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
Optical Performance			
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)[2]	0.4 µrad RMS (-E1) 0.02 µrad RMS (-E2)		
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]	355,000 m/s^2 (-E1) 300,000 m/s^2 (-E2)	262,000 m/s^2 (-E1) 231,000 m/s^2 (-E2)	95,000 m/s^2 (-E1) 88,000 m/s^2 (-E2)
Continuous Acceleration[4][6]	95,000 m/s^2 (-E1) 80,000 m/s^2 (-E2)	66,000 m/s^2 (-E1) 58,000 m/s^2 (-E2)	25,000 m/s^2 (-E1) 23,000 m/s^2 (-E2)
Positioning Speed[4]	84 m/s (-E1) 48 m/s (-E2)	81 m/s (-E1) 48 m/s (-E2)	55 m/s (-E1) 48 m/s (-E2)
Jump & Settle Time, 1 mm Move[4][7]	210 µs (-E1) 250 µs (-E2)	225 µs (-E1) 260 µs (-E2)	280 µs (-E1) 340 µs (-E2)
Stability			
Long-Term Drift-Offset[3]	10 µrad/12 hrs 15 µrad/24 hrs		
Long-Term Drift-Gain[3]	10 ppm/24 hrs		
Thermal Drift-Offset	10 µrad/°C		
Therman Drift-Gain	1 ppm/°C		
Mechanical Specifications			
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 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

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

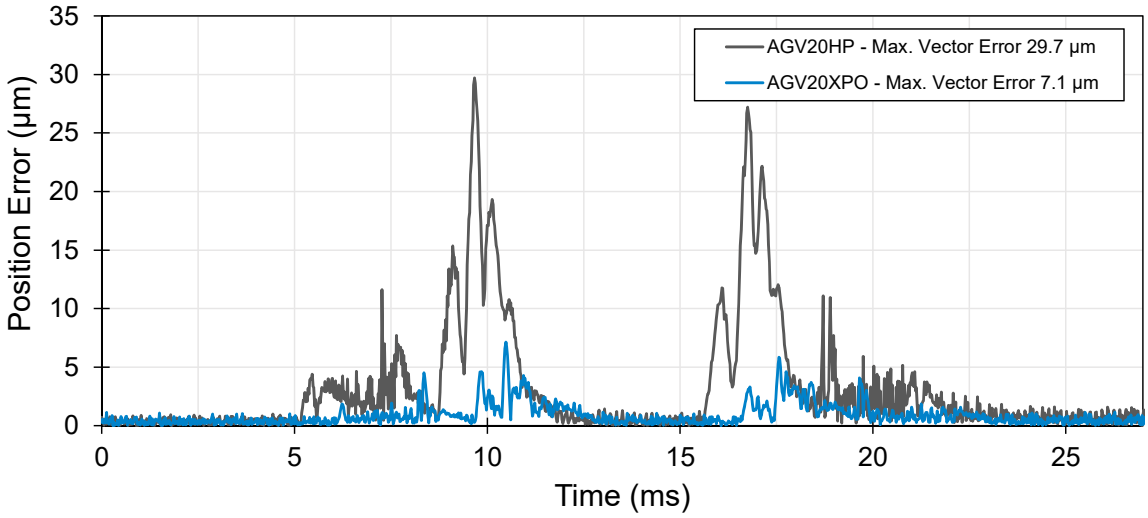
Performance Grade (Required)

-PL0 Standard performance grade

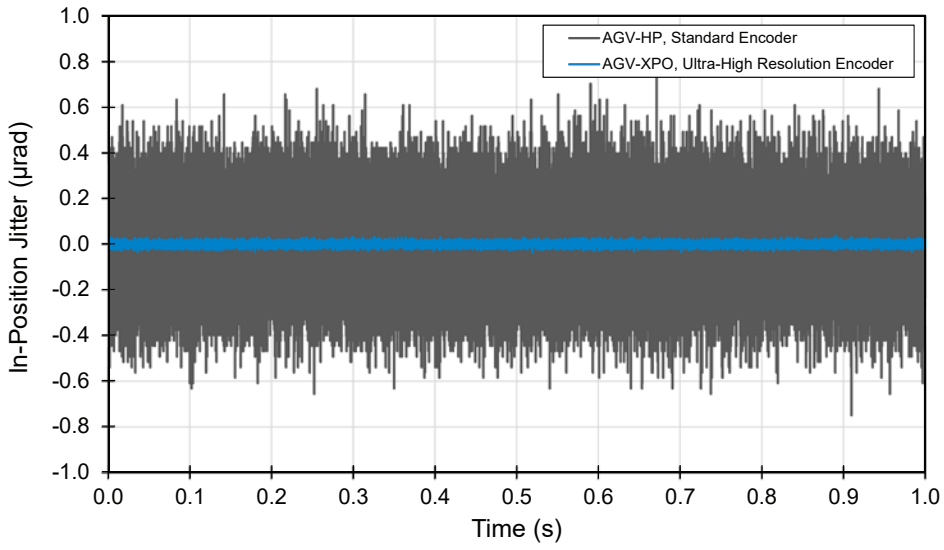
Integration (Required)

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.



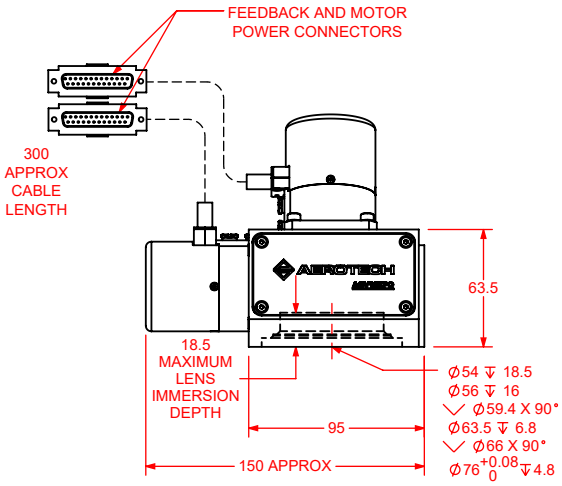
AGV-XPO is capable of extremely high accelerations and processing speeds with minimal trajectory error, resulting in the highest throughput and the best part quality. As demonstrated in this vector position error plot, the AGV-XPO provides superior part-path accuracy at high processing speeds. Comparison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

