



Energy Toolkit Equipment Summary

Table of Contents

Electricity Usage Monitor.....	2
Color LED Light Meter	5
Ultrasonic Leak Detector with Sound Blaster	8
1000 a Power Quality clamp – on Meter	13
DENT CLAMP – ON CURRENT TRANSFORMER.....	17
ELITEpro XC™ Portable Recording Power Meter.....	21
Infrared Camera	30

Instrument Name: Electricity Usage Monitor

Manufacturer: P3 Kill-A-Watt

Model: P4400

Total Quantity of this equipment at ESI NCDEQ: 05

Range:

Operating voltage: 115 V AC

Current range: 15 A



Measurements:

Voltage

Amps

Watts

Hz

VA

Brief description:

Electricity usage monitors or energy monitors are used to measure and record the electricity use in your home or building and displays what amount of energy is being used by the appliance. Energy monitors are an effective tool that can enhance the energy efficiency management and help to reduce the carbon footprints. One can calculate their own expenses by the day, week, month or even an entire year. It can also help to check the quality of the power by monitoring voltage, line frequency and power factor.



Features:

- Large LCD display
- Cumulative kilowatt-hour monitor
- Forecast your costs
- Display volts, Amps, watt, Hz and VA
- 0.2% Accuracy

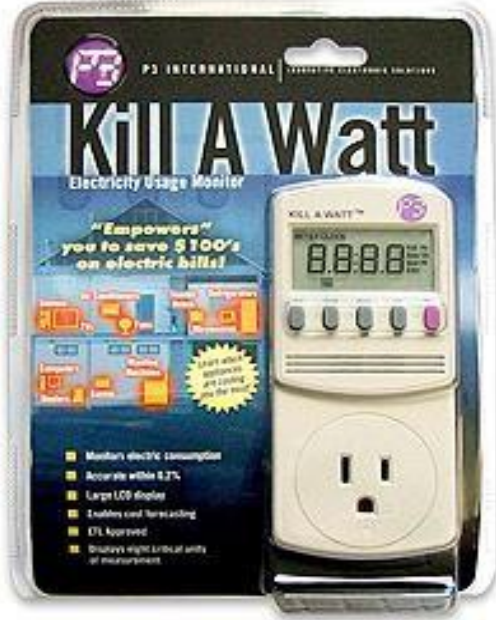
Detail specification can be found in the following link:

[P4400 Kill A Watt TM Operation Manual](#)

[P4400 KAW brochure](#)

Detail Specification include following:

- Operating voltage
- Max Voltage
- Max current
- Max power
- Weight and Dimension
- RMS voltage
- RMS current
- Active power
- Apparent power
- Line frequency
- Power Factor
- Power quantity
- Time quantity
- Display update
- Power consumption



Resources:

- [P4400 Kill A Watt TM Operation Manual](#)
- [P4400 KAW brochure](#)
- [Kill A Watt Meter - Electricity Usage Monitor | P3 \(p3international.com\)](#)
- [P3 Electricity Usage Monitor: 115 V AC, 15A - 9JG60 | P4460 - Grainger](#)
- [How Does Your Electric Meter Work & What Does It Do? | Palmetto](#)
- [video - What is Kill-A-Watt meter/Review](#)
- [Video-How to use a Kill A Watt and save money](#)
- [video - Know your watts, Kill A watt Electricity Usage Monitor](#)

Instrument Name: Color LED Light Meter

Manufacturer: Extech

Model: LT 45

Total quantity if this equipment at ESI NC DEQ: 01

Range:

Foot-candle (Fc) = 40, 400, 4000, 40000 Lux Range =
40, 400, 4000, 40000

Measurement:

Foot candle (Fc) and Lux

Brief description:

LT 45 Color LED light meter is an instrument that is used to measure the illuminance of white and color LED lights – yellow, green, blue and red. It also measures light levels for fluorescent, halogen, and incandescent lights. It is mainly used for monitoring and optimizing environmental light levels in a wide range of environments, including office buildings, manufacturing plants and warehouses, university campuses, schools, hospitals, and many other locations. This instrument is more efficient to operate, it emits stable, high-quality illumination.





