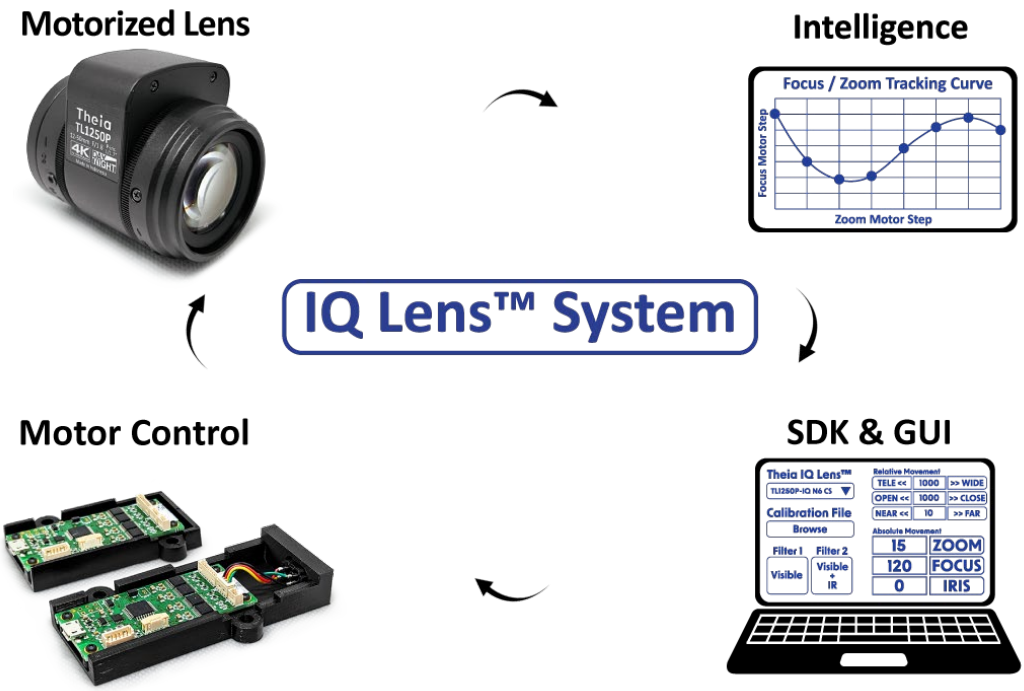
Theia®
TECHNOLOGIES



Theia Technologies' IQ Lens™ System brings together a motorized lens, motor control board, average calibration data, and software with graphical user interface (GUI) to form an intelligent, modular, and highly configurable system.

Theia's IQ Lens™ System software application and intuitive graphical user interface saves the user considerable development effort and cost, speeding time to market.

The IQ Lens™ calibration data provides intelligence that enables optimal image quality as well as easy imaging system setup.

The compact, lightweight varifocal or telephoto lens and motor control board provide for remote operation in hard to reach or mobile environments.

Combined, these elements allow for convenient and cost-effective integration into the imaging system.

Theia's IQ Lens™ System - Fast. Intelligent. Cost-effective. Just plain Smart!

IQ Lens™ - Motorized for Remote Access and Control

Theia's motorized IQ Lenses provide the ability to adjust the zoom and focus remotely, offering enormous flexibility in the placement of imaging systems requiring variable camera positions and/or object distances simplifying camera setup and installation in applications that have remote or difficult-to-access set up locations. Remote zoom and focus permit fine tuning of object resolution in dynamic environments and applications as in autonomous mobile robots (AMRs), UGV's and Cobots for example.

Theia's motorized, NIR corrected IQ Lenses offer the ability to switch between transmitting visible light and Near IR light, enabling high image detail in multi-spectral applications, accurate color rendition in visible light and improved sensitivity in NIR light for a variety of applications including produce inspection and grading, agricultural crop monitoring, Automated Number Plate Reading (ANPR) and many more.

