MIKRON MCS640 AND MCS640-HD

Compact, short wavelength thermal imaging process cameras for non-contact temperature measurement of metallic, graphite, or ceramics.

The Mikron® MCS640 and MCS640-HD are short wavelength infrared (SWIR) thermal imagers with internal digital signal processing. These imagers are designed to accurately measure temperatures between 600 and 3000°C (1112 to 5432°F), with minimal interference from temperature reflections on the object. This makes it suitable for applications such as measurements on metallic surfaces, graphite, and ceramics, etc.

PRODUCT HIGHLIGHTS

- 640 x 480 pixel detector for high quality images of even the smallest objects
- Accurate to within ±0.5% of reading for superior temperature measurement
- Image acquisition of 60 frames per second for dynamic temperature processes
- Gigabit Ethernet interface for real-time data transfer and remote monitoring over local area network
- Rugged IP65 (NEMA 4) enclosure for protection in harsh industrial environments (MCS640) and optional heavy duty, rugged water cooled enclosure for harsh high temperature environments (MCS640-HD)
- Wide range of optics for macroscopic and microscopic applications
- Support for I/O module, OPC, and Modbus through LumaSpec™ RT Control software

TYPICAL APPLICATIONS

- Preheating
- Annealing
- Tempering
- Welding
- Forging
- Hardening
- Sintering
- Melting
- Soldering
- Brazing
- Rolling
- Tempering

AT A GLANCE

Temperature Ranges

600 to 1600°C (MB16) or
800 to 3000°C (MB30) in up to 4
sub ranges

Configurations

MCS640/I5 Filter (780 to 1080 nm)
MCS640/I1 Filter (850 nm)
MCS640/V Filter (650 nm)
MCS640/I4 Filter (750 nm)
MCS640/I8 Filter (1080 nm)

Image Update Rate

60 Hz

Measurement Accuracy

±0.5% of reading in °K

Detector

640 x 480 Silicon

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MIKRON MCS640 · MCS640-HD

OVERVIEW

The compact design of the Mikron MCS640 enables the integration of the camera into compact production machines, while the solid and robust housing guarantees reliability even in harshest industrial environments. The Mikron MCS640-HD can be paired with an optional water cooled enclosure for additional protection in harsh industrial environments where ambient temperatures exceed 50°C.

Advanced Energy offers a wide variety of compatible optics for the MCS640 and MCS640-HD, allowing each instrument to be configured exactly to the

measurement needs of the desired scene. Microscopic lenses are also available, allowing accurate measurement of small objects, such as filament temperatures.

The 640 x 460 resolution pixel detector is designed to allow precise targeting of small objects in a wider field of view. The built-in Gigabit Ethernet interface (GigE) allows the camera to be connected to the network for long data transmission or to Advanced Energy's application software for further analysis.

TECHNICAL DATA

Performance Specifications	
Configurations	MCS640/I5 Filter (780 to 1080 nm)
	MCS640/I1 Filter (850 nm)
	MCS640/V Filter (650 nm)
	MCS640/I4 Filter (750 nm)
	MCS640/I8 Filter (1080 nm)
Standard Temp. Ranges	600 to 1600°C (1112 to 2912°F) (MB 16)
	800 to 3000°C (1472 to 5432°F) (MB 30) in up to 4 sub ranges
Sub Ranges	MB 16: 600 to 850°C (1112 to 1562°F), 700 to 1000°C (1292 to 1832°F), 850 to 1250°C (1562 to 2282°F), 1100 to 1600°C (2012 to 2912°F)
	MB 30: 800 to 1150°C (1472 to 2102°F), 1000 to 1500°C (1832 to 2732°F), 1350 to 2050°C (2462 to 3722°F), 1900 to 3000°C (3452 to 5432°F)
Sensitivity/NETD	1° @ 600°C
Detector	640 x 480 pixels; Silicon
Image Update Rate	60 Hz frames per second
Emissivity	10.0 to 100.0% adjustable via interface in steps of 0.1% (for full frame camera picture)
Transmittance	10 to 100% (in application software)
Uncertainty (Accuracy)	±0.5% of reading in °K
Repeatability	0.1% of measured value in °K + 1°K

Interface Specifications	
Digital	Gigabit Ethernet (1000 MBit/s)
Connections	12-pin power connector, RJ45 Ethernet connector

Electrical Specifications	
Power Supply/Consumption	24 VDC, 1A
Power Consulption	10 W Typical, 13W Max
Analog Output	None