Features:

- Measures LED and standard lighting in Lux and Footcandle (Fc) units
- 4000 count display
- Min/Max average
- Cosine and Color corrected measurements
- Auto power off
- Measures white, red, yellow, green, and blue LED lights
- Manually store and recall up to 99 readings

Detailed specification can be found in the following link

[LED Light meter - Data Sheet](#)

Detailed Specification include following information:

- Sampling rate
- Display and sensor
- Ranges and Resolution
- Auto range
- Accuracy
- Angle deviation from cosine characteristics
- LED types
- Operating conditions and Altitude
- Storage temperature and RH
- Battery status indication
- Power supply
- Auto power off
- Dimensions and Weight
- Spectral sensitivity



Color LED Light Meter kit consists of:

- Protective case
- Instruction manual
- Color LED light meter

Resources:

- [LED Light meter - USER Manual](#)
- [LED Light meter - Data Sheet](#)
- <http://www.extech.com/products/LT45>
- <https://www.testequipmentdepot.com/extech/light-meters/led-lightmeters/color-led-light-meters-lt45.htm>
- [video - Introduction of the Extech LT 45 LED light meter](#)
- [Video - How to measure LED lights](#)

Name of Equipment: Ultrasonic Leak Detector with Sound Blaster

Manufacturer: Bacharach

Model: Tru Pointe 1100 (0028 – 8012)

Total number of this equipment at ESI NC DEQ: 01 Range:

- Frequency response, Airborne - 4 KHz – 42 KHz
- Frequency response, Touch Probe – 6KHz – 24 KHz

Audio Output measurements: 0 Hz – 4 KHz



Brief description:

Ultrasonic leak detector is an equipment used to detect the inaudible-high frequency ultrasonic sound of high-pressure leaks and mechanical wear. Through a process called heterodyning, the ultrasonic sound of a leak is converted into a lower frequency that can be heard through headphones. This equipment is suitable for detecting any type of gas leak. The Ultrasonic leak detector, Tru Pointe 2100 with SoundBlaster can be used to detect pressurized leaks of compressed air, refrigerant, steam, and nitrogen as well as leaks in pressurized tanks or pipes and vacuum leaks; including touché probe that allows the quick detection of flow abnormalities in the pumps, stream traps and valves along with the mechanical wear in bearings and other machine parts. Noise patterns can be recorded and compared to previous readings for an accurate record of noise patterns.

Features:

- Detects any gas
- Sensitivity adjustments
- Visual indication
- Unique volume control
- Pocket sized
- Dual audio intensity displays

Detailed specifications for this equipment can be found at the following link.



[Instruction manual - Bacharach Tru Pointe 1100](#) Detailed

specifications include following information:

Physical details:

- Dimensions
- Overall length
- Body material
- Body finish
- Connector
- Weight

Electrical details:

- Sensitivity
- Ultrasound Convertor type
- Frequency Response, Airborne
- Frequency Response, Touch probe
- Heterodyne Oscillator
- Heterodyne Filter
- Controls
- Digital Sensitivity control
- Digital volume control
- Output, Audio
- Output, visual
- Signal Output
- ON Indicator
- Low Battery Indicator
- Insufficient Battery Change
- Battery Type
- Run Time