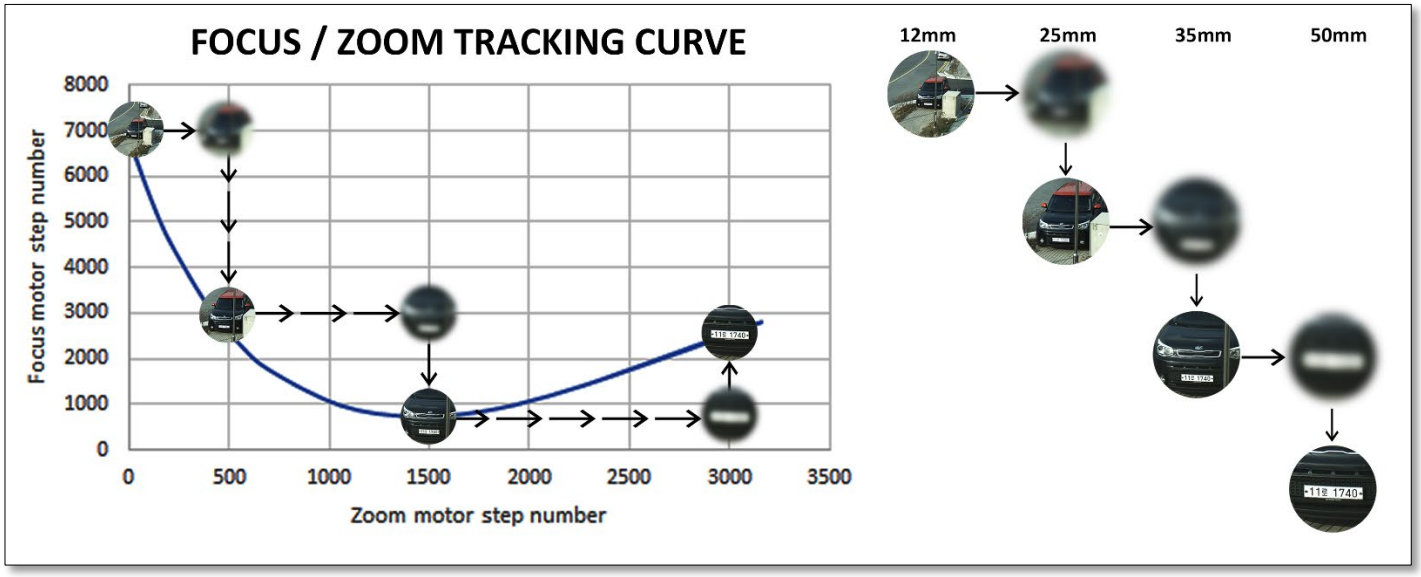
IQ Lens™ Intelligence

Theia's IQ Lens™ includes calibration data in a computer-readable .JSON formatted data file to enable enhanced image performance and image processing speed. Calibration curves are monitored from lens lot to lot to verify the continued accuracy of the curves; the most recent data file is provided with lens purchase, available through cloud download.

Data frame	Y axis	X axis	Benefit & Application
Focus/zoom tracking*	Focus motor step	Zoom motor step	Find focus quickly post zooming, remote set up
Focal length conversion*	Zoom motor step	Focal length [mm]	Accurate FOV setup for mobile, dynamic imaging
Distortion^	Object angle [deg]	Image height [mm]	Precise positional control for mapping
Relative illumination^	Illumination [%]	Image height [mm]	Brightness adjustment for lighting uniformity
Aperture^	Aperture	Iris motor step	Balance lens brightness with image resolution

*Average measured data; ^Design data

Theia's IQ Lens™ calibration data includes an average measured zoom/focus tracking curve which can be used to quickly find focus when changing zoom position, or to set the focus at a known zoom position. The IQ Lens™ calibration data provides intelligence that enables optimal image quality and easy imaging system setup.



IQ Lens ™ System SDK = Plug and Play

Theia's IQ™ Lens System comes with an easy-to-use software development kit (SDK) that translates engineering parameters into motor steps and motor steps into lens commands for quick and easy integration into the imaging system.

With the system's SDK, engineering units are automatically converted from intuitive concepts into motor steps using Theia's lens control library and GUI without complicated external calculations, curve fitting, or interpolation[1].

The system also includes the MCR IQ™ Motor Control Board with software module and GUI to convert motor steps into machine commands and to move the lens to desired positions.

