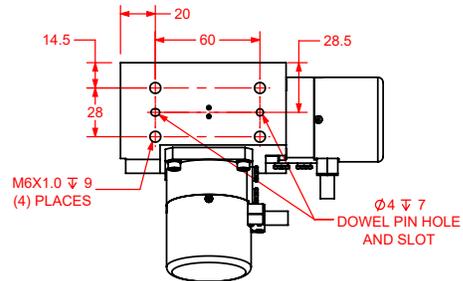
(-AC) AIR COOLING OPTION



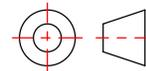
INLET TUBES = BLUE  
OUTLET TUBES = BLACK



(-WC) WATER COOLING OPTION

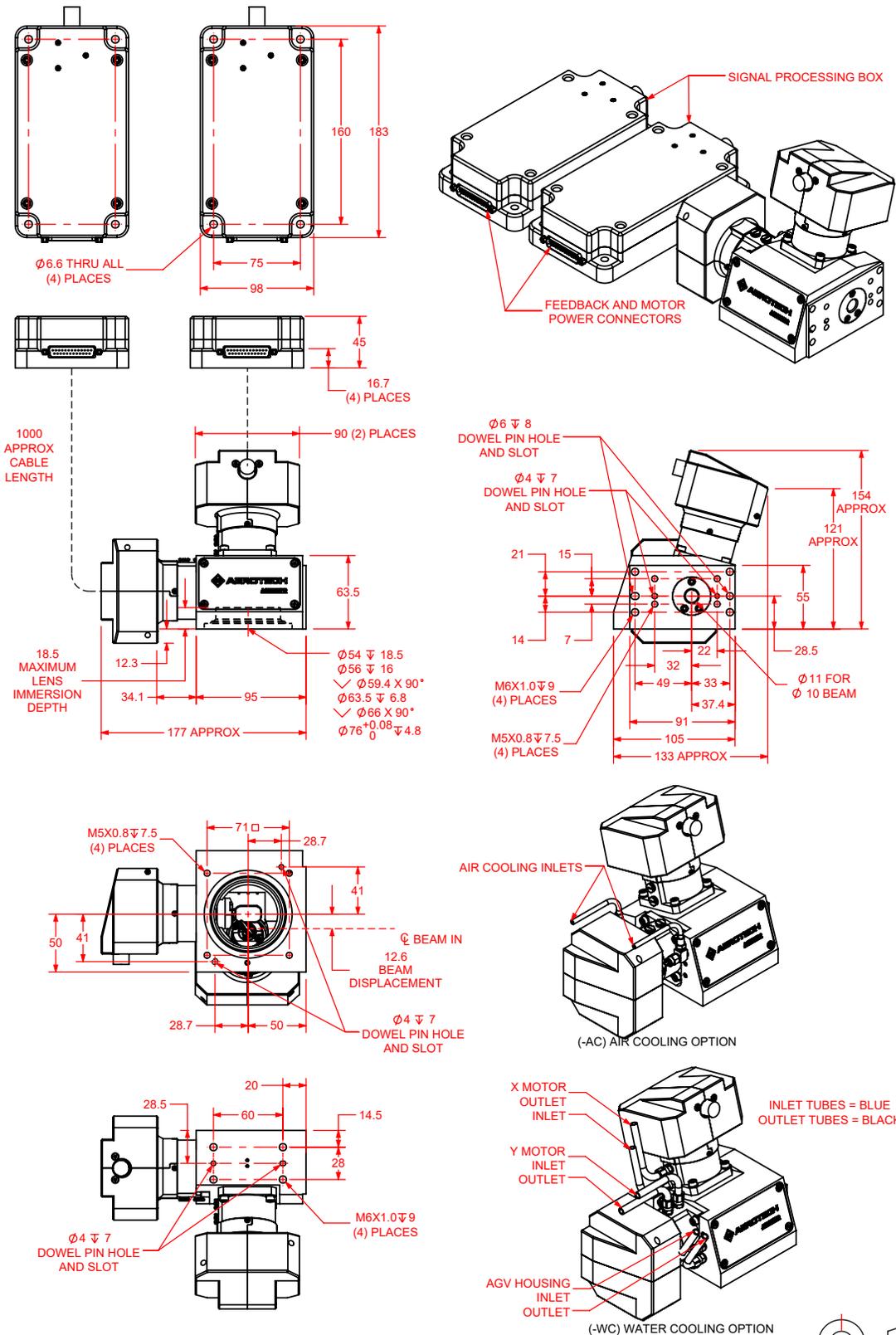


DIMENSIONS: MILLIMETERS

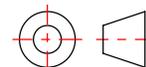


