3-Axis Micro Wire EDM Machine (MW250)
Micromachining of small parts

Viteris Technologies

μ**wire-EDM with vertical cutting sections**

Work piece tank

Dielectric tank with pump and filter

24" color touchscreen

Electrical cabinet w/ USB port and control buttons
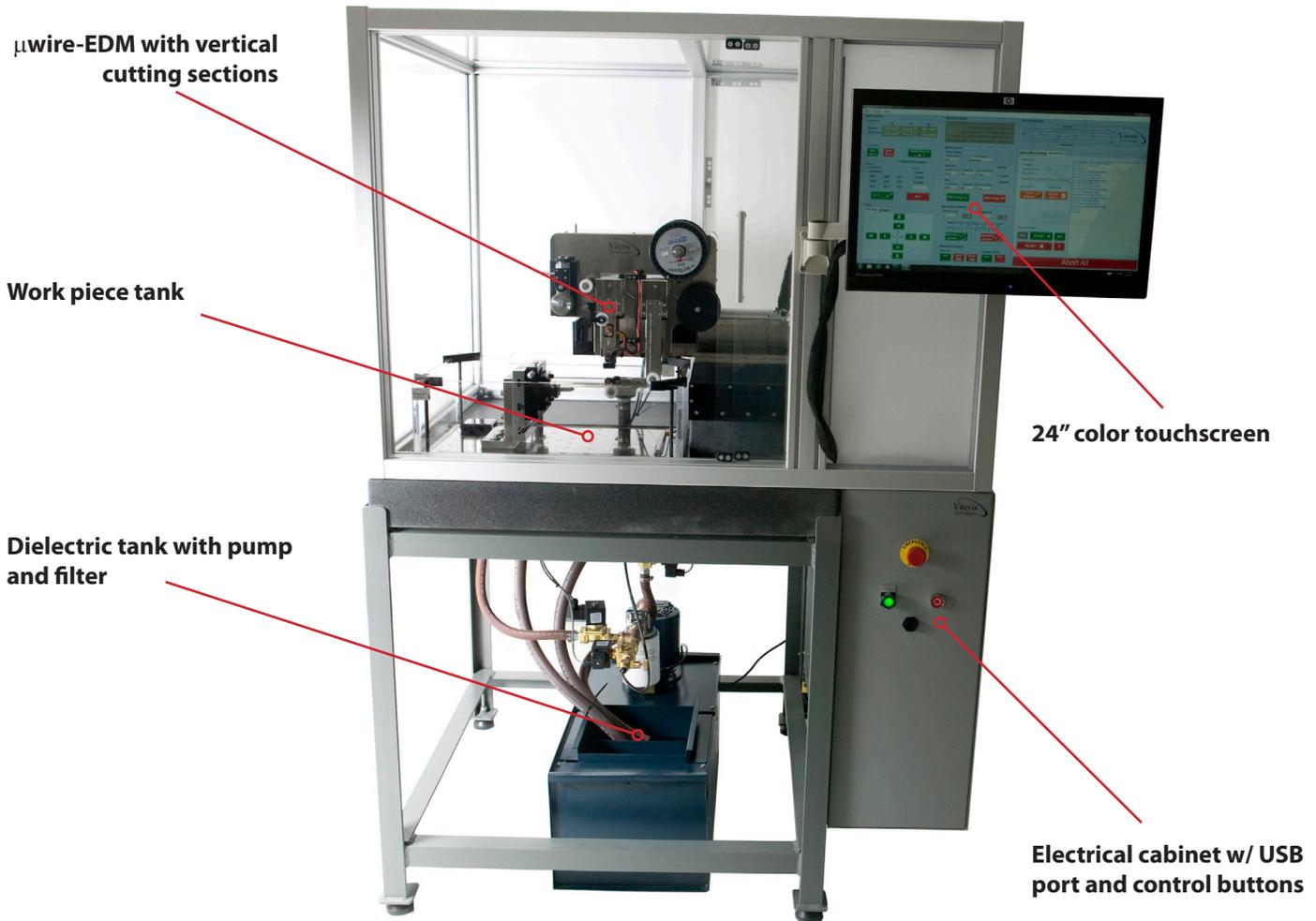
Standard features