Energy Toolkit Equipment Summary

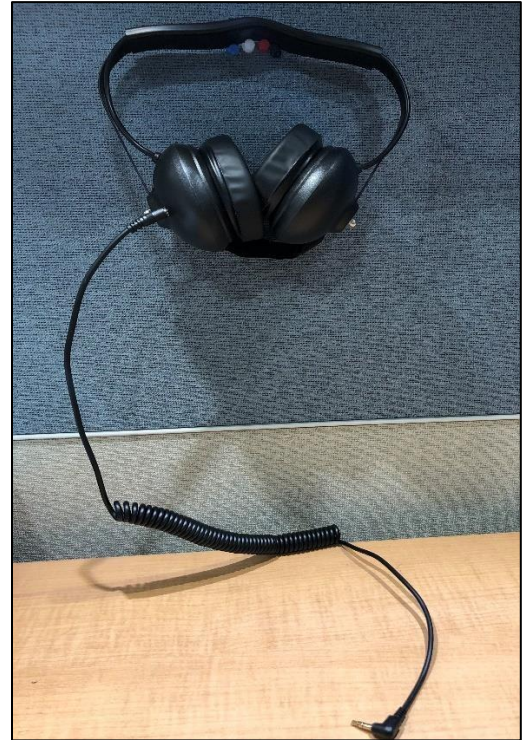
Ultrasonic Leak Detector kit includes:

- Tru Pointe 1100 Ultrasonic leak detector with bar graph display
- Sound blaster Ultrasonic leak detector
- Probe wrench
- Solid touch probe
- Heavy duty headset
- 9v Battery
- Instruction Manual (hardcopy)
- Warranty card
- 6" waveguide



Energy Toolkit Equipment Summary

Heavy



SoundBlaster Ultrasonic leak detector and Tru Pointe 1100 ultrasonic leak detector along with the Instruction Manual



Resources:

- [Operation and Use of the Ultrasonic Leak Detector](#)
- [Superior AccuTrak Goose-neck Ultrasonic Leak Detector With Several Different Leaks to Hear](#)

**Instruction Manual: [Bacharach Tru Pointe 1100 Instruction Manual](#)
(click on the above link)**

- [Tru-Pointe-Series Datasheet 4900-045-MC.pdf \(ss-usa.s3.amazonaws.com\)](#) (Datasheet)

Instrument Name: 1000 a Power Quality clamp – on Meter

Manufacturer: Amprobe

Model: ACD – 41 PQ

Total quantity of this equipment at ESI NCDEQ: 01

Range:

Voltage: 600 V

AC Current: 1000 A

Frequency: 5.00 Hz – 500.0 Hz

Temperature: -50 Degree Celsius to 300 Degree Celsius

-58 Degree Fahrenheit to 572 Degree Fahrenheit



Measurements:

- AC Current
- DC voltage
- Temperature • Frequency
- Active Power
- Power factor
- Total Harmonics Distortion (THD%)



Features:

- TRMS Sensing
- Wide variety of measurements
- Auto selection of AC volts, DC volts or AC amps
- Total harmonic distortion to 51st harmonics
- Optional PC interface capability
- Audible continuity
- Auto power off
- Automatic polarity
- Low battery indication
- Peak hold and data hold
- LCD display
- Voltage overloaded protection for all functions up to 600 V AC/DC
- Accommodate conductors up to 1.77" (45 mm) in diameter

Brief description:

The ACD – 41PQ provides a simple and effective way to verify if the electrical system is affected by the Harmonics. This equipment is true RMS (root mean square) sensing, auto-ranging multimeter for measuring current, voltage, resistance, frequency, temperature, harmonics, power factor and real, reactive, and apparent power in industrial electrical testing application. The meter comes with a Type-K thermocouple probe for measuring temperature and detachable test leads that measures DC voltage and AC voltage, resistance, and frequency. It also measures fundamental total harmonics distortion (THD) and individual harmonics along with the peak hold reading displaying the maximum measurement of a current or voltage surge.

Detailed Specification can be found in the following link.