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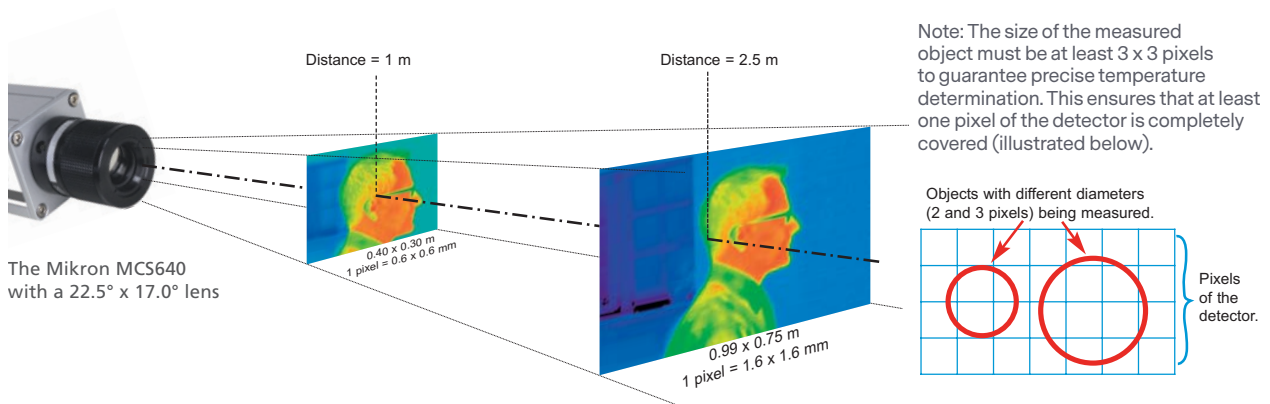## TECHNICAL DATA (CONTINUED)

Environmental Specifications	
Ambient Temperature	0 to 50°C (32 to 122°F)
Storage Temperature	-40 to 70°C (-40 to 158°F)
Relative Humidity	Non-condensing conditions
Weight	MCS640: 0.7 kg (1.5 lbs)
	MCS640-HD: 3.0 kg (6.6 lbs) (dependent on final lens configuration)
Housing	Aluminium extrusion
CE-label	According to EU directives about electromagnetic immunity
Protection Class	IP65 (IEC 60529); NEMA 4
Shock Resilience	30G (IEC60068-2-29/JIS C 0042)
Vibration Resilience	3G (IEC60068-2-6/JIS C 0040)

OPTICS

A wide range of alternative lenses are available for the MCS640 and MCS640-HD, making the thermal imager suitable for most applications. The table and picture show the correlation between the measurement distance, different optics, and the size of the measurement fields.

Distance of Object [m]	Measurement Field W × H [m]					
	3.5° x 2.6°	5.4° x 4.0°	10.8° x 8.1°	22.5° x 17.0°	33.3° x 25.3°	40.4° x 30.9°
1.00	0.06 x 0.05	0.09 x 0.07	0.19 x 0.14	0.40 x 0.30	0.60 x 0.45	0.74 x 0.55
1.50	0.09 x 0.07	0.14 x 0.10	0.28 x 0.21	0.60 x 0.45	0.90 x 0.67	1.10 x 0.83
2.50	0.15 x 0.11	0.24 x 0.17	0.47 x 0.35	0.99 x 0.75	1.50 x 1.12	1.84 x 1.38
10.00	0.61 x 0.45	0.94 x 0.70	1.91 x 1.43	3.98 x 2.99	5.98 x 4.49	7.36 x 5.53

Note: Distances in the table may not apply to some high-temperature situations. Be sure to consult the Applications Team to determine the proper distance for your application.


Distance = 1 m

Distance = 2.5 m

The Mikron MCS640 with a 22.5° x 17.0° lens

0.40 x 0.30 m
1 pixel = 0.6 x 0.6 mm

0.99 x 0.75 m
1 pixel = 1.6 x 1.6 mm

Note: The size of the measured object must be at least 3 x 3 pixels to guarantee precise temperature determination. This ensures that at least one pixel of the detector is completely covered (illustrated below).

Objects with different diameters (2 and 3 pixels) being measured.

Pixels of the detector.