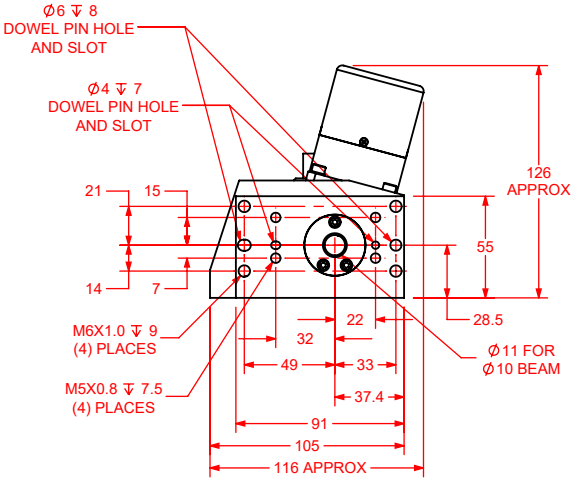


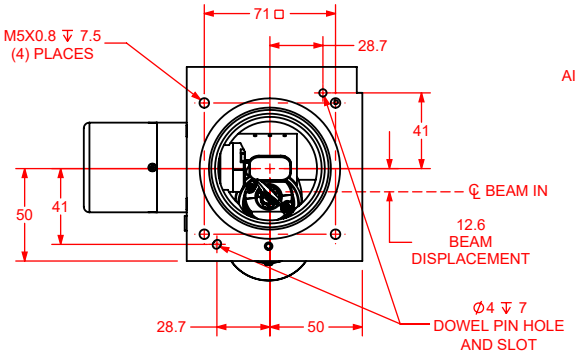
Ultra-high resolution feedback (-E2 option) provides the lowest noise levels for applications that require extremely fine trajectory accuracy or utilize long effective focal lengths.