[ACD-41PQ 1000A Power Quality Clamp-On with THD Measurement Data Sheet](#) **Detailed**

specifications include following:

- Electrical specification
 - AC voltage
 - DC voltage
 - PEAK-rms HOLD (ACA and ACV only)
 - Ohms
 - ACA current (clamp-on)
 - Temperature
 - Frequency
 - THD%
 - Total power factor (PF)
 - Power (VA)
 - Power (KW and KVAR)
- Display functions



What's included:

- ACD – 41PQ
- Carrying Case
- Test Leads
- Batteries (installed)
- Type-K thermocouple



Resources:

- [ACD-30P, ACD-31P, and ACD-41PQ 1000A Clamp-On Power Meters **Product Manual**](#)
- [ACD-41PQ 1000A Power Quality Clamp-On with THD Measurement **Data Sheet**](#)
- [Amprobe ACD-41PQ 1000A Power Quality Clamp Meter with Temperature | Amprobe](#)
- [Amprobe ACD-41PQ 1000A Power Quality Clamp Meter with Temperature: Multi Testers: Amazon.com: Industrial & Scientific](#)
- [AMPROBE Clamp-On Power Quality Meter: 600 kW Max. - 1WXE7|ACD-41PQ - Grainger](#) • [video - Amprobe power quality clamp meters](#)

Instrument Name: DENT CLAMP – ON CURRENT TRANSFORMER

Manufacturer: DENT Instruments

Model: CON – 0500

Total Quantity of this equipment at ESI NC DEQ: 03

Range:

Useful Current range: 10 to 600 A AC



Measurement:

Input: 4 -600 A AC

Output: 0.666 mV AC / A AC

Brief Description:

The current clamp measures electric current flowing through a wire, cable, bus bars or other conductor. Therefore, they are often used for monitoring and quality control of system to ensure current is flowing and flowing at the correct magnitude. The AC current clamp is an accessory which will allow your multimeter to measure electrical current up to 600 amps AC. In general, AC clamp meters operate on the principle of current transformer (CT) used to pick up magnetic flux generated as a result of current flowing through a conductor. Clamp-on current transformers are the one-hand operating solution for temporary or long-term studies. They are designed to work in tight places and clamp around bus bars.

Features:

- High accuracy
- High sensitivity
- Versatility
- Low phase shift

Detailed specification for this equipment can be found in the following link.



Manual - DENT clamp on current transformer Detailed

specification includes following information:

- **Electrical specification:**
 - Nominal rating
 - Useful current range
 - Output signal
 - Accuracy
 - Phase shift
 - Frequency range

- **Mechanical specifications:**
 - Dimensions
 - Maximum cable/bus bar
 - Polarity
 - Output Lead
 - Operating Temperature

- **Other features:**
 - Jaw opening
 - Weight
 - Dielectric strength
 - Storage temperature
 - Case protection
 - Drop test
 - Mechanical shock
 - Common Mode voltage

- **Safety specifications:**
 - Working voltage
 - CE Mark

Clamp – On Current Transformer with the instruction Manual





Resources:

- [Manual - clamp on current transformer](#)
- [Operation Manual - clamp on current transformer](#)
- <https://cakebilt-dev-shop.myshopify.com/products/dent-con-0500-b-clamp-on-currenttransformer-500a-banana-jack-connectors>
- <https://www.kew-ltd.co.jp/en/support/mame/detail.php?id=60>
- <https://gmw.com/current-clamps/>



Instrument Name: ELITEpro XC™ Portable Recording Power Meter

Manufacturer: DENT INSTRUMENTS

Model: ELITEpro XC

Total quantity of this equipment at ESI NC DEQ: 02

Range: 0 – 10 Volts and 4 – 20 mA

Energy Measurements: Volts, Amphs, Amp-Hrs (Ah), KW, KWh, KVAR, KVARh, KVA, KVAh, Displacement Power Factor (dPF).

Brief description:

The ELITEpro XC energy data logger is complete solution for pinpointing the electric usage, building performance metrics, and capturing climate normalized energy data. It is capable of measuring, storing, and analyzing electrical consumption data which is derived from the voltage and current inputs. ELOG™ software for ElitePRO XC for set-up, Data Retrievals, Analysis and Export.