# AGV-XPO DIMENSIONS

AGV10XPO-E2-BE1

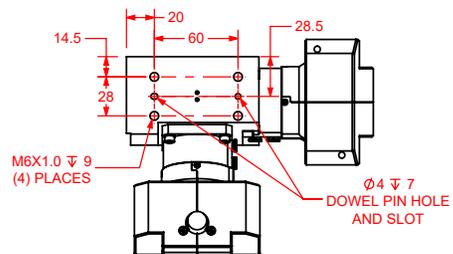
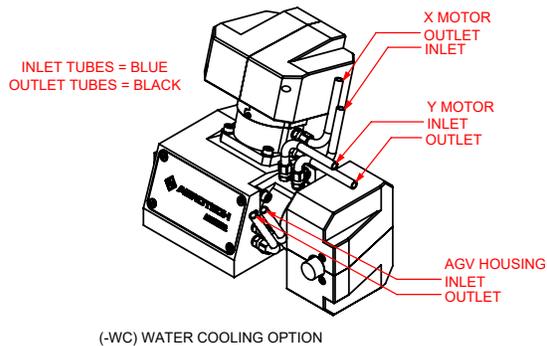
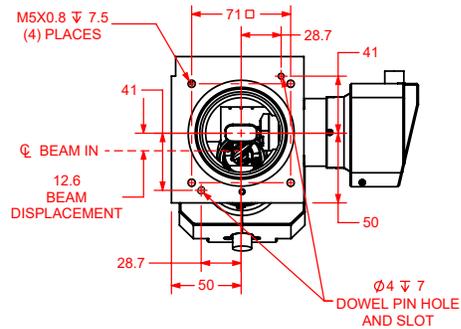
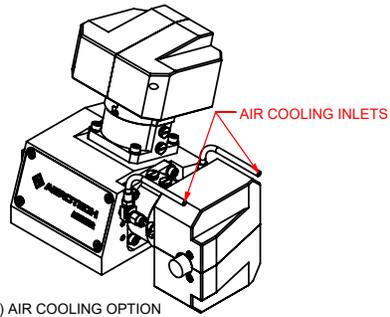
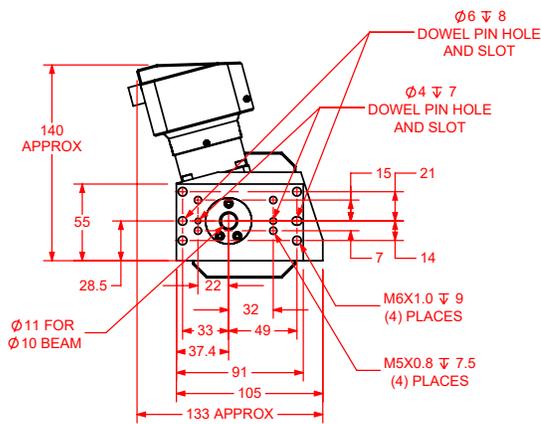
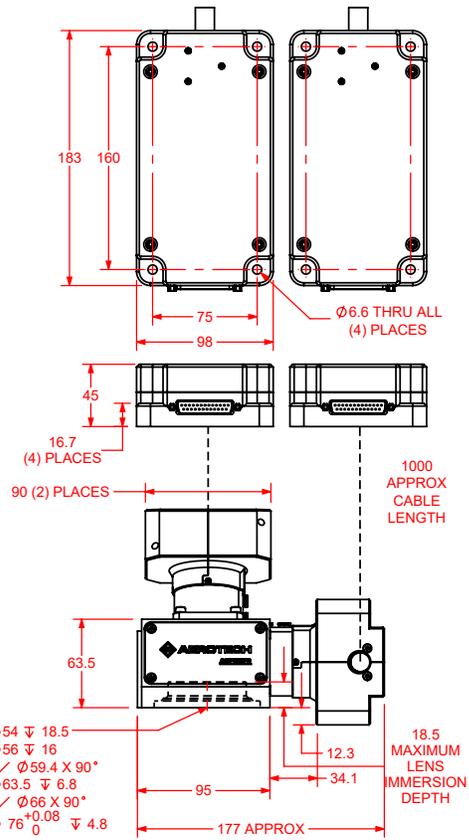
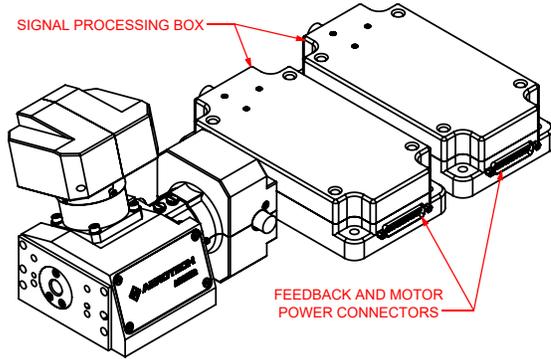