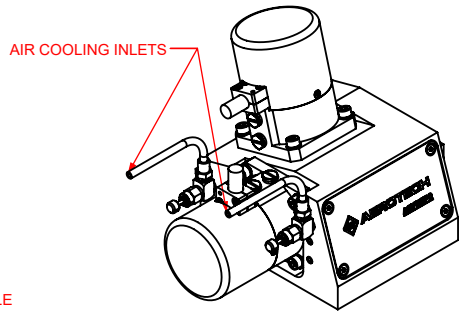
AGV-XPO DIMENSIONS

AGV10XPO-E1-BE1

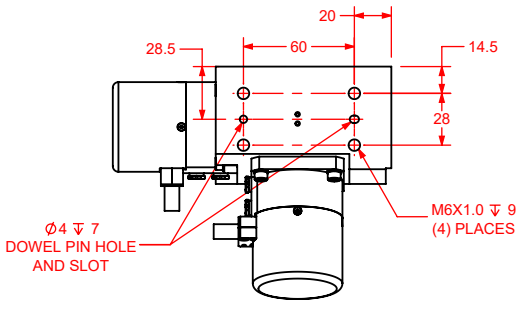


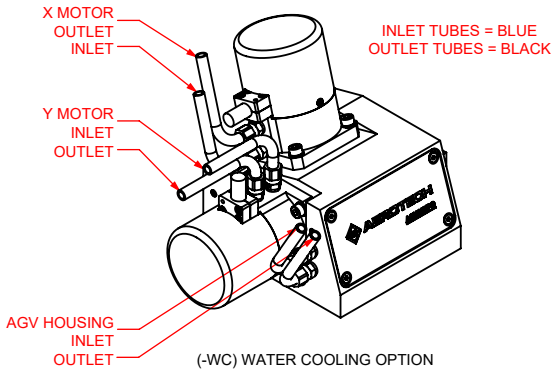






(-AC) AIR COOLING OPTION



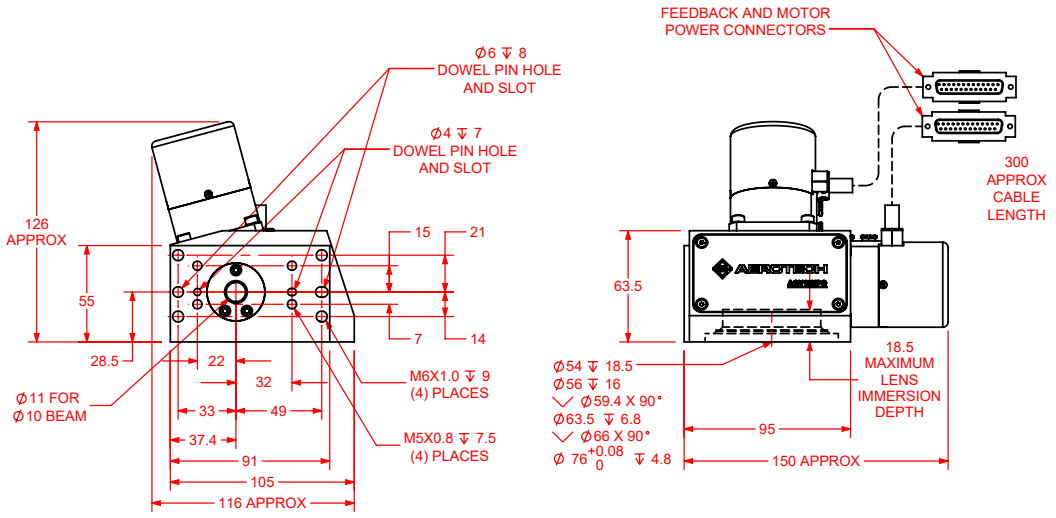


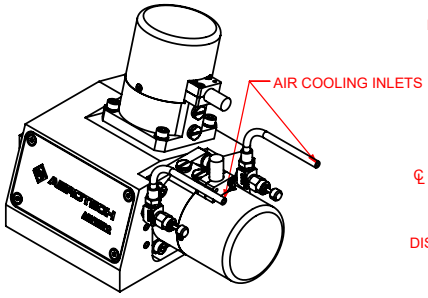
(-WC) WATER COOLING OPTION

DIMENSIONS: MILLIMETERS

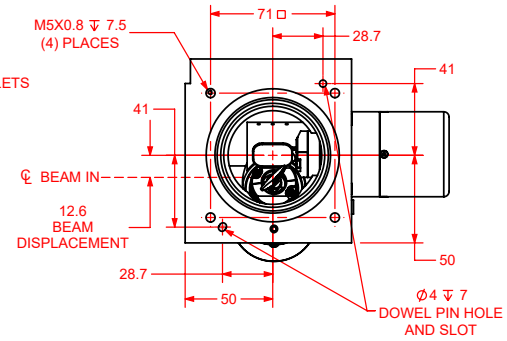
AGV-XPO DIMENSIONS

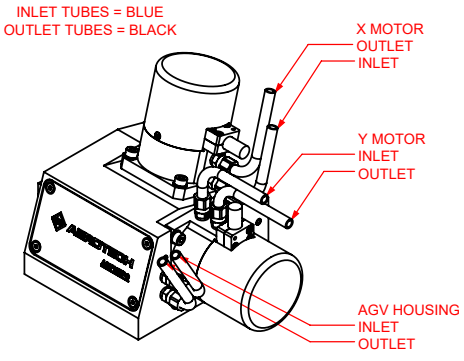
AGV10XPO-E1-BE2



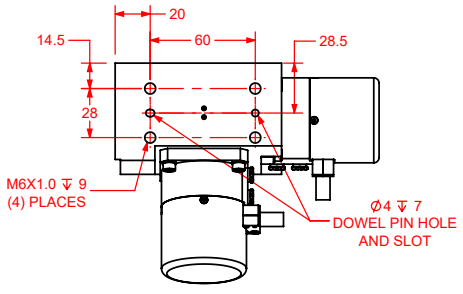


(-AC) AIR COOLING OPTION





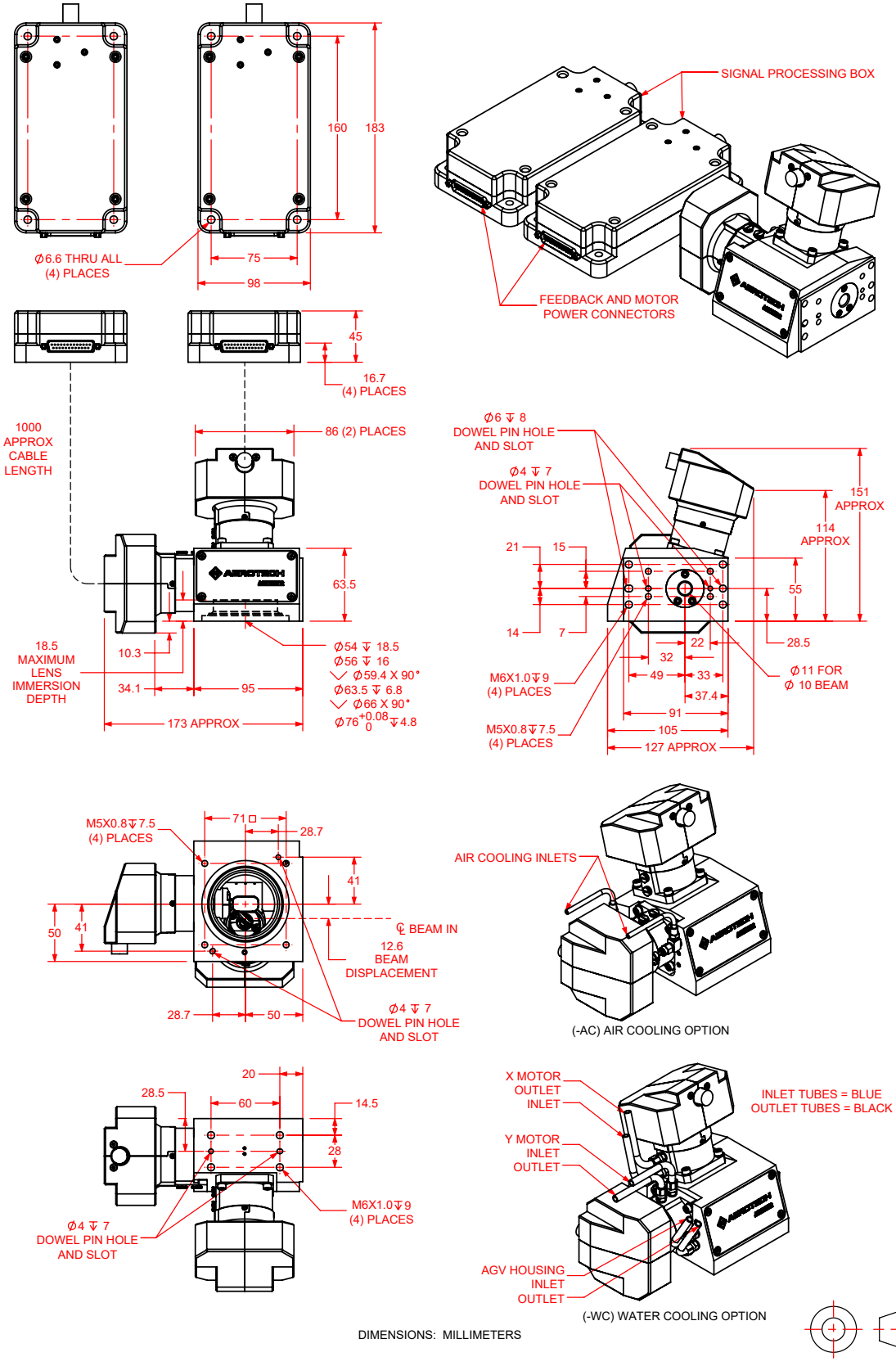