Features:

- Single or 3-phase systems
- Analog inputs – 4 Analog inputs for voltage or current, Temperature or Process control conditions.
- Line-powered
- User-selectable integration periods
- 16 MB nonvolatile memory
- USB connection
- Standard Ethernet port
- Optional WI-FI
- ELOG software
- Easy setup

- Rugged and compact
- Load profiling
- Energy Audits and Energy surveys
- Verification studies
- True RMS current reading
- Analog channels

Figure 1: DENT ELITEpro™ Power Meter Recording

ELITEPRO XC ANATOMY



Detailed specifications for this equipment can be found at the following link. [Detailed specification](#)



Detailed specification includes following information:

- Energy Measurements
- Analog Measurements
- Service Type
- Voltage
- Current
- Max current input
- Measurement Type
- Line frequency
- Data storage capacity
- Sampling Rates
- Integration period
- Accuracy
- Resolution
- LED indicators
- Communications
- Power
- Operating range
- Mobile App
- Enclosure
- Standard compliance
- Weight
- Dimensions

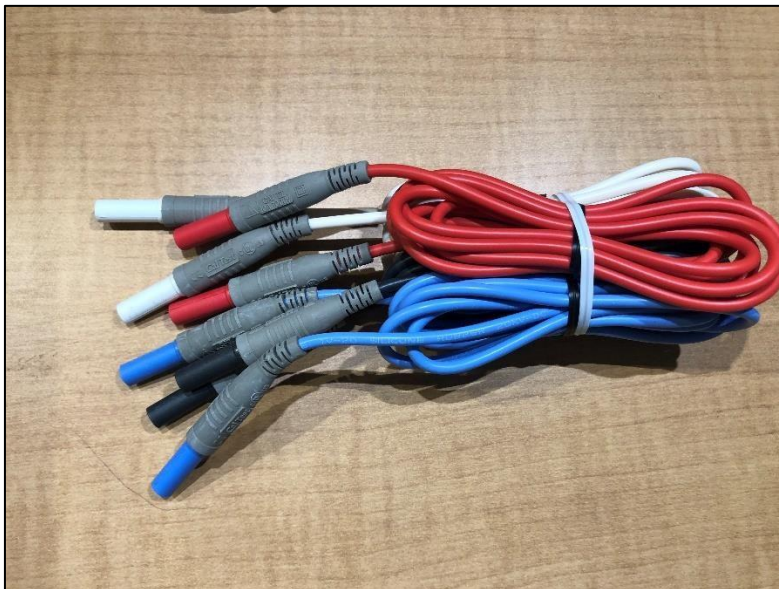


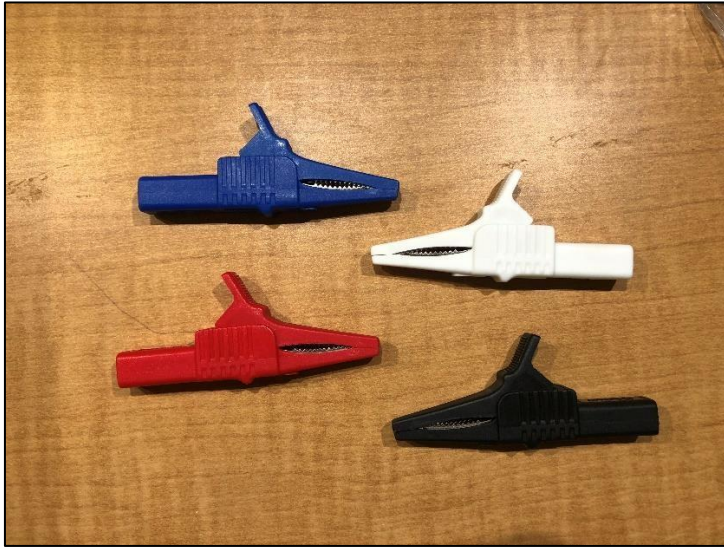
DENT Elitepro^{XC} Kit includes:

- DENT Elite pro XC Power Meter
- 4 RoCoil Current Transformer
- 4 Crocodile clips
- 5 different types of plugs
- Power supply
- 4 connecting wires
- 1 USB cable
- Quick Start guide