DIMENSIONS: MILLIMETERS

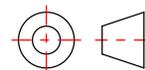


# AGV-XPO DIMENSIONS

AGV10XPO-E2-BE2

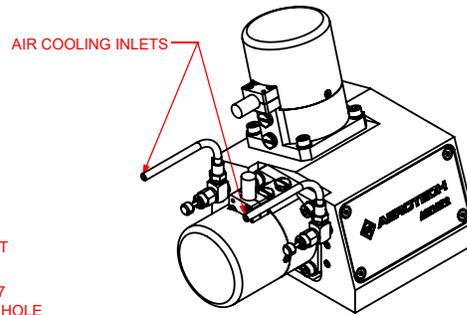
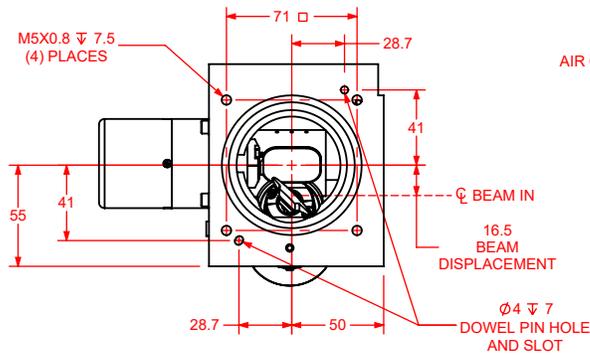
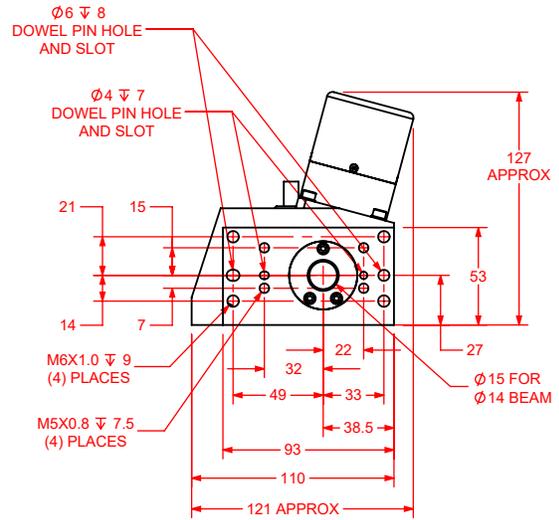
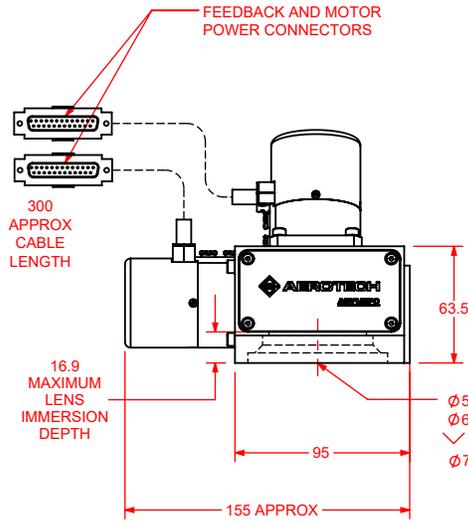