(-WC) WATER COOLING OPTION



DIMENSIONS: MILLIMETERS

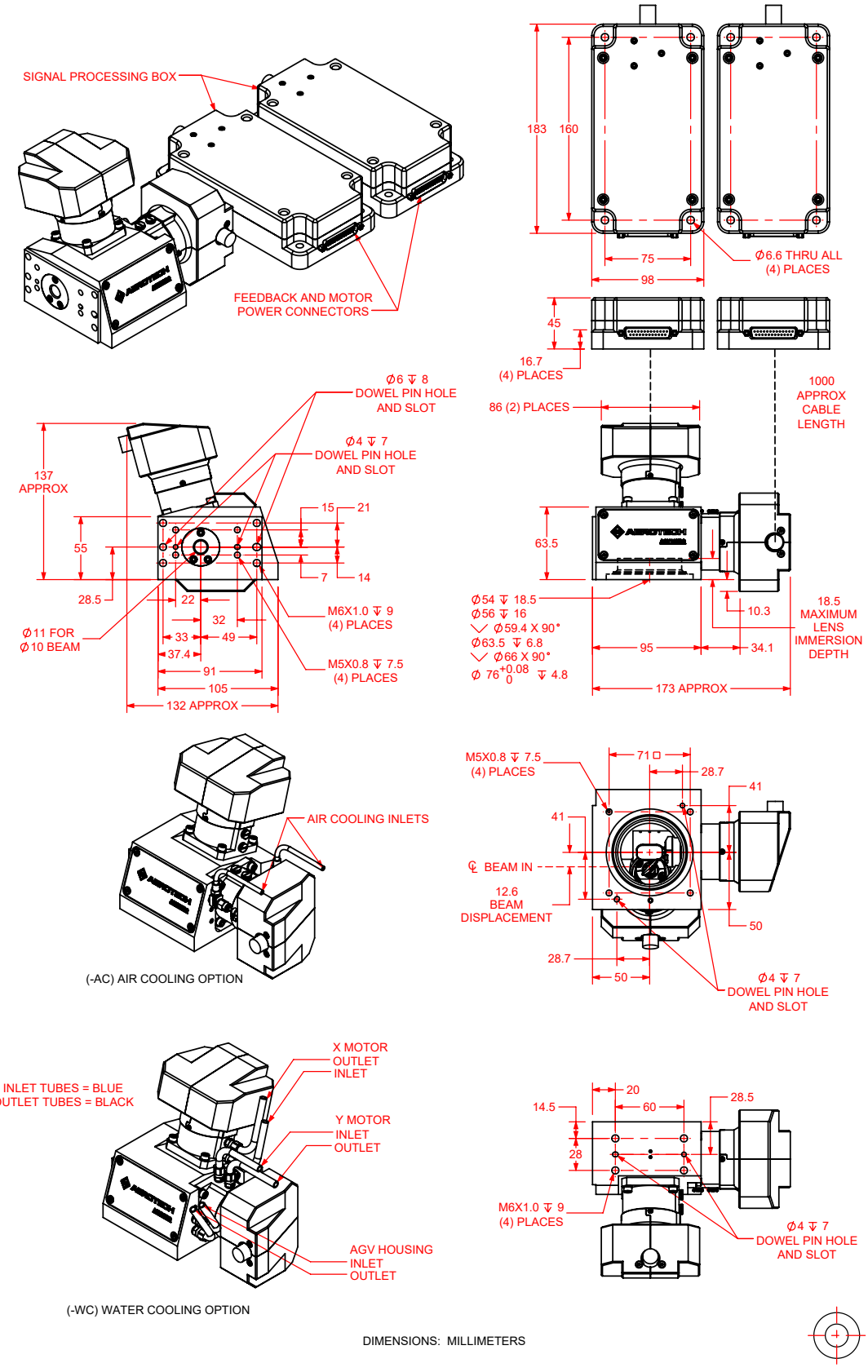
AGV-XPO DIMENSIONS

AGV10XPO-E2-BE1



AGV-XPO DIMENSIONS

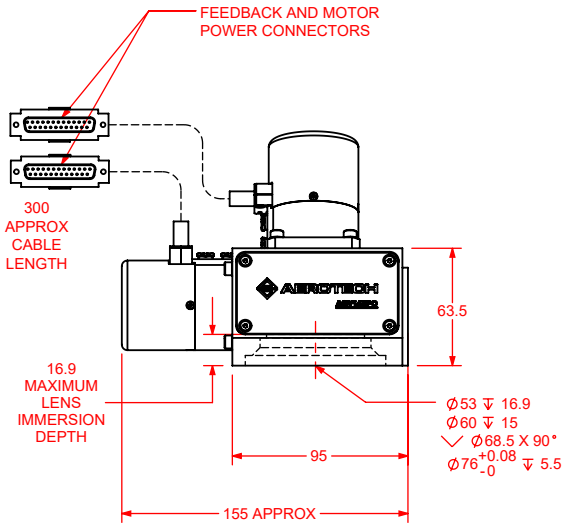
AGV10XPO-E2-BE2

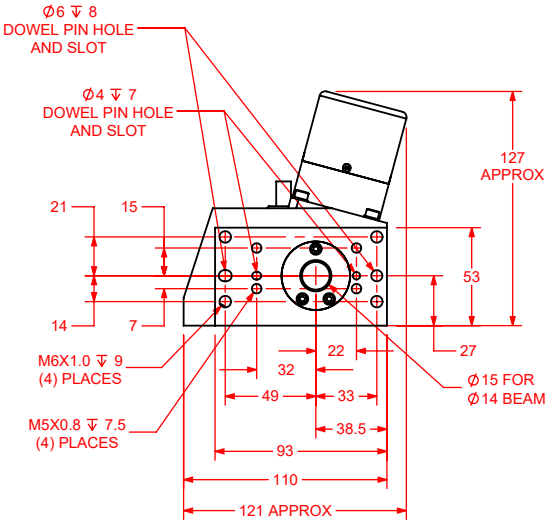


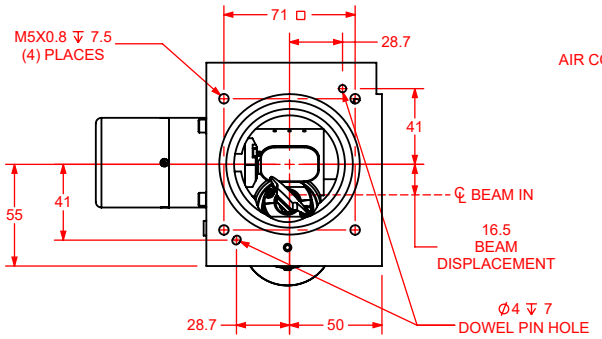
DIMENSIONS: MILLIMETERS

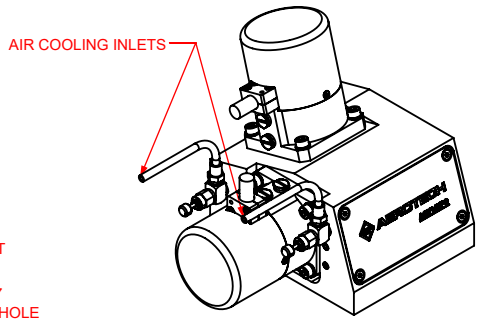
AGV-XPO DIMENSIONS

AGV14XPO-E1-BE1

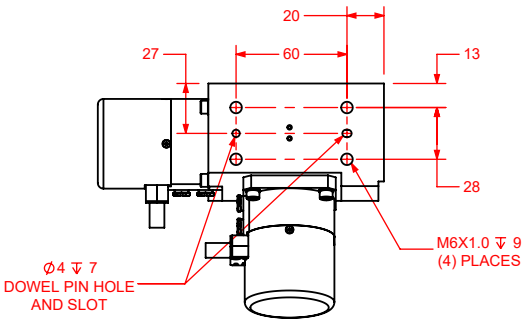


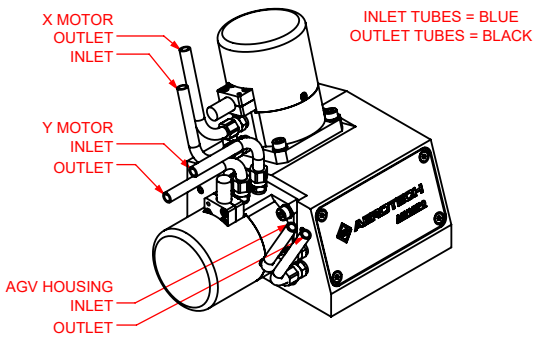






(-AC) AIR COOLING OPTION