- Small overall size (1050 x 1050 x 2000 mm)
- 250 x 250 mm work volume
- Versatile μEDM discharge generator w/ 12 - 200 V discharge voltage
- 0.01 - 0.1 mm EDM wire w/o changing hardware
- Synthetic dielectric oil
- 24" color touchscreen with USB ports
- 3-axis control
- G-Code compatible (32,000 lines max)
- Made in the USA

Optional features

- Integrated machine vision system with variable zoom and coaxial illumination
- Optical work piece setup
- Submersible, backlash-free rotary axis for continuous rotation and stationary positioning in power-off state
- Advanced user control with 19" color touchscreen, hardware buttons, keyboard + trackball + CNC pendant

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**Precision Machines Designed and Built to Meet your Needs**

MW250 is a high-precision micro wire EDM machine with a highly flexible wire management system. Utilizing open V-groove wire guides and a takeup spool for the used wire, EDM wires ranging from 0.01 to 0.1 mm (0.0004 - 0.004") can be used without changes to the machine. The wire is set up in a vertical arrangement that facilitates vibration-free self-flushing induced by the heat of the EDM process. The X- and Y-axes with a travel of 250 mm (9.84") have a linear resolution of 0.0001 mm (0.000004 in) to allow the precise servoing required for micro-EDM. The machine uses a RC-based discharge generator that was specifically designed for wire-EDM with extremely small wire diameters. EDM parameters that can be adjusted include the ionization voltage (24 - 200 V), the work voltage (12 - 100 V), the on-time (0.6 - 3 usec), the off-time (4 - 35 usec) as well as any combination of 5 ionization and 8 work capacitors. Grounding of the work piece is achieved through the tank plate, which remains at earth ground regardless of whether positive or negative EDM polarity is used.

Wire Guides

The upper and lower wire guides are mounted to micro-flexure stages that allow precise alignment of the wire to the machine axes. The position and length of the cutting section is adjusted by varying the vertical position of both wire guides. This highly flexible wire guide system yields a wide range of cutting lengths (4 - 102 mm = 0.16 - 4.01") as well as cutting heights. The depth of cut is limited by the geometry of the lower wire guide assembly and cannot exceed 75 mm (3.0"). The MW250 wire system requires manual threading, and as such is primarily intended for work pieces with external features. The machining of internal features requires pre-machined starter holes through which the wire needs to be threaded manually. The control software includes G-Code commands for threading and cutting of the EDM wire.

