

Your Next Step to Energy Savings

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Electro Specialties

Energy Related Products

- Fluke
 - Infrared Cameras
 - Motor Vibration Analyzers
 - Energy and Power Quality Loggers
 - Sonic Camera for Air Leak Detection
- NEPSI (Medium Voltage Power Factor Correction)
- E-Mon (Sub-metering)

Why does measuring energy matter?

Measurement data supports the decisions and actions that reduce energy consumption and cost, such as:

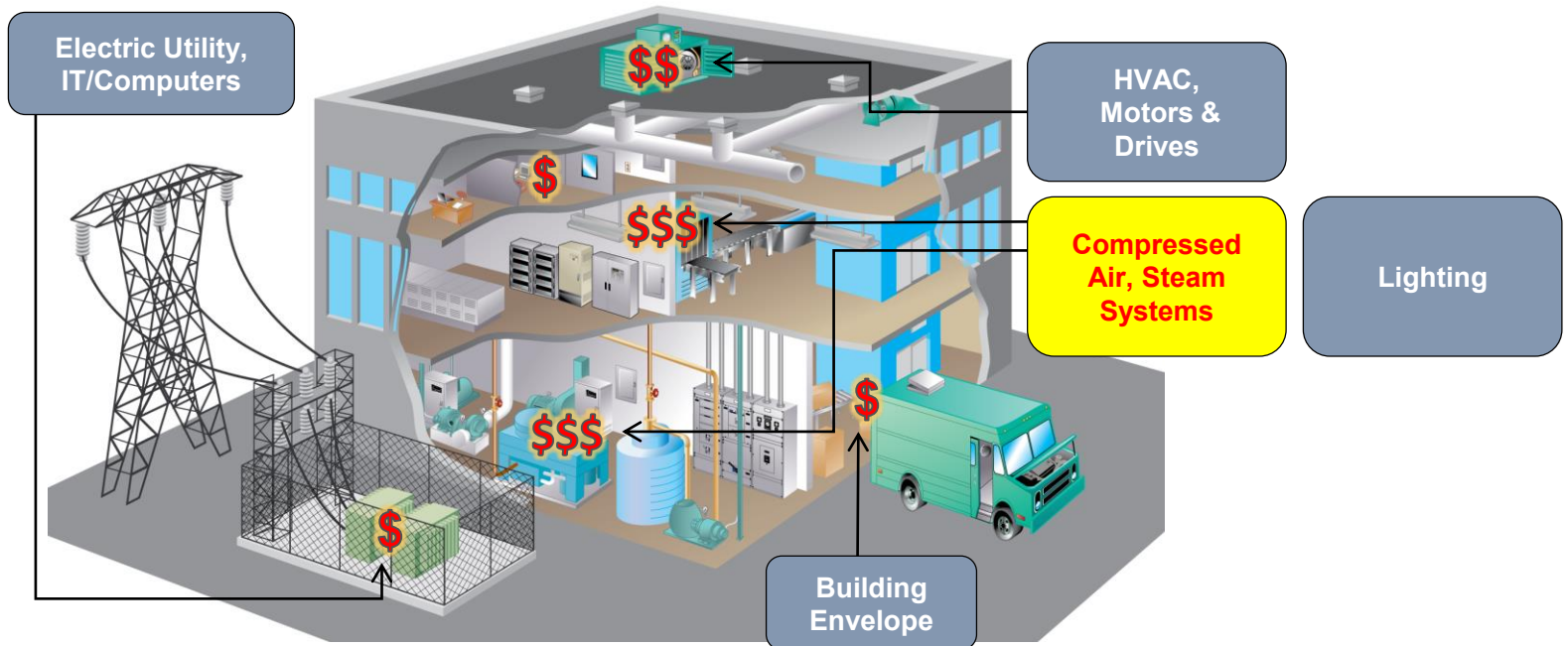
- Equipment upgrade analysis and **ROI**
- Supply/**demand right-sizing** and optimization
- **Applications for utility incentives**
- **Repairs**



Biggest savings opportunities

Facility energy audits can reduce utility expenses by 25% within 1 year

Savings	
\$\$\$	Biggest Opportunities
\$\$	Medium Opportunities
\$	Smaller long-term Opportunities