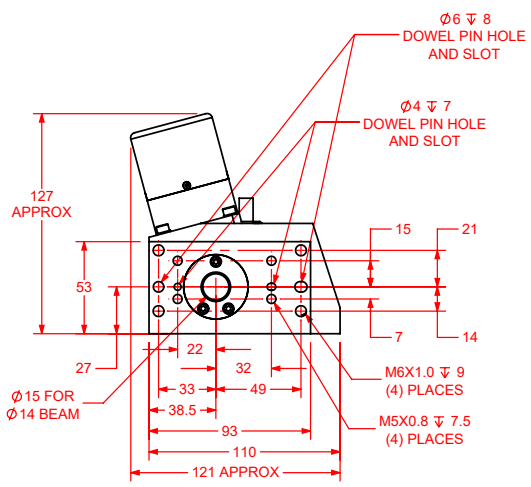


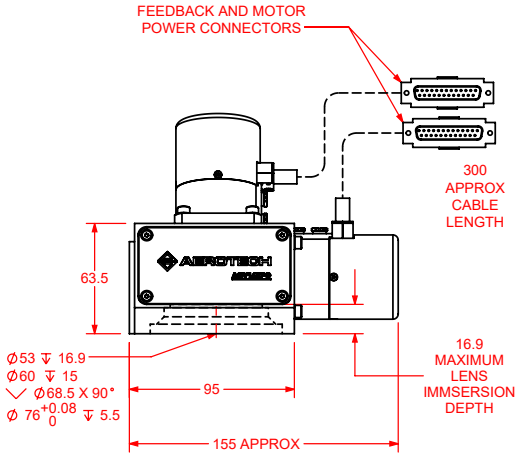
(-WC) WATER COOLING OPTION

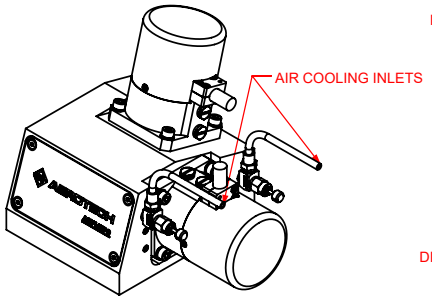
DIMENSIONS: MILLIMETERS

AGV-XPO DIMENSIONS

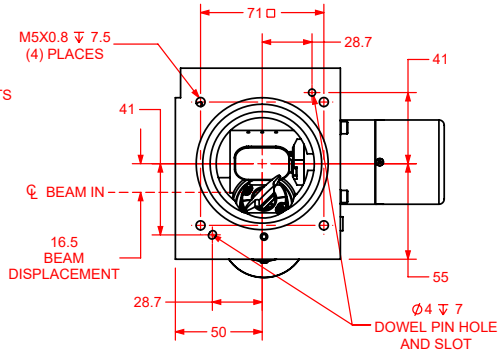
AGV14XPO-E1-BE2

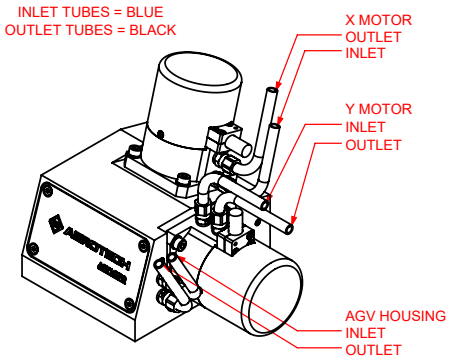




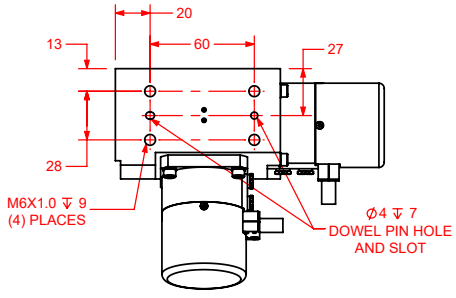


(-AC) AIR COOLING OPTION





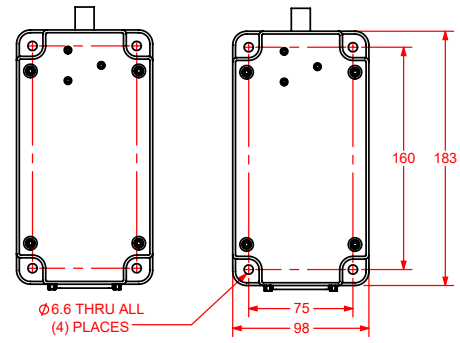
(-WC) WATER COOLING OPTION

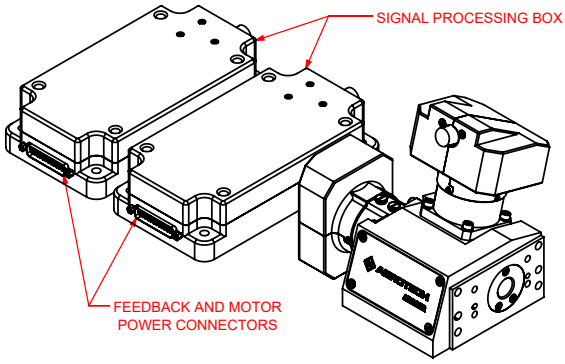


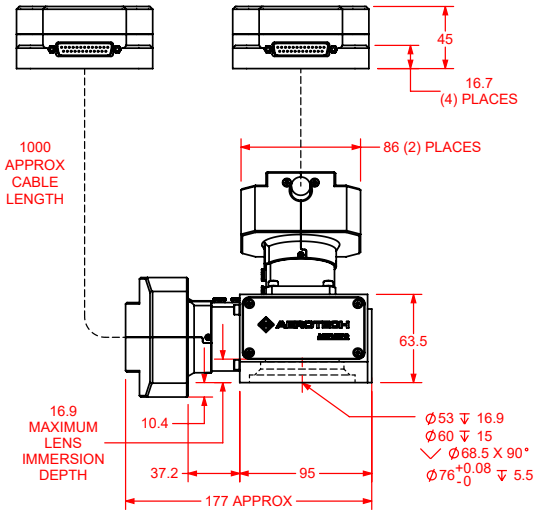
DIMENSIONS: MILLIMETERS