DENT's RoCoil Current transformer





Crocodile clips



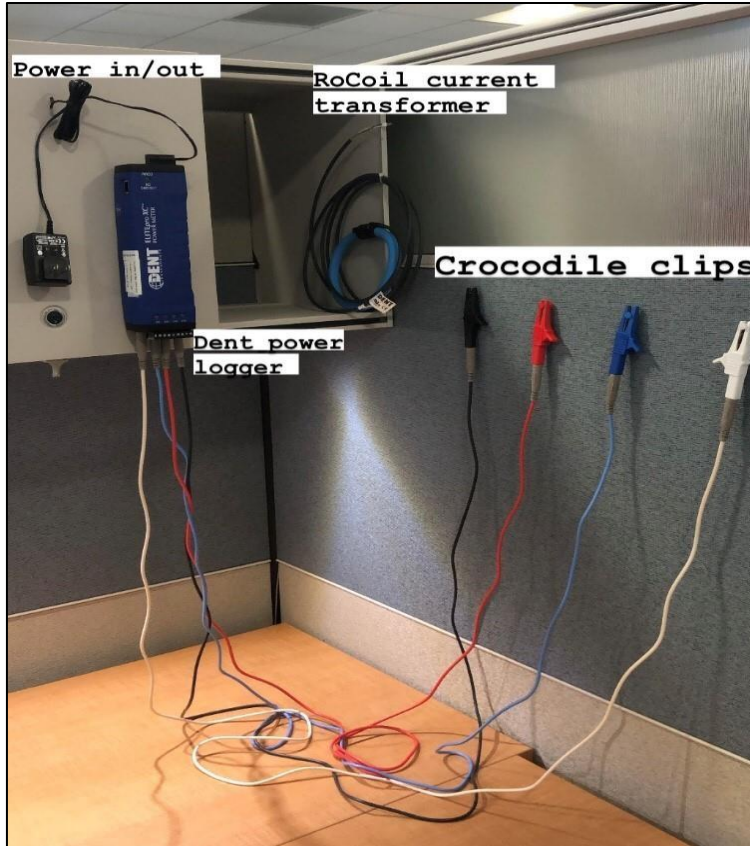
Different types of Plugs



Power Meter



Four analog Input Channels



Assembly Overview

Resources:

1. [ElitePro XC introductory video](#)
2. [How to retrieve a setup table from Elite Pro XC](#)
3. [Communicating with ELOG Software via USB](#)
4. [DENT ELOG 14 Software](#) (size: 20.49 MB) – compatible with windows XP
5. [DENT instruments ELOG 15 software](#) (size: 22.92 MB) – compatible with windows 10, 8 and 7 (32 and 64 bits).
6. [DENT instruments ElitePro AXc: communication options](#) (size: 0.88 MB)
7. [DENT instruments ELitePro XC: Ethernet Communications](#) (size: 0.67 MB)
8. [DENT instrument Elitepro: Port forwarding instructions](#) (size: 0.64 MB)
9. [DENT instruments ElitePro XC: Quick start guide](#) (size: 0.51 MB)
10. [DENT instrument ElitePro XC: User manual](#) (size: 5.33 MB)
11. [DENT instruments ElitePro XC: WiFi Communications](#) (size: 1.32 MB)



Software:

1. [ELOG software overview](#)
2. [DENT ELOG 14 Software](#) (size: 20.49 MB) – compatible with windows XP
3. [DENT instruments ELOG 15 software](#) (size: 22.92 MB) – compatible with windows 10, 8 and 7 (32 and 64 bits).
4. [ELOG software download](#)
5. [ELITEpro Mobile App \(Android APK file\)](#)

Main Resources websites referred:

1. <https://shop.dentinstruments.com/products/elitepro-xc-power-meter>
2. <https://microdaq.com/dent-instruments-elitepro-xc-recording-power-meter.php>