DIMENSIONS: MILLIMETERS

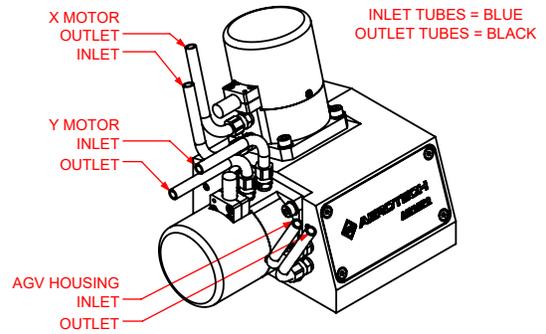
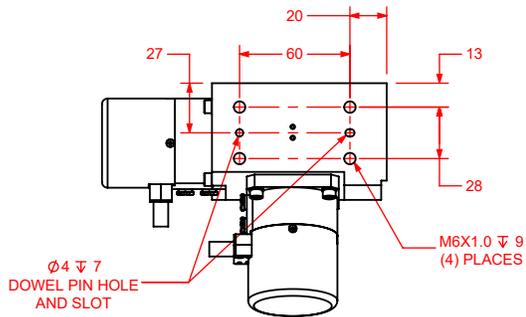


# AGV-XPO DIMENSIONS

AGV14XPO-E1-BE1

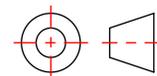


(-AC) AIR COOLING OPTION



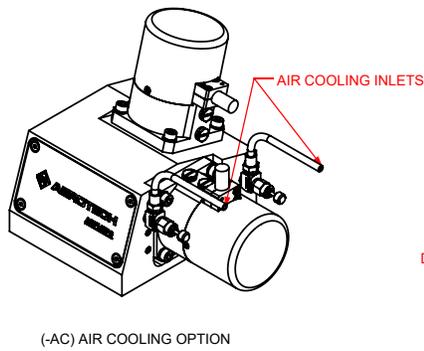
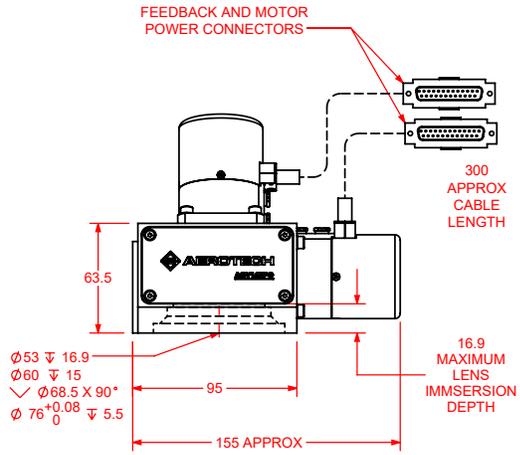
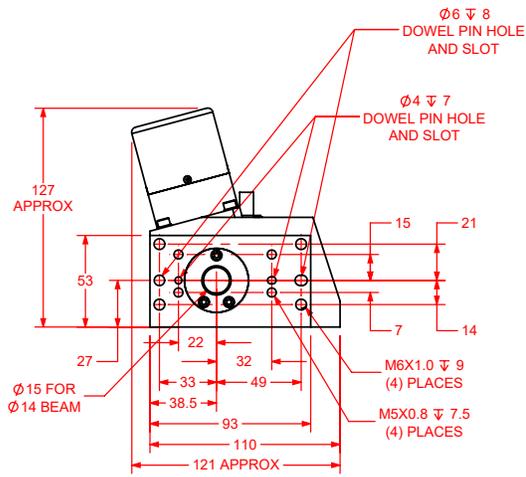
(-WC) WATER COOLING OPTION