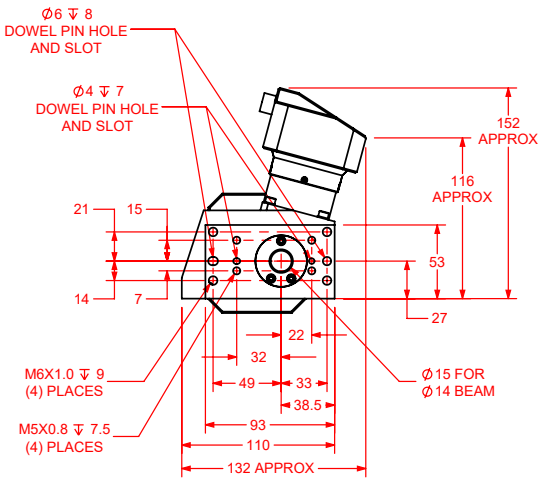
AGV-XPO DIMENSIONS

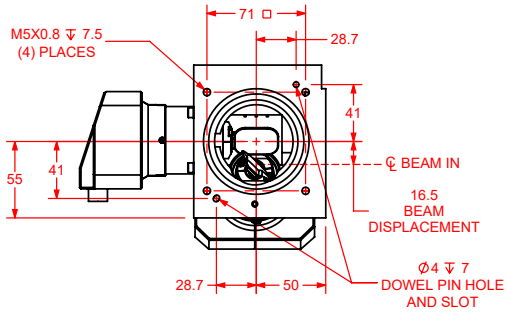
AGV14XPO-E2-BE1

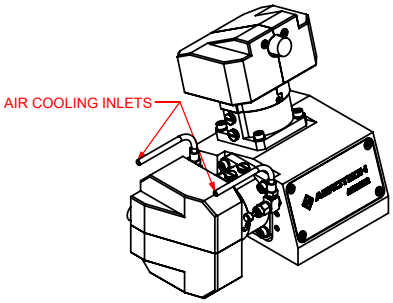




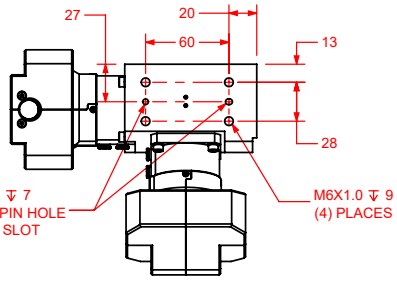


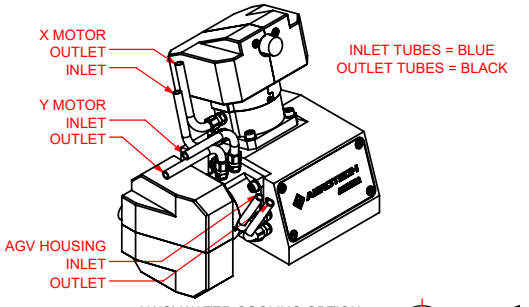






(-AC) AIR COOLING OPTION



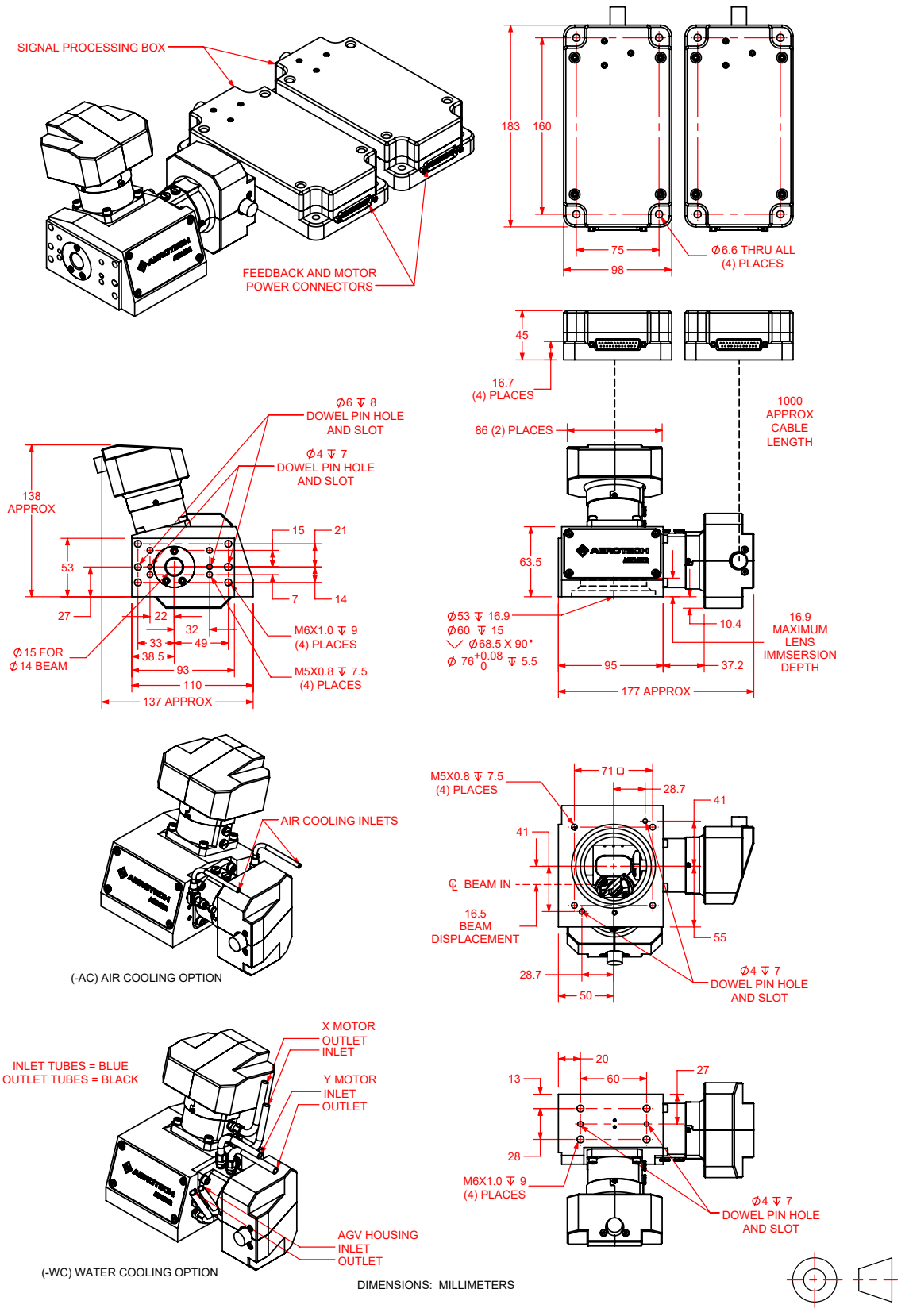


(-WC) WATER COOLING OPTION

DIMENSIONS: MILLIMETERS

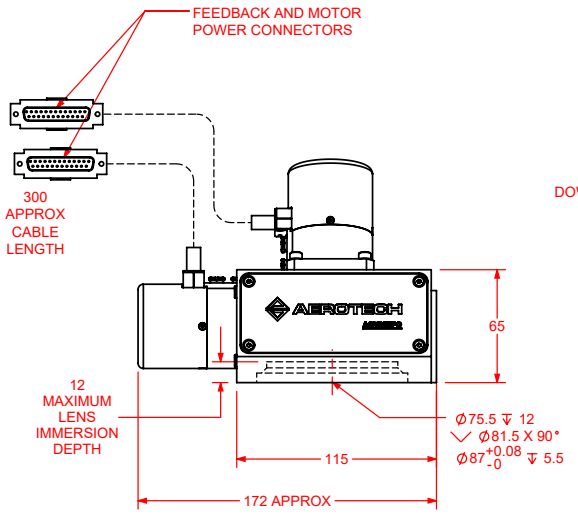
AGV-XPO DIMENSIONS

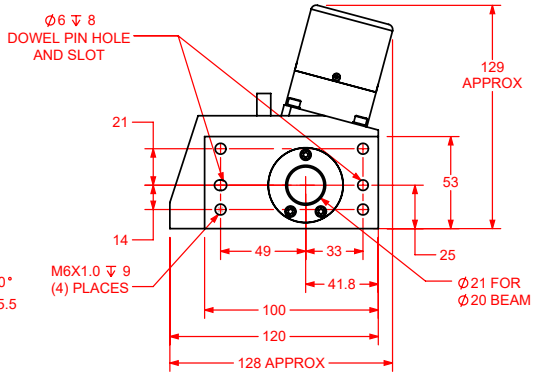
AGV14XPO-E2-BE2

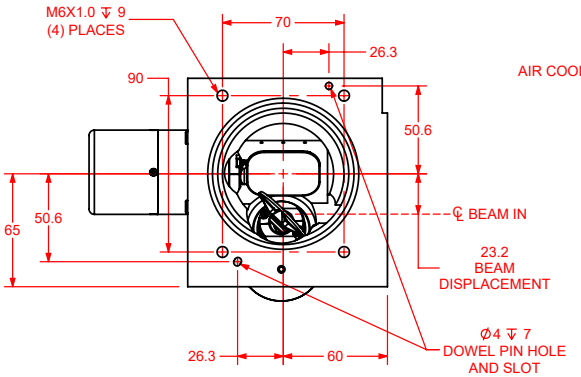


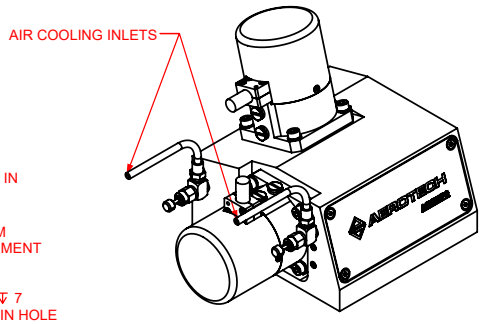