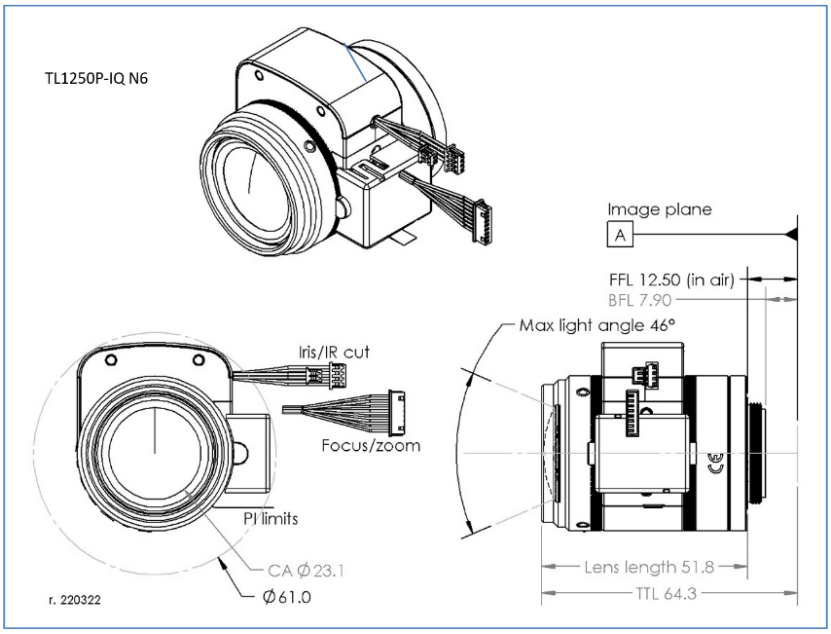
Purchase of the IQ Lens™ and MCR IQ™ Motor Control Board includes a royalty free license to use the Python based software modules and GUI applications.

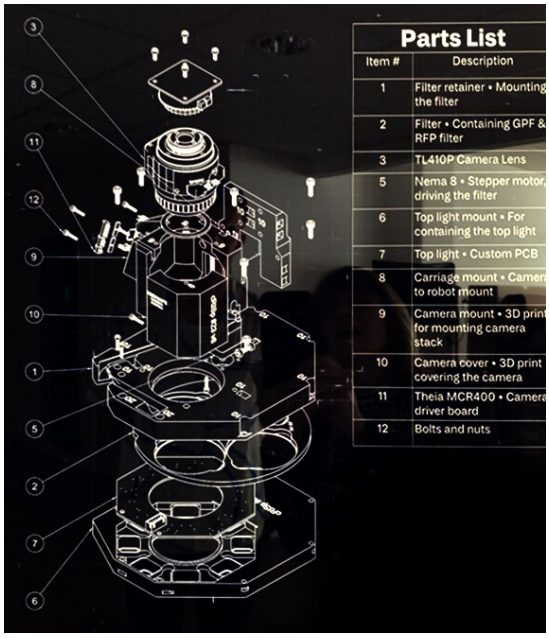
[1] The SDK is designed for use with USB communication protocol. It can be modified by the customer to support I²C and UART protocols.

IQ Lens™ System Modular Design

Theia's IQ Lens™ System offers a modular design with separate components allowing flexible configuration inside the hardware envelope.

Theia's motorized varifocal IQ Lens™ series offers compact and lightweight lenses. The TL1250P-IQ 12-50mm telephoto lens is compact at less than 52mm lens length and lightweight at only 74 grams, while the TL410P-IQ (CS mount version) and ML410P-IQ (C mount version) 4-10mm varifocal lenses are less than 47mm lens length and weigh 75 grams, making all three lenses well suited for uncrewed autonomous, robotic, and remote applications for optimal maneuverability.





Theia's MCR IQ™ motor control board is only 25mm x 60mm to fit into small enclosures and lightweight at only 10 grams, great in mobile monitoring or dynamic inspection environments. With USB, UART or I^2C communication protocols the IQ Lens™ and MCR IQ™ motor control board offer convenient and flexible integration into the imaging system.

Theia's IQ Lens™ System with motorized varifocal lenses, motor control board, average calibration data, and software application saves the user considerable development effort and cost, speeding time to market. The system provides convenience, flexibility and optimized image quality in a cost-effective package to support today's demanding machine vision applications.

Theia's IQ Lens™ System - Fast. Intelligent. Cost-effective. Just plain Smart!