DIMENSIONS

MCS640

Lens Length vs. HFOV	Lens Diameter	3.5°	5.4°	10.8°	22.5°	33.3°	41.0°
Filter code I5 (without filter adapter)	44 mm	65.5 mm	38.5 mm	25.5 mm	27.0 mm	27.0 mm	31.5 mm
Filter code I1, I2, I3, I4, I8 and V (including filter adapter)	44 mm	90.5 mm	63.5 mm	50.5 mm	52.0 mm	52.0 mm	56.5 mm
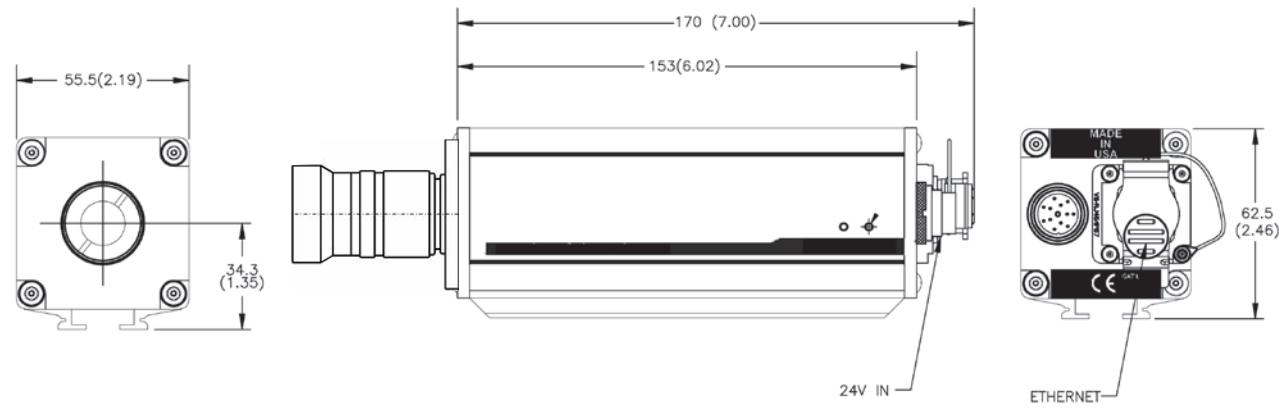
MCS640-HD

|	Lens Type						
Model: Standard	6.5 mm	8 mm	12 mm	25 mm	35 mm	50 mm	75 mm
Overall Length	8.38	8.38	8.38	9.33	9.33	9.33	11.38
Model: Air Purge	6.5 mm AP	8 mm AP	12 mm AP	25 mm AP	35 mm AP	50 mm AP	75 mm AP
Overall Length	10.31	10.31	10.31	10.31	10.31	10.31	10.74
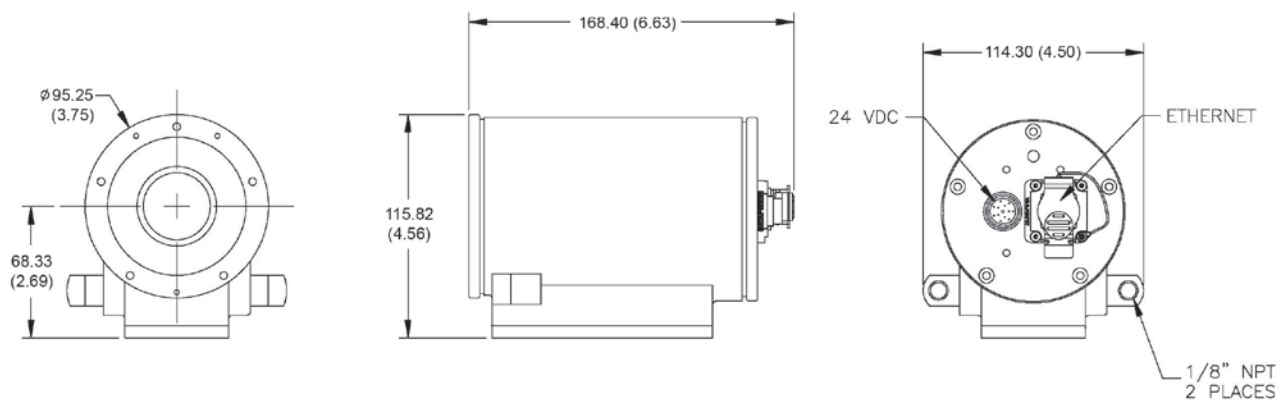
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SYSTEM CONFIGURATION

Advanced Energy's thermal imagers offer several configuration options.