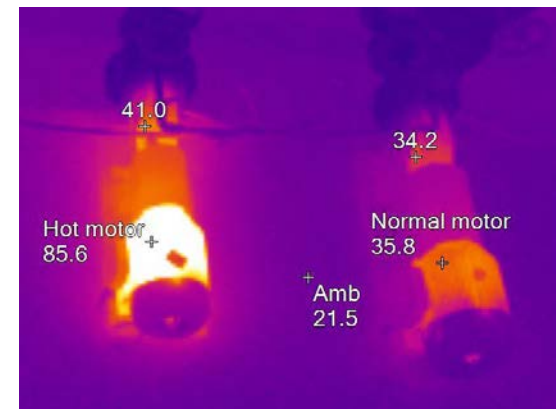
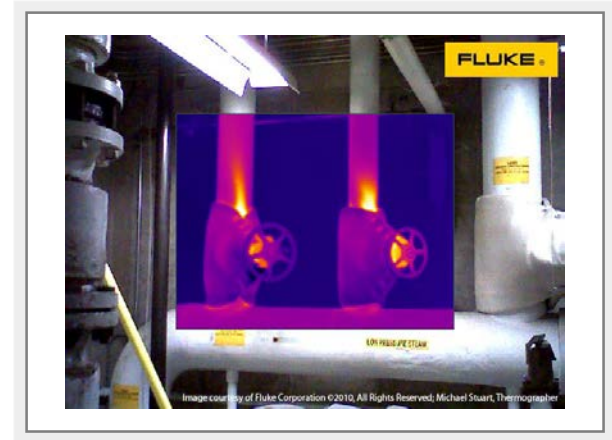


How much can you save?

Spot Measurements to Identify Waste

Key Data Point Measurements

- Use various test tools to take spot measurements at peak operating loads
 - **Temperature**
 - Voltage, Current, Power
 - Motor Torque & Speed
 - Power Quality
- Heat dissipation is not only wasteful energy
- Is potentially an indicator of power quality issues or operation overload
- Leads to reduced equipment lifespan and/or costly repairs