Dielectric System

The dielectric system is based on synthetic EDM oil whose extremely low viscosity paired with high dielectric strength is a major factor in achieving very fine surface finishes. The oil, which requires no maintenance besides filtering, is stored below the machine in a separate tank. Before machining, the oil is pumped through a filter into the work tank, thereby cleaning the oil of particulates.
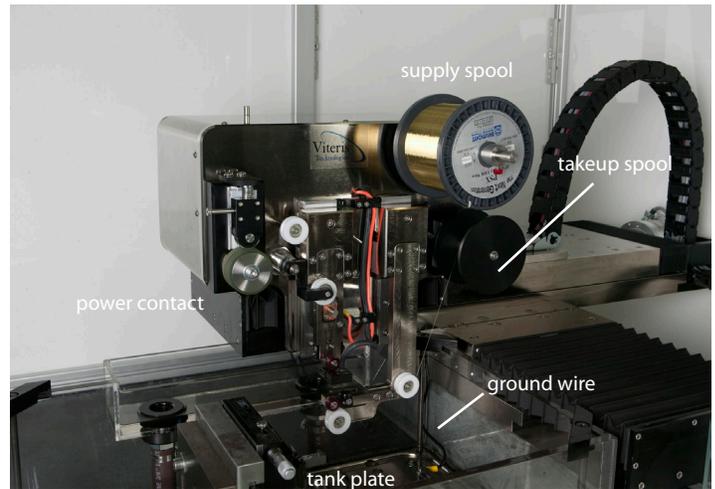
**MW250 is a highly flexible micro wire EDM machine**
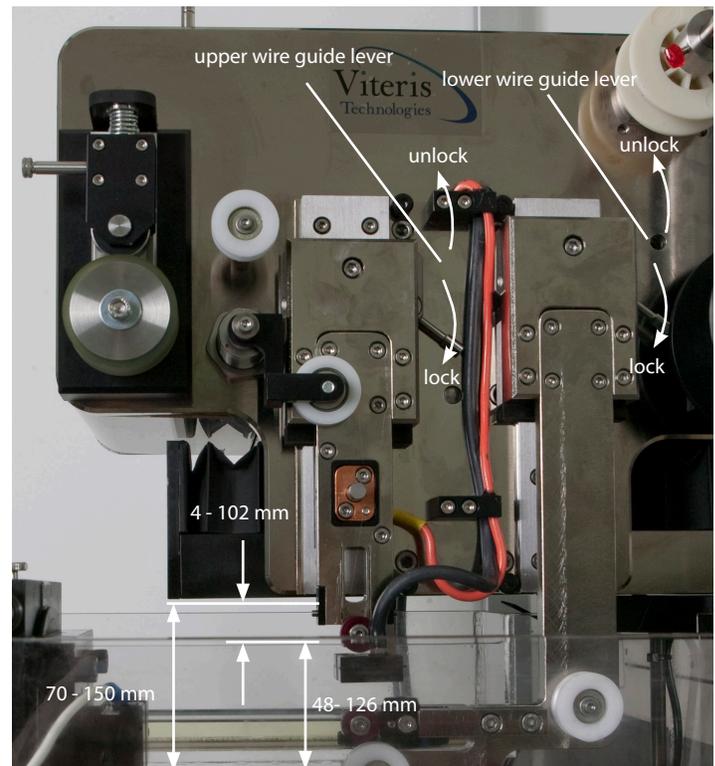
The exposed length of the wire can be varied from 4 - 102 mm
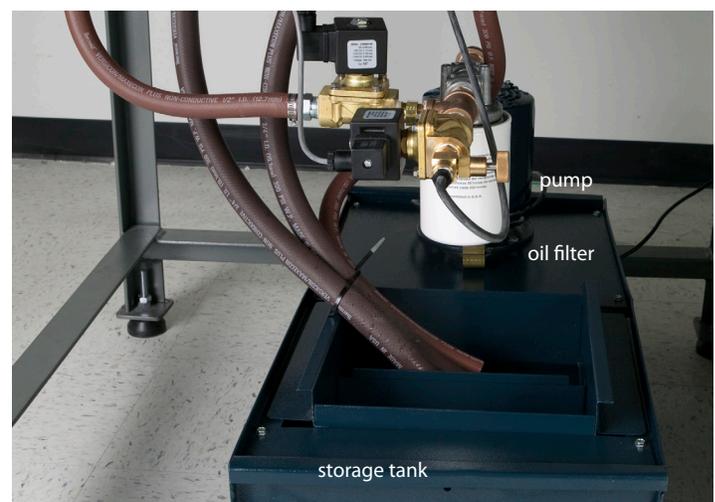
**Dielectric oil is stored below the machine in a separate tank**