MCS640 or MCS640-HD Over Network

The system can be set up by connecting the camera to a network device (switch) or by connecting the camera directly to a dedicated computer using a cross-over Ethernet cable.
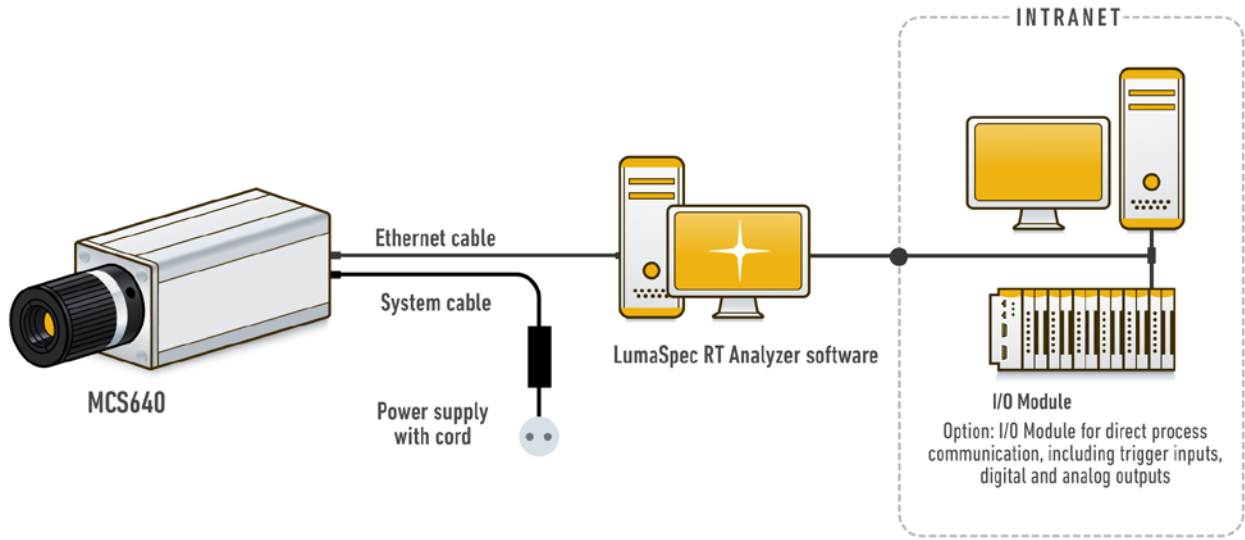
MCS640 or MCS640-HD Mobile Setup

Additionally, the camera can be used with a desktop PC or with a laptop PC for a mobile measuring system.

MIKRON MCS640 · MCS640-HD
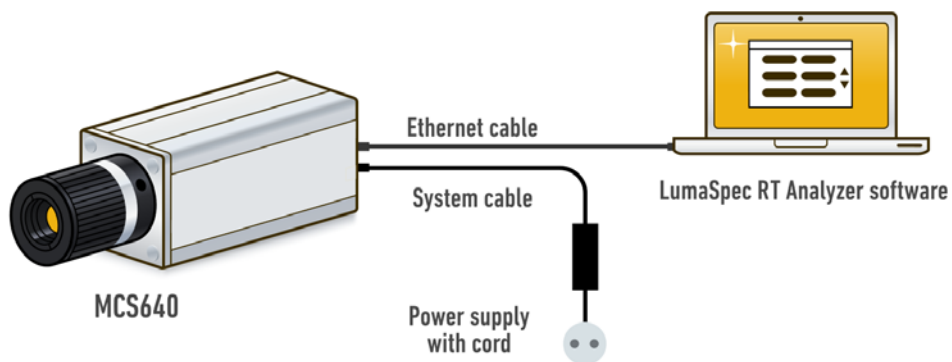
MCS640 and MCS640-HD				
	MCS640/I5 (780 to 1080 nm)	**MCS640/I1** (850 nm, clean gas flame furnaces)	**MCS640-HD/I5** (780 to 1080 nm)	**MCS640HD/I1** (850 nm)
Standard lens (10.8° x 8.1°), 60 Hz, 600 to 1600°C	461H1625	461J1625	461H1625-HD	461J1625-HD
Wide angle lens (33.3° x 25.3°), 60 Hz, 600 to 1600°C	461H1608	461J1608	461H1608-HD	461J1608-HD
Wide angle lens (22.5° x 17°), 60 Hz, 600 to 1600°C	461H1612	461J1612	461H1612-HD	461J1612-HD
Telephoto lens (5.4° x 4.0°), 60 Hz, 600 to 1600°C	461H1650	461J1650	461H1650-HD	461J1650-HD
Telephoto lens (3.5° x 2.6°), 60 Hz, 600 to 1600°C	461H1675	461J1675	461H1675-HD	461J1675-HD
Standard lens (10.8° x 8.1°), 60 Hz, 800 to 3000°C	461H3025	461J3025	461H3025-HD	461J3025-HD
Wide angle lens (33.3° x 25.3°), 60 Hz, 800 to 3000°C	461H3008	461J3008	461H3008-HD	461J3008-HD
Wide angle lens (22.5° x 17°), 60 Hz, 800 to 3000°C	461H3012	461J3012	461H3012-HD	461J3012-HD
Telephoto lens (5.4° x 4.0°), 60 Hz, 800 to 3000°C	461H3050	461J3050	461H3050-HD	461J3050-HD
Telephoto lens (3.5° x 2.6°), 60 Hz, 800 to 3000°C	461H3075	461J3075	461H3075-HD	461J3075-HD