Building infrastructure: Envelope



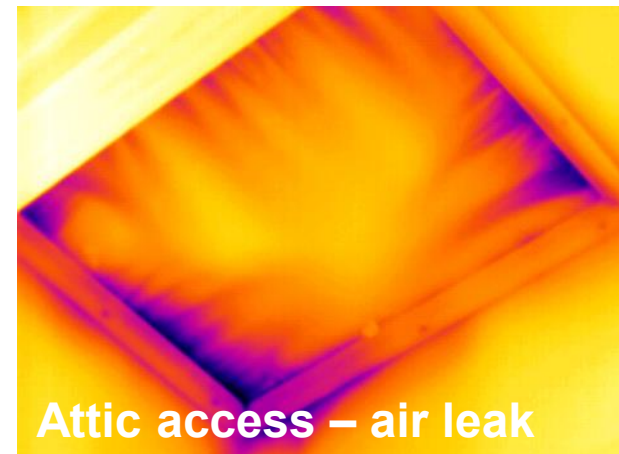
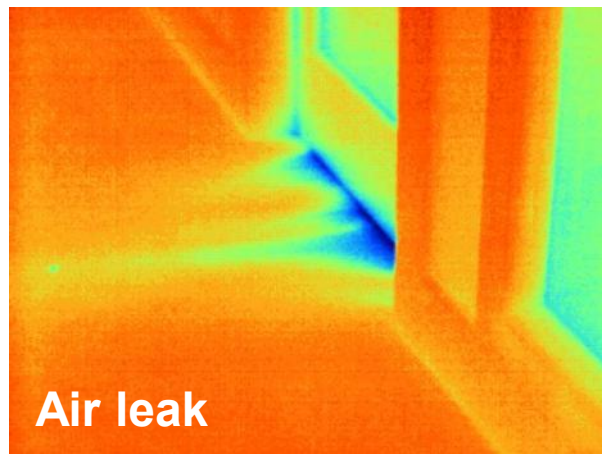
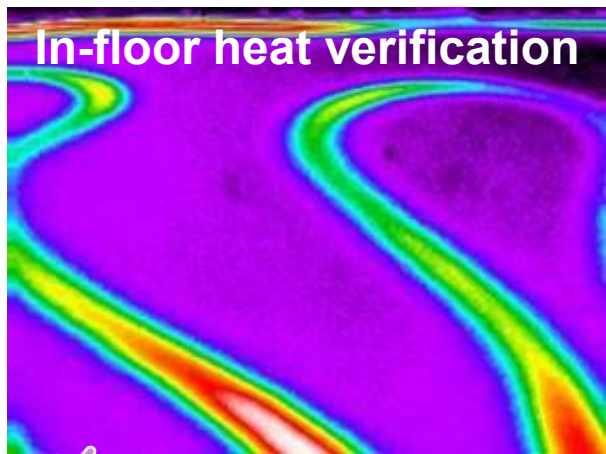
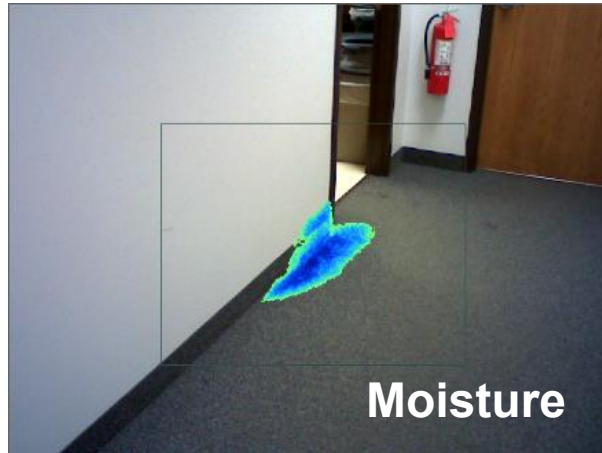
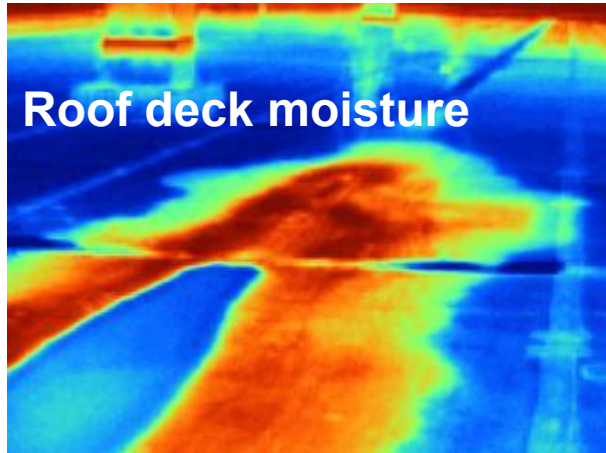
http://www1.eere.energy.gov/consumer/tips/air_leaks.html

Savings opportunity:
Reduced HVAC costs!

Primary locations of unintentional heat transfer (loss or gain):

- Roof defects and moisture damage
- Pipes and ducts
- Door and window frames
- Switches and sockets
- Cracks in structural joints
- Faulty or insufficient wall insulation