Controls

The user interface (MicroPEC 5) was specifically created for touchscreens. On the left 1/2 of the screen, critical information about machine status such as axis position, EDM status, etc. is provided. The right 1/2 of the screen are tabbed according to individual machine function. Shown in the picture is the "Work Piece Setup" tab, which provides controls and information that are relevant to setting up the work piece offsets (G54 - G59). In the case of the MW250, the work piece can be setup by touching two surfaces with the EDM wire or optically using the optical system and its live video stream. A second tab provides controls and information related to machining, which is based on line-by-line instructions provided as G-Code. A separate tab is provided that allows the machine to be used as a coordinate measuring machine (CMM) by sampling work piece data points optically or by touch with the EDM wire.
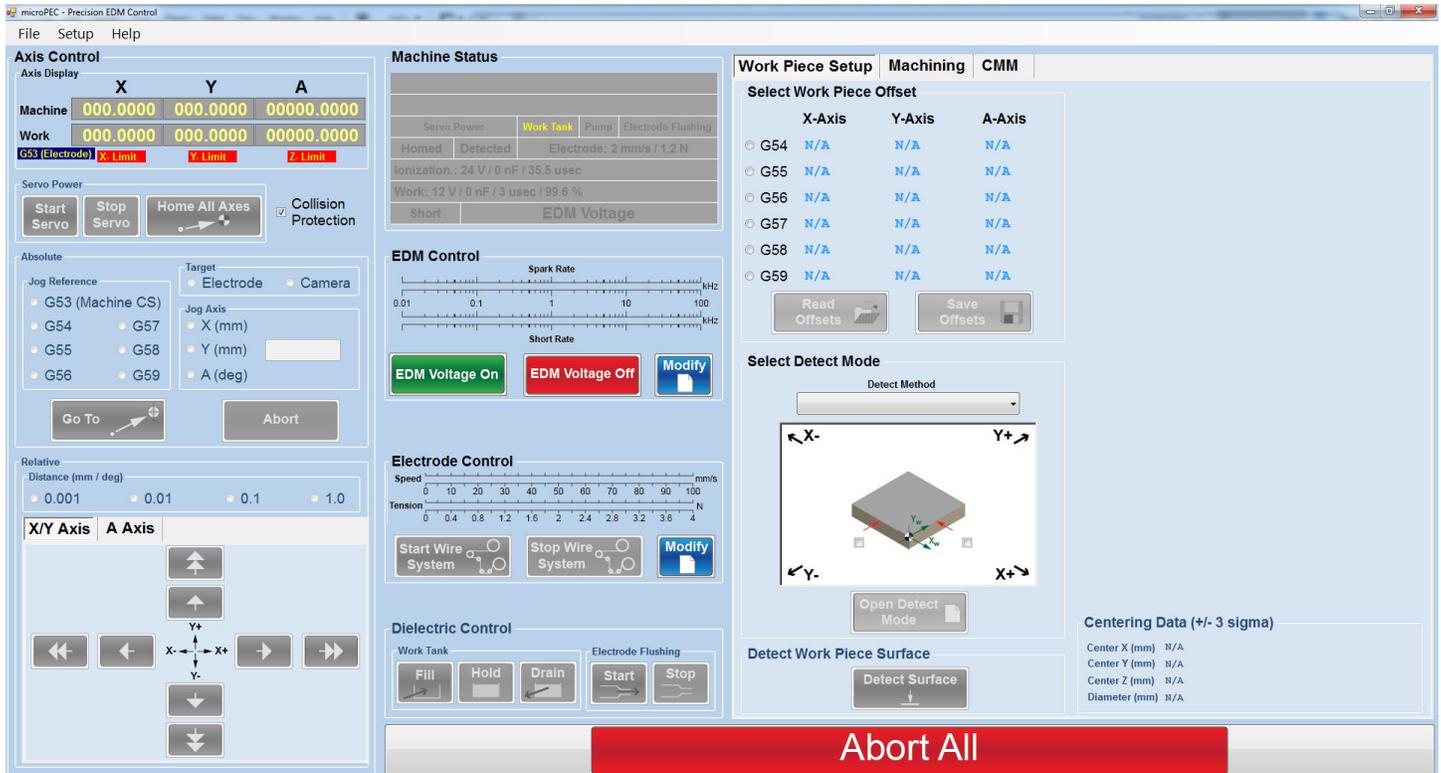
MicroPEC is optimized for a touchscreen interface and provides separate tabbed screens for uncluttered presentation of individual machine functions