AGV-XPO DIMENSIONS

AGV20XPO-E1-BE1

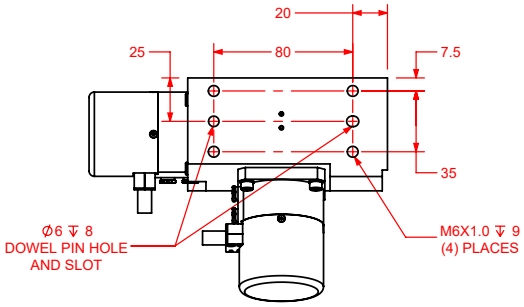


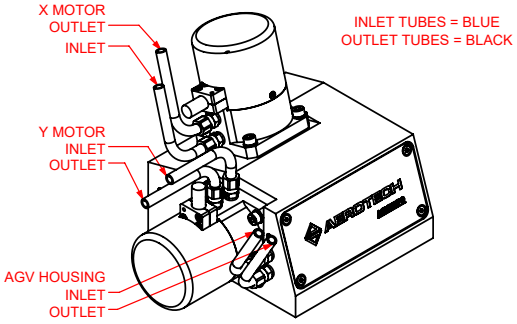






(-AC) AIR COOLING OPTION



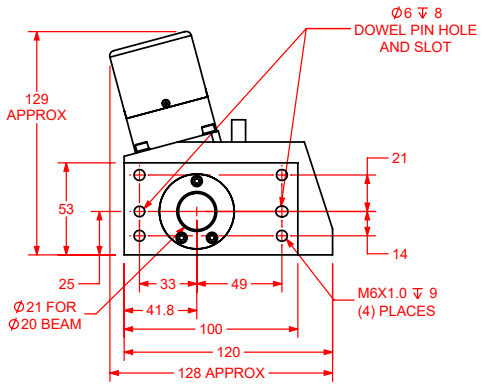


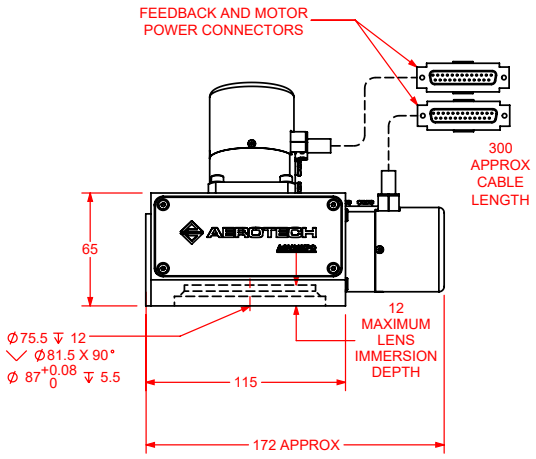
(-WC) WATER COOLING OPTION

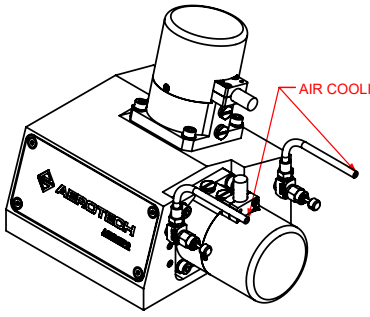
DIMENSIONS: MILLIMETERS

AGV-XPO DIMENSIONS

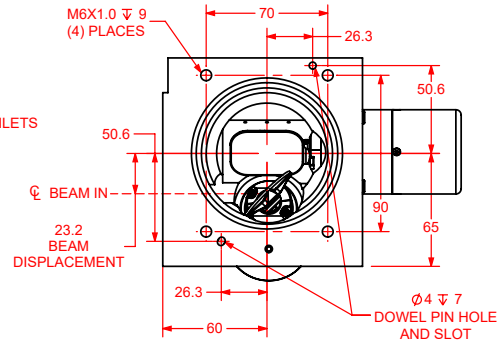
AGV20XPO-E1-BE2

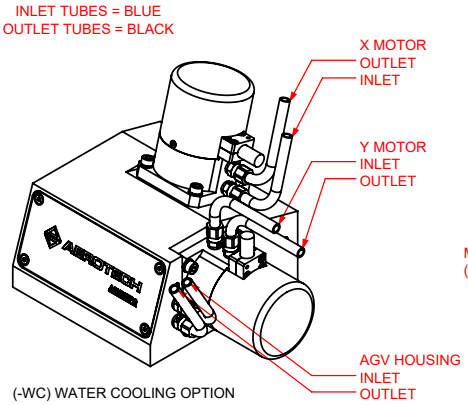




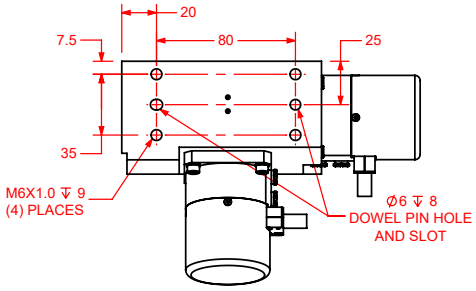


(-AC) AIR COOLING OPTION