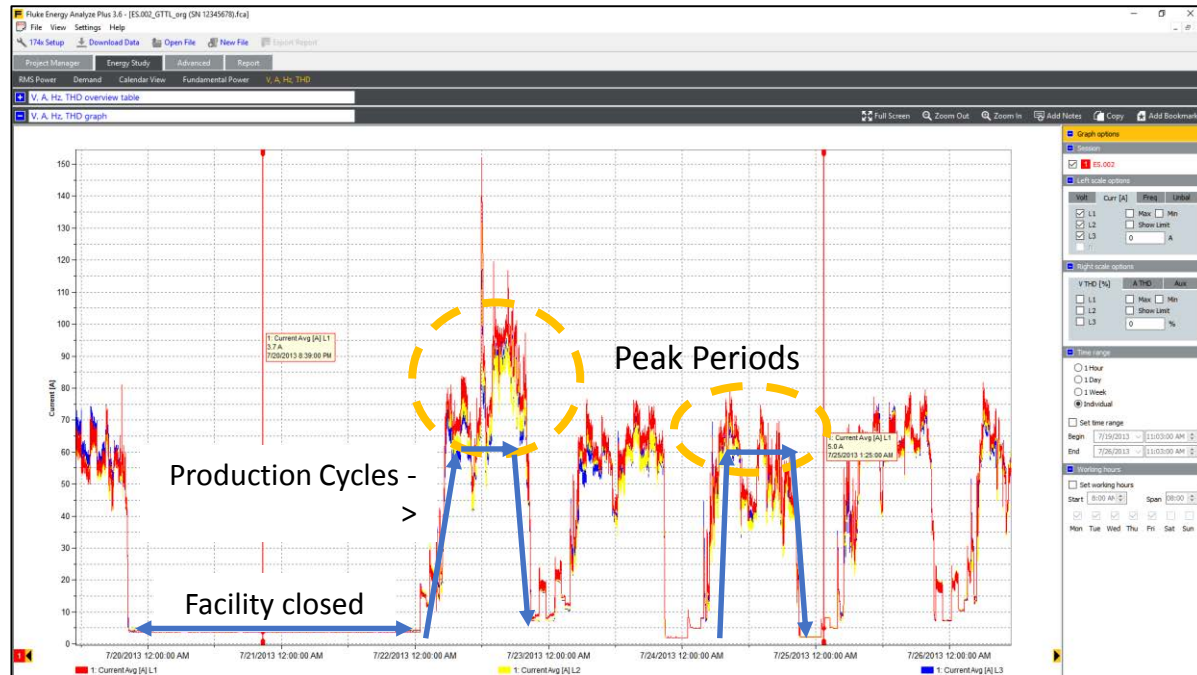
Building Envelope



Analyze Energy Data Trends: Consumption Patterns

Analyze Energy Consumption Patterns

- Identify peak periods, does that correspond to production output or particular process
- Does the repetitive pattern coincide with normal product manufacturing cadence (Startup -> Operate -> Rest/Shutdown)



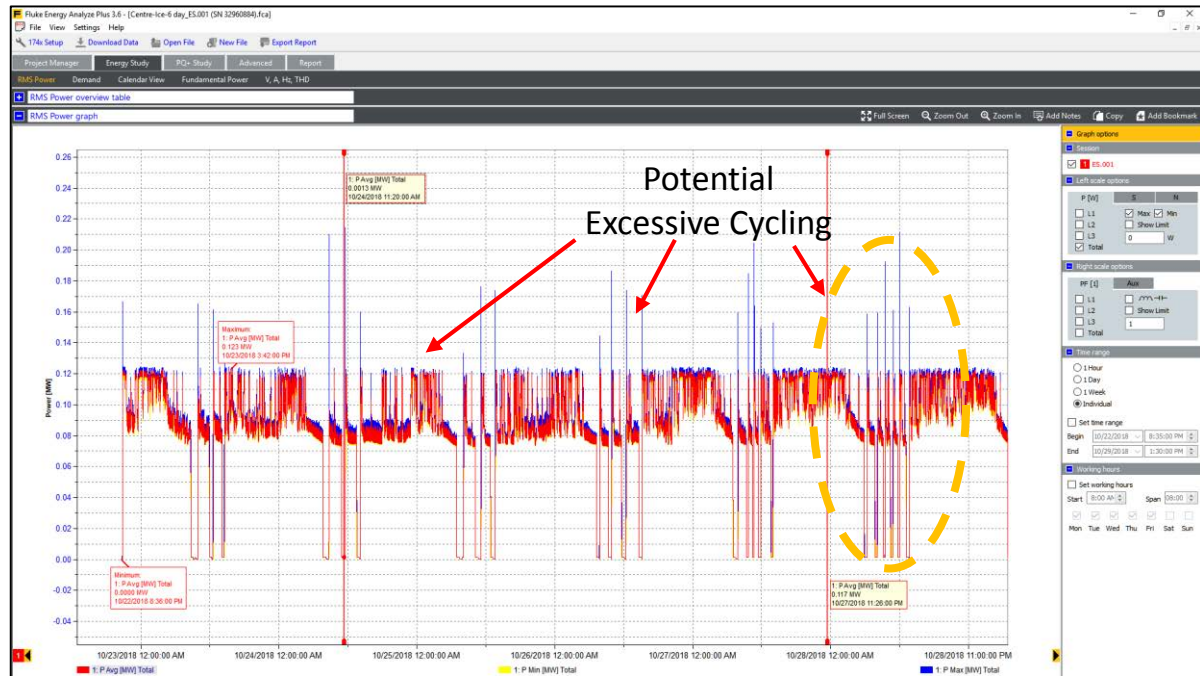
Look to optimize energy consumption by sequencing equipment startup's apart, avoid peaks where possible. Alternatively schedule startup during off peak hours