MicroPEC 5 performs machining by executing G-Code that includes the full set of EDM parameters. A unique feature is Auto Tuning, whereby the control software optimizes the axis feed rates to maximize the machining rate. When Auto Tuning is disabled, the axes move at the rate as set by the G-Code, which can be overwritten manually using the the feed rate override buttons. Another feature of MicroPEC is that setting up work piece offsets is supported by a graphical interface that offers various options (finding corners vs. center of work piece). The setup is performed by automatically taking into consideration the probe size (radius of EDM wire) as well as the approach direction, thereby eliminating the need for manual modifications.
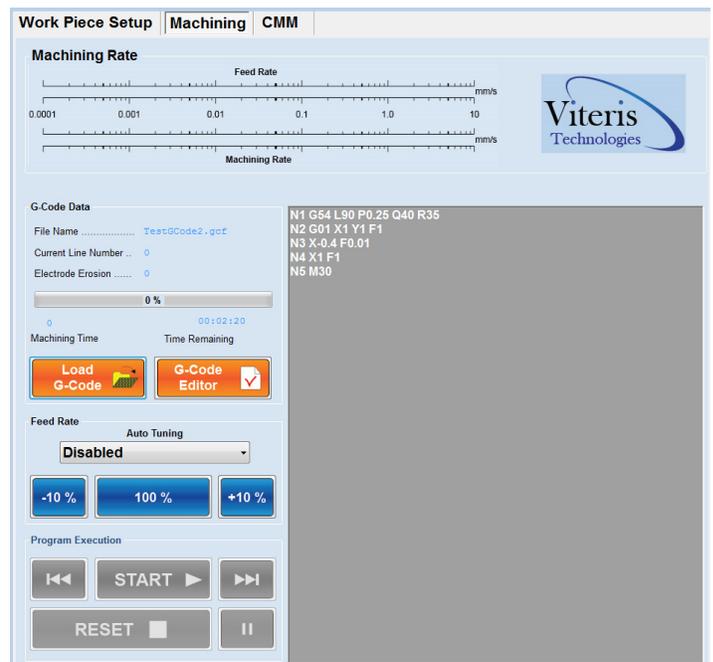
The Machining tab provides controls and information of the G-Code program
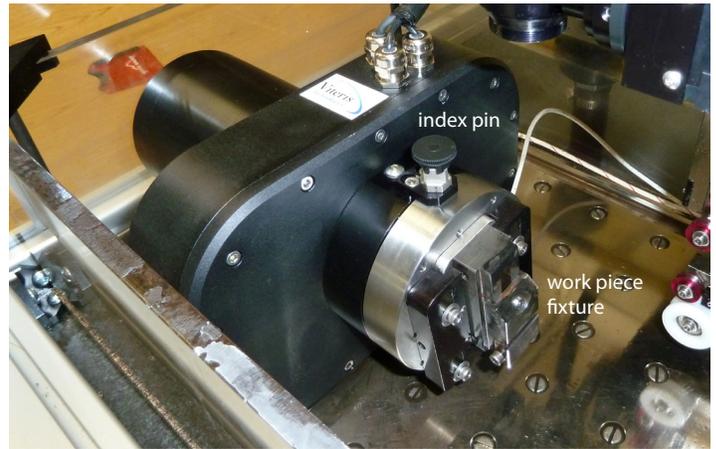
Rotary Axis (optional)

The 3rd axis of this micro-wire EDM machine is mounted inside the work tank. This friction-based, direct-drive rotary axis is fully submersible and allows the work piece to be rotated continuously 20 rpm max) in both clock- as well as counter-clockwise directions. Owing to its friction-based drive system, the axis is completely free of backlash and is able to hold a stationary position in a power-off mode. This eliminates servo dither as well as heat generation. The direct rotary encoder provides the angular position with a resolution of 5.5 arc-sec (0.0015 deg). At this resolution, servoing of the rotary axis with a linear resolution of 0.001 mm (0.00004") is achievable at work piece diameters of up to 75 mm (3.0").

The submersible rotary axis is a continuous rotation, backlash-free, direct drive system with an angular resolution of 5.5 arc-sec. It can hold position in a power-off state.

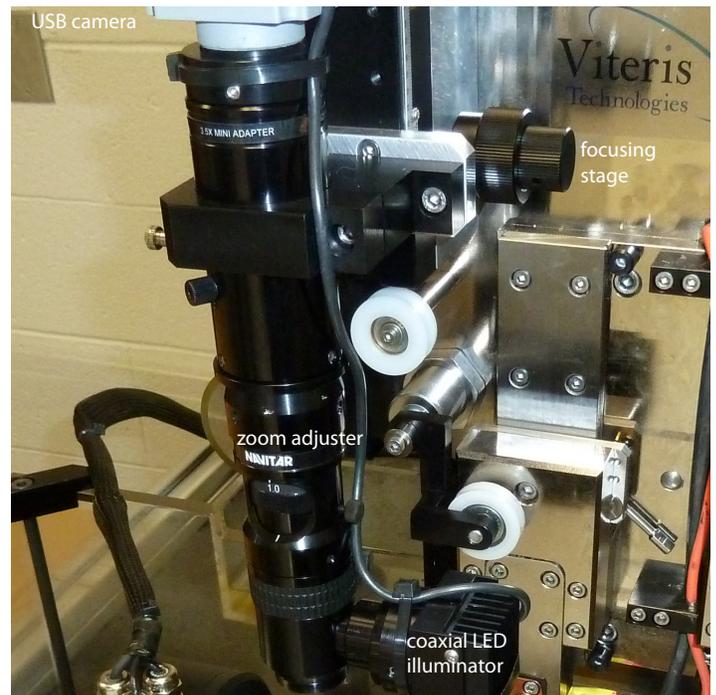## On-Machine High-Mag Optical System (optional)