Note: The MCS640 and MCS640-HD cameras are designed to operate on a 32 or 64-bit Windows™ based computer with the following (minimum) components: Dual Core 1.5 GHz or faster processor, 4 GB RAM (running at 1600 MHz), Dedicated Video Card with 1 GB of 900 MHz DDR3 dedicated RAM, 7200 RPM Hard Drive with a 16 MB buffer and using a 3.0 GB/sec SATA bus, Gigabit Ethernet card that supports Jumbo Packets up to 9014 bytes.

Scope of Delivery:
MCS640: 2 m Ethernet cable, 2 m power supply cable, power supply unit (100 to 240 VAC, 47 to 63 Hz), mounting adapter, PCI/Gigabit Ethernet card (depending on computer), lens cap, manual (on CD), carrying case, and LumaSpec RT Viewer software.
MCS640-HD: Additional HD enclosure

- Adjustable emissivity, background, and transmission settings
- Real-time display of thermal images with frame capture and sequence capture
- Includes 19 different color palates
- Auto-Gain available for entire image or ROI
- Multiple types of ROI including point, line, and area with temperature display
- Includes analysis tools like histogram, 3D profile, line profile, and temperature trend
- Alarm generation for entire or ROI image based on minimum, maximum or average temperature
- Support for OPC (OPC DA 2.0) with user-defined scan rate
- Analog and digital output module
- Web server functionality
- Triggered capture based on alarm conditions

- Password controlled user access
- Digital zoom up to 8X
- Data export to text or Microsoft Excel (includes thermal image, ROI table summary/data, image data) or to text
- Modbus TCP/IP available
- Multi-camera configuration with camera auto start feature
- Image subtraction available
- Analyze previously recorded images
- Export captured sequences to AVI
- Image format compatible with LumaSpec Offline Analyzer software for advanced analysis and report writing
- Optional SDK

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ACCESSORIES

PN	Description
3 832 950	Lab power supply (24 VDC, 1.25 A)
3 832 970	DIN rail mounted power supply (24 VDC, 2.5 A)
3 821 360	Connecting cable, 5 m
3 821 370	Connecting cable, 10 m
3 821 380	Connecting cable, 15 m
3 821 390	Connecting cable, 25 m
3 829 850	CAT 6 Ethernet cable, 7.5 m
3 829 860	CAT 6 Ethernet cable, 15 m
3 829 870	CAT 6 Ethernet cable, 25 m
3 830 460	ID enclosure for MCS640 (standard, non-HD)
3 835 490	Adapter for mounting rail to tripod
3 834 410	Adjustable mounting support (3 hole)
812 0008 01	Software LumaSpec RT Viewer
812 0009 01	Software LumaSpec RT Basic
812 0029 01	Software LumaSpec RT Analyzer
812 0029 06	Software LumaSpec RT Analyzer-Multi 6
57 0013	Industrial grade laptop
912 0042 01	Tower style controller
912 0014 01	Remote I/O Blocks (8 analog outputs)
912 0015 01	Remote I/O Blocks (Alarm kit, 8 channels, relay)
912 0016 01	Remote I/O Blocks (Remote trigger kit)
912 0017 01	Remote I/O Blocks (8 analog, 8 alarm outputs)
912 0018 01	Remote I/O Blocks (32 analog, 32 alarm outputs)
912 0019 01	Remote I/O Blocks (8 analog inputs)

ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

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