DIMENSIONS: MILLIMETERS

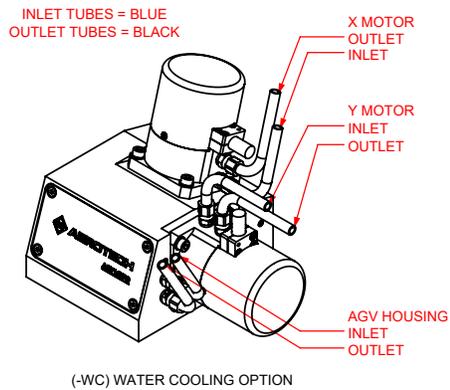
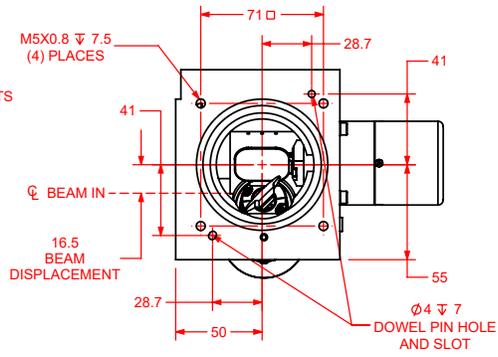


# AGV-XPO DIMENSIONS

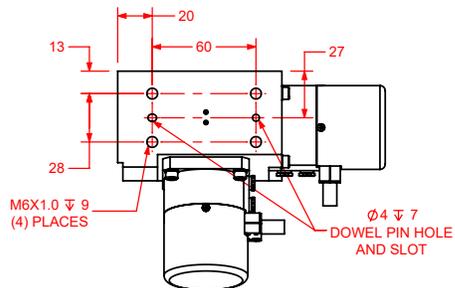
AGV14XPO-E1-BE2



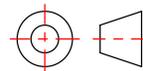
(-AC) AIR COOLING OPTION



(-WC) WATER COOLING OPTION



DIMENSIONS: MILLIMETERS

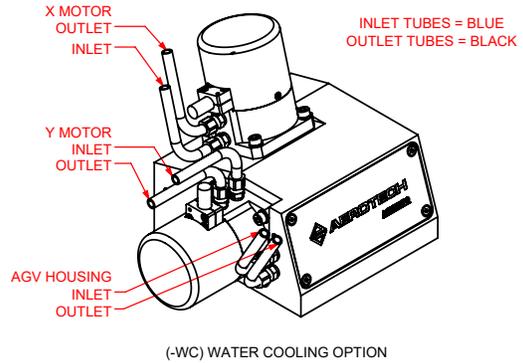