A high-magnification video system is mounted on a focusing stage parallel to the EDM wire. The system has an adjustable zoom that ranges from 2.45 to 15.75X. Together with the 1/2" sensor of the USB camera, the system delivers a field of view ranging from 3.26 to 0.5 mm at a working distance of 92 mm. The system provides a live video stream to the control interface and can be used to perform measurements at the micron-level as well as perform work piece setup functions. The attached camera has user selectable parameters such as exposure time and gain as well as a digital crosshair with user selectable color. The video stream allows images to be captured and stored to the machine hard drive as bitmaps. The coaxial LED illuminator has 7 levels of illumination that can be set from within the control software.

The video tube with integrated coaxial illumination with adjustable zoom (2.45X - 15.75X) resulting in a field of view ranging from 3.26 to 0.5 mm. The working distance is 92 mm.

Advanced Control Interface (optional)

The control module is mounted to the outside of the machine with a swing arm that allows the user to orient the module freely. It features a 19" touchscreen and a full-size keyboard with integrated trackball. Critical machine functions such as cycle start/stop, power on/off, and emergency stop are handled by hardware buttons. Not shown in the picture is a removable CNC pendant with magnetic backing and 3 m (10 ft) of coiled cabeling. The pendendant has a jog wheel to move any of the 3-axis in switch-selectable increments. Furthermore, pressing one of the two dedicated jog buttons allows for continuous jogging at a switch-selectable jog speed. For additional safety, the pendant is also equipped with an emergency stop button.

The control module is housed in a stainless steel enclosure that is mounted on a swing arm. It features a 19" touchscreen, full keyboard, trackball, and dedicated buttons for critical machine functions. A removable CNC pendant (not shown) is housed in the lower left recess.

Overall Specs

- Size (w x d x h): 1050 x 1050 x 2000 mm (41.3 x 41.3 x 78.7 in)
- Weight: 450 kg (990 lbs)
- Workvolume: 250 x 250 x 102 mm (9.84 x 9.84 x 4.0 in)
- Dielectric tank: 63.6 l (17.0 gal.)
- Dielectric filter size (user selectable): 0.001 - 0.01 mm (0.00004 - 0.0004 in)
- Linear axis resolution: 0.0001 mm (0.000004 in)
- Linear overall accuracy: 0.001 mm / 100 mm (0.00004 in / 4 in)
- Supply power: 110 - 130 VAC (single phase) @ 10 A

WEDM Specs

- Discharge voltage: 12 - 200 V
- Discharge capacitance: 0.1 - 1000 nF
- Wire tension: 0.05 - 4 N (0.011 - 0.88 lb)
- Wire speed: 5 - 100 mm/s (0.2 - 4 in/s)
- Wire size: 0.01 - 0.1 mm (0.0004 - 0.004 in)
- Wire guide opening: 4 - 102 mm (0.16 - 4.0 in)
- Wire guide type: universal v-groove
- Wire orientation: vertical
- Dielectric fluid: synthetic EDM oil

Control Specs

- User interface: 19" touchscreen + keyboard + trackball + CNC pendant (not shown)
- G-Code compatible (32,000 lines max)
- Work piece setup: optics + EDM wire

Machine Vision Specs (optional)

- Magnification: 2.45 - 15.75X
- Working distance: 92 mm (3.62 in)
- Field of view: 3.26 - 0.5 mm (0.13 - 0.02 in)
- Exposure: 0.0001 - 0.25 s
- Gain: 0 - 25.1 db in 45 increments
- Resolution: 1280 x 1024
- Framerate: 28 fps (1280 x 1024 pixel)
- Pixel pitch: 0.0032 x 0.0032 mm (0.00012 x 0.00012 in)

Rotary Specs (optional)

- Rotary axis resolution: 5.5 arc-sec (0.0015 deg)
- Rotary axis accuracy: 11 arc-sec (0.003 deg)
- Maximum speed: 20 rpm (continuous)
- Static holding torque: 1.4 Nm (1.03 lb-ft)
- Dynamic holding torque: 1.5 - 1.8 Nm (1.1 - 1.3 lb-ft)