Name of Equipment: Infrared Camera

Manufacturer: FLIR

Model: Ex-Series FLIR – E6390

Total number of this equipment at ESI NC DEQ: 01



Range:

Temperature range (F) – infrared: - 4 Degrees to 482 Degrees

Temperature range (C) – infrared: - 20 Degrees to 250 Degrees

Field of view – IR Camera: 45.0 Degrees Horizontal * 34.0 Degrees vertical

Measurements:

Display – IR Camera: 3.0 in High Contrast Landscape color LCD *Display*

Resolution – infrared: 320 * 240 pixels

Brief description (FLIR Ex Series – E4):

FLIR E4 Infrared Thermal imaging camera is powerful and easy-to-use troubleshooting tool for buildings, electrical and mechanical applications. The E4 include MSX technology, providing extraordinary thermal imaging details. It offers instant detection of temperature gradients in many different materials. The color LCD displays highlights area problems, providing more advanced features than infrared thermometers can offer. Four resolution options are available (ranging from 80 * 60 pixels to 320 * 240) along with the ability to accurately measure temperatures from -4 degrees Fahrenheit to 482 degrees Fahrenheit which fit the target size, working distance and detail you require.

Applications:



- Home weatherization
- HVAC/R
- Restoration Contractors
- Building Diagnostic
- Utility Trouble men
- Facility Maintenance
- Electrical and Mechanical Application

Features:

- Four different image modes
- MSX Thermal image enhancement
- Automatic and focus free
- Conveniently share images and findings
- Compact and Rugged
- Wide Range of Visibility
- Wide range of temperature for operation
- IR Resolution (80 * 60) pixels
- 0.15 degrees Celsius thermal sensitivity

Detailed specifications can be found in the following link:

[Technical data - FLIR Ex Series](#)

Detailed Specifications include following information:

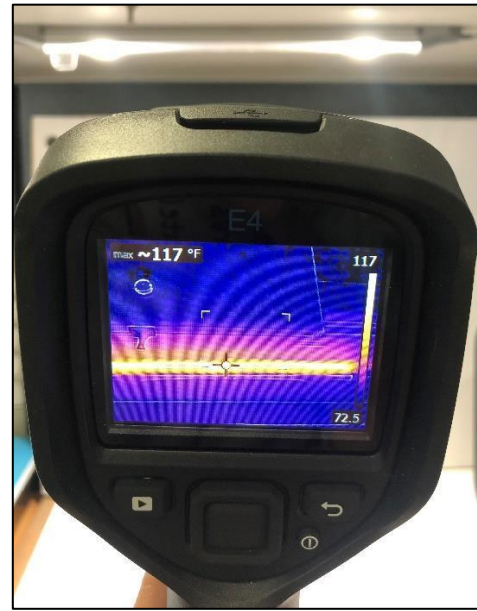
- Imaging and Optical data
- Detector data
- Image presentation
- Image presentation modes
- Measurement
- Measurement analysis
- Set-up
- Storage of images
- Digital Camera
- Data communication interfaces
- Power system
- Environmental data

- Physical data



FLIR Ex-Series Kit includes:

- E4 Infrared Camera
- Battery
- USB cable
- Power supply
- EU, UK, AU, and US plugs
- Printed Instruction Manual



Resources:

- [Instruction Manual - FLIR E4 IR Camera](#)
- [Datasheet - FLIR Ex series - E4](#)
- [Detecting elevated body temperature](#)
- <https://www.globaltestsupply.com/product/flir-e4-ir-camera-w-msx>
- <https://www.testequipmentdepot.com/flir/thermal-imagers/ex-series/infrared-cameramsx-wi-fi-e4wifi.htm>
 - [video - FLIR Ex Series - Building Application](#)
 - [Video - FLIR Ex Series - Electrical Application](#)
 - [Video - FLIR Ex Series - WIFI feature with MSX tech](#)
- [video - FLIR E4 Thermal Camera review with custom firmware](#)
- [video - How to use an IR camera to inspect electrical panels](#)