What is a good process: Download & Analyze

Analyze Energy Data Trends: Excessive On/Off Cycling

Analyze RMS Current for excessive On/Off Cycling

- Excessive on/off cycling is indicative of;
 - Incorrect setpoints,
 - Undersized equipment, or
 - Faulty Equipment
- Refrigerators, compressors, furnaces that do not hold setpoint well due to leakage or heat dissipation contribute to energy waste



Consult the equipment manufacturers specifications to compare to max rated On/Off Cycling

What is a good process: Download & Analyze

Analyze Energy Data Trends: Usage Behavior Patterns

Review the daily cadence of energy usage

- Does the pattern fit with the process?
- Is equipment left on unnecessary?
- Is the equipment setpoints justified for after hour periods?



Adding simple timers to boilers, furnaces and other large consuming devices can ensure equipment is not operating unnecessarily, wasting energy

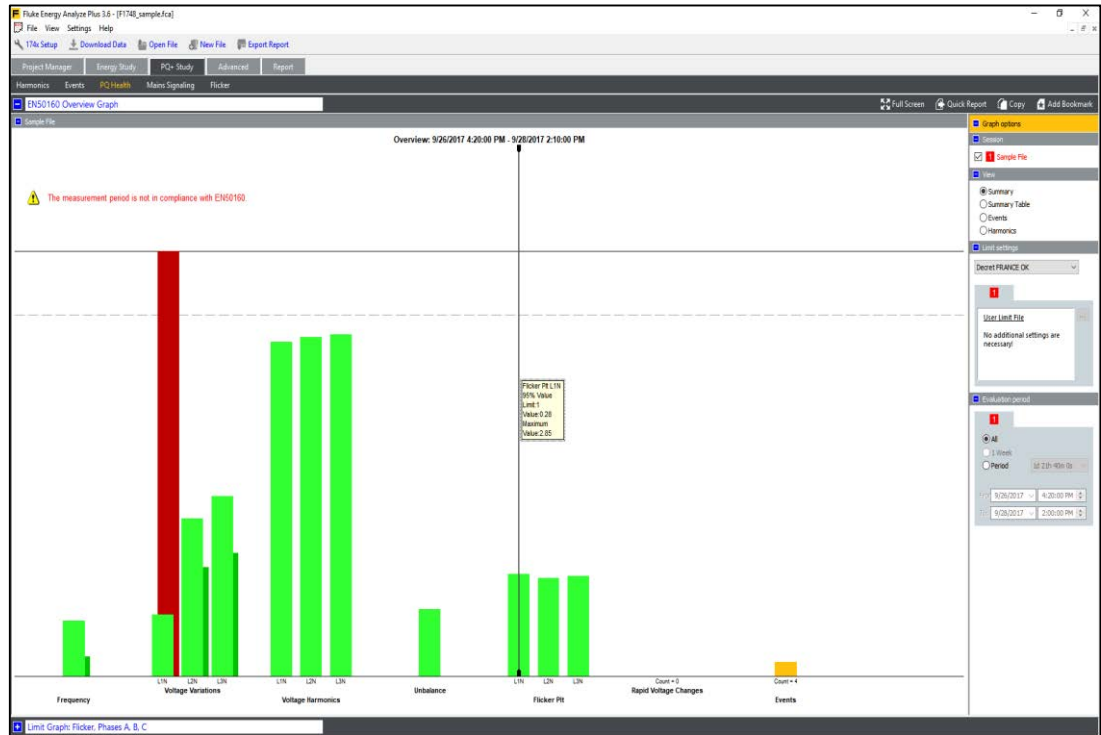
What is a good process: Download & Analyze

Overheating motors and transformers

Check operating current – is the equipment close to their maximum operating limits?