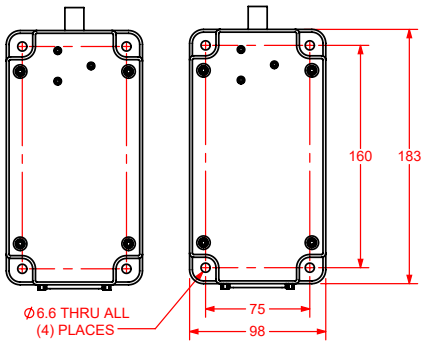
(-WC) WATER COOLING OPTION

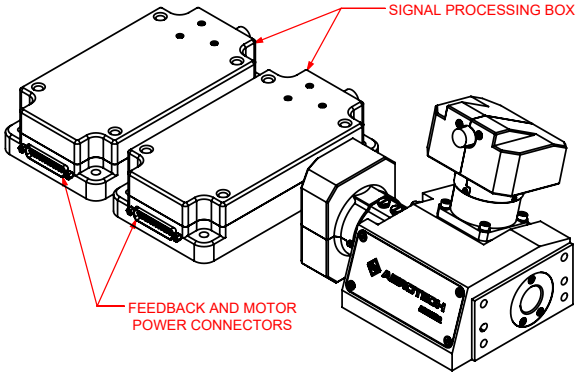


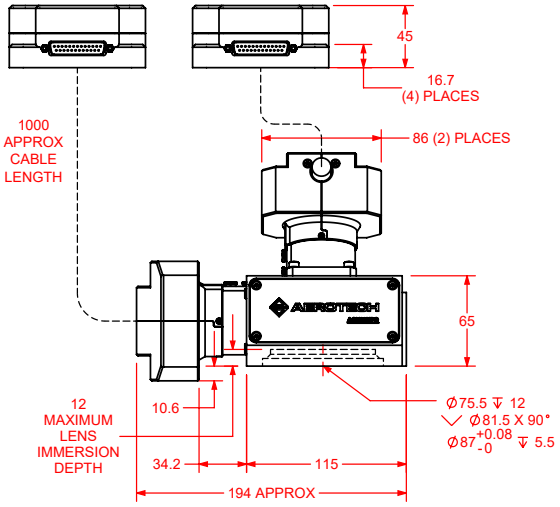
DIMENSIONS: MILLIMETERS

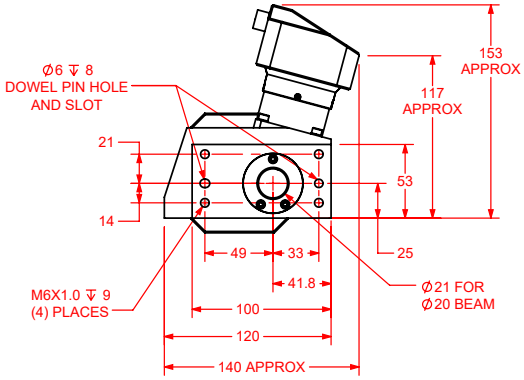
AGV-XPO DIMENSIONS

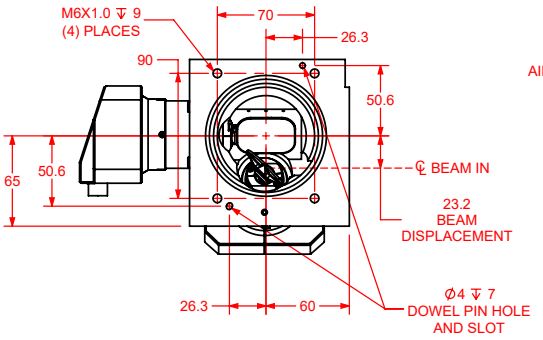
AGV20XPO-E2-BE1

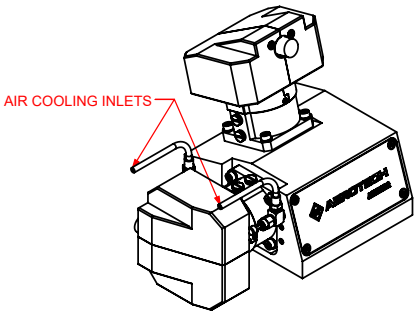




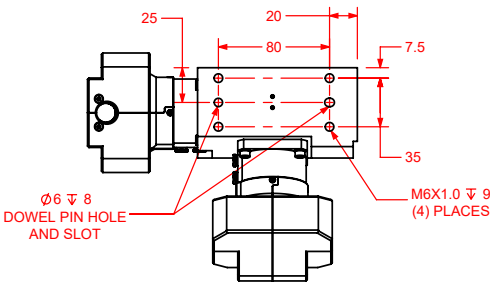


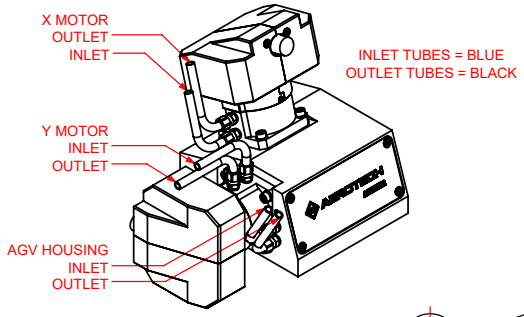






(-AC) AIR COOLING OPTION





(-WC) WATER COOLING OPTION

DIMENSIONS: MILLIMETERS

AGV-XPO DIMENSIONS

AGV20XPO-E2-BE2