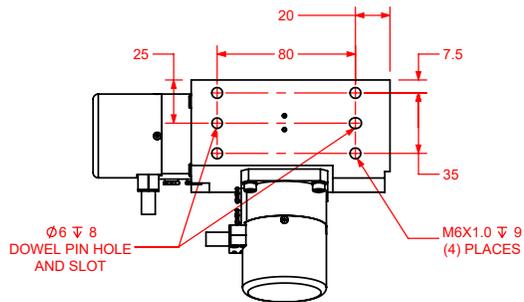
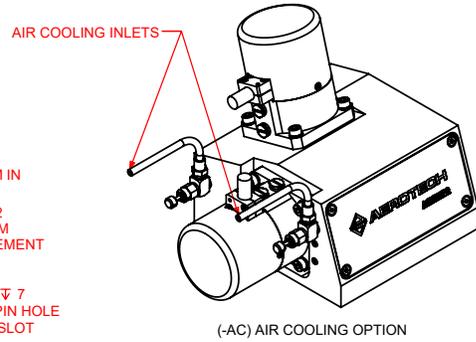
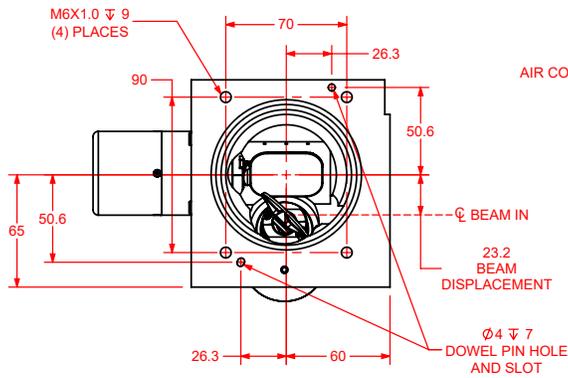
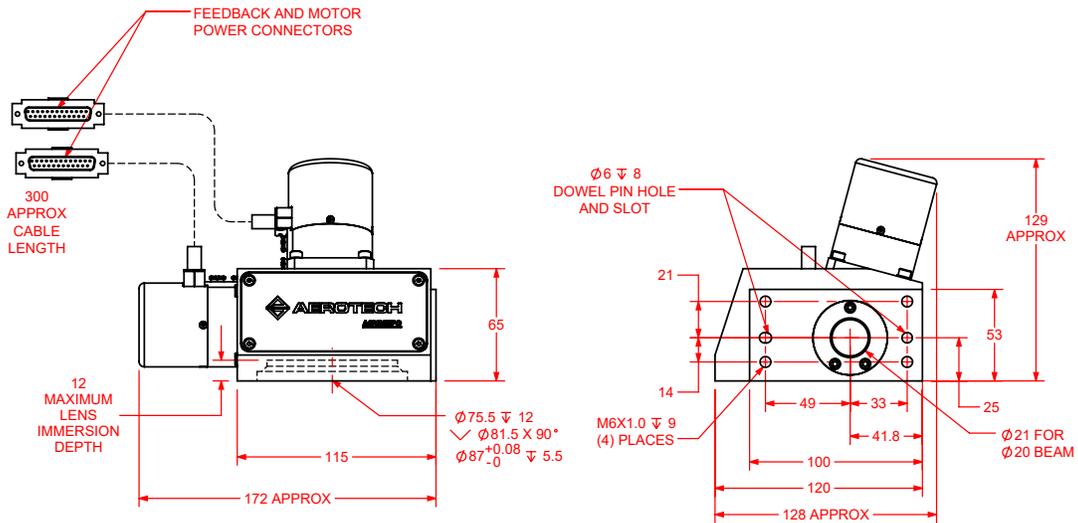




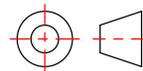


# AGV-XPO DIMENSIONS

AGV20XPO-E1-BE1

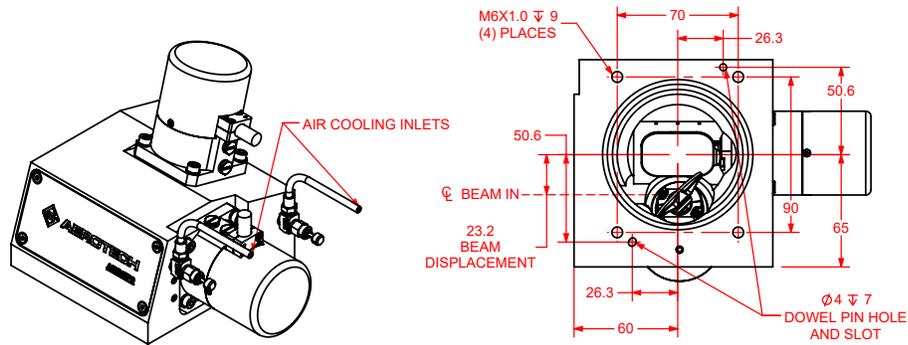
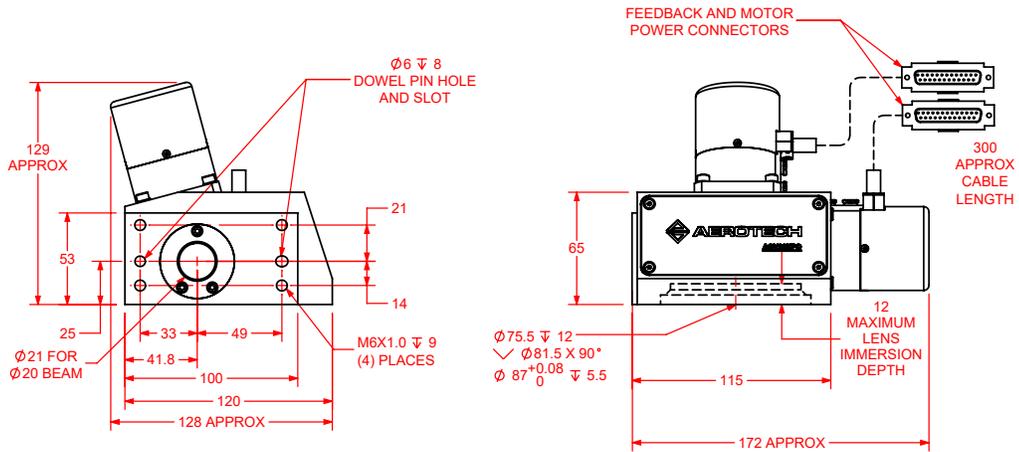