Is the cause due to poor power quality?

- Identify overall power quality health
- Are there excessive harmonics or unbalance
- A clear Power Quality Health summary quickly shows where problems might be



Ensure other equipment is not creating unbalance. Consider installing capacitors to correct power factor or filters to reduce harmonics

Why do they need it?

To get the right data

- Key Power Measurements
 - All measurements are measured and logged to eliminate the risk of not recording the important parameters

To check in on the problem

- Fluke Connect App Compatible
 - Enables data to be viewed **without having to suit up** and can remotely view measurements – no need to visit the electrical panel

Powering the Logger

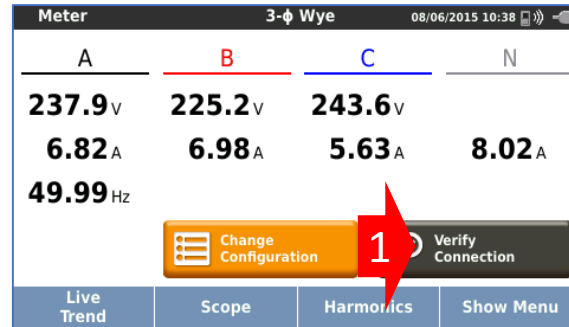
- Convenient Instrument Power
 - Powered from the measurement circuit means there's **no need to find a power outlet** and run power cord extensions



Fluke 173X – Auto-correction

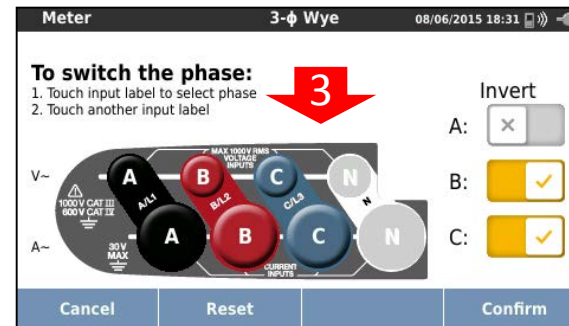
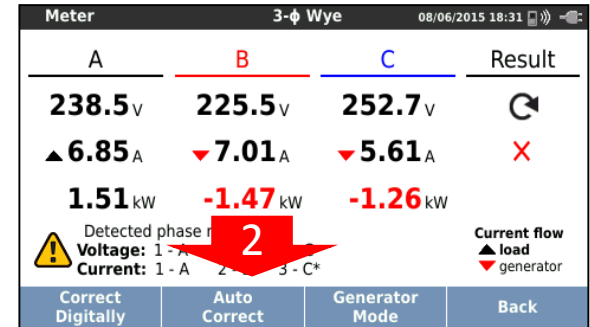
After connecting up, check the connections by touching the 'Verify Connection' button on screen to display correction screen.

1



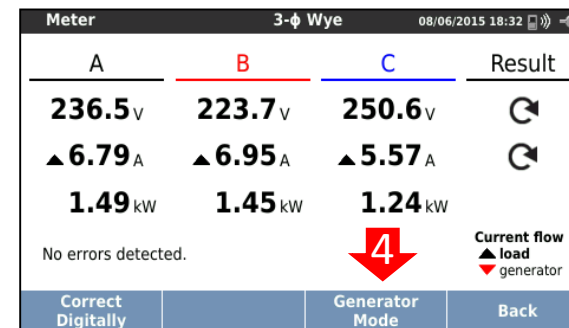
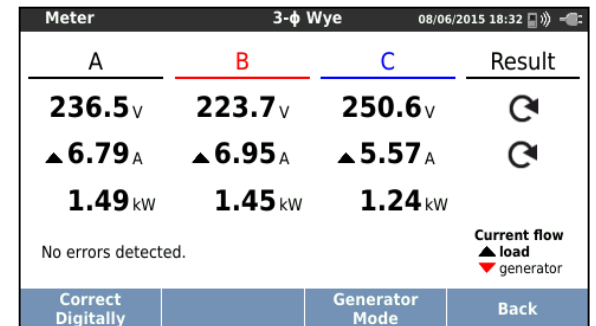
Select 'Auto Correct' to let the instrument make the correction, confirm suggested correction, readings are now correct.

2