DIMENSIONS: MILLIMETERS

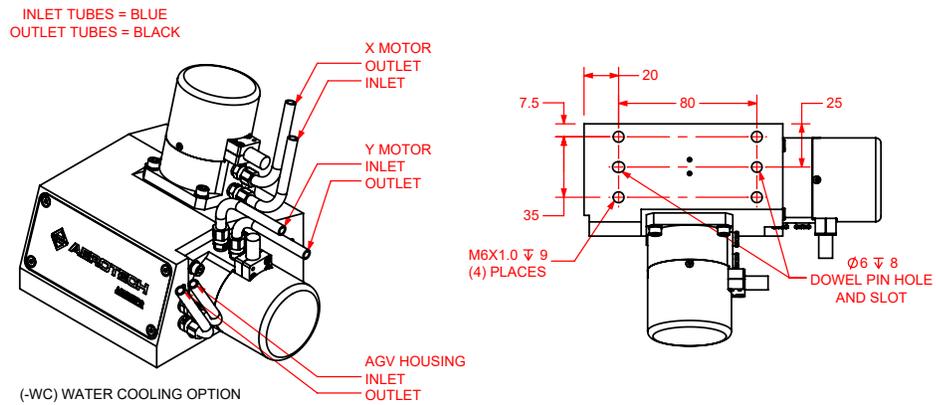


# AGV-XPO DIMENSIONS

AGV20XPO-E1-BE2

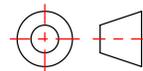


(-AC) AIR COOLING OPTION



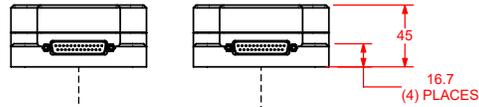
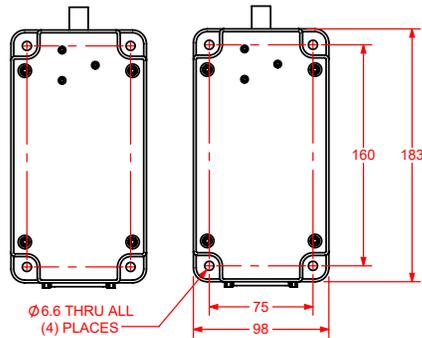
(-WC) WATER COOLING OPTION

DIMENSIONS: MILLIMETERS

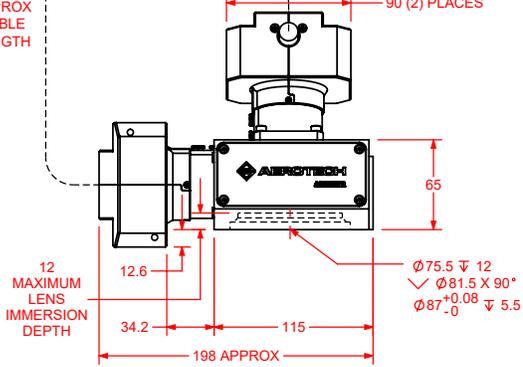


# AGV-XPO DIMENSIONS

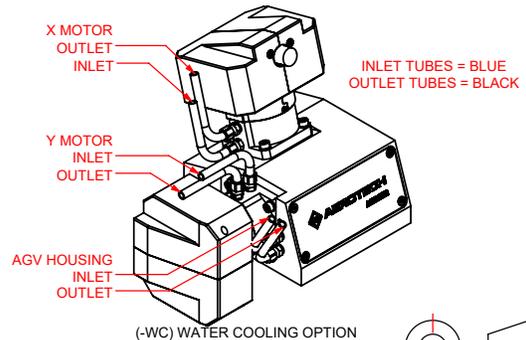
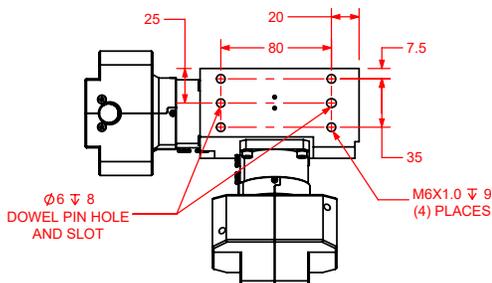
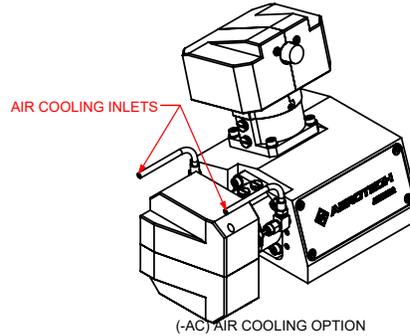
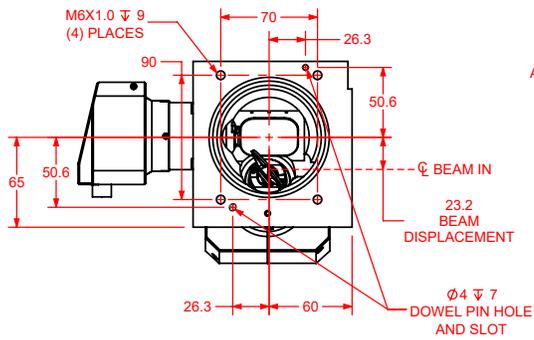
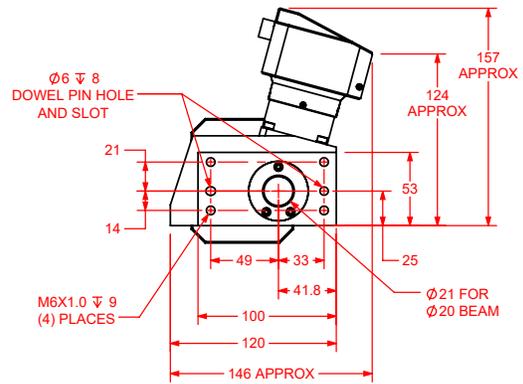
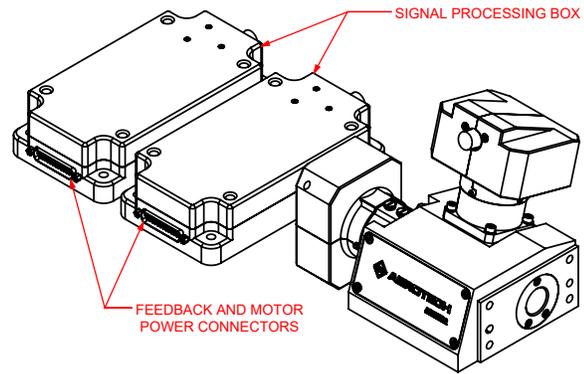
AGV20XPO-E2-BE1



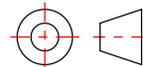
1000 APPROX CABLE LENGTH



12 MAXIMUM LENS IMMERSION DEPTH



DIMENSIONS: MILLIMETERS



# AGV-XPO DIMENSIONS

AGV20XPO-E2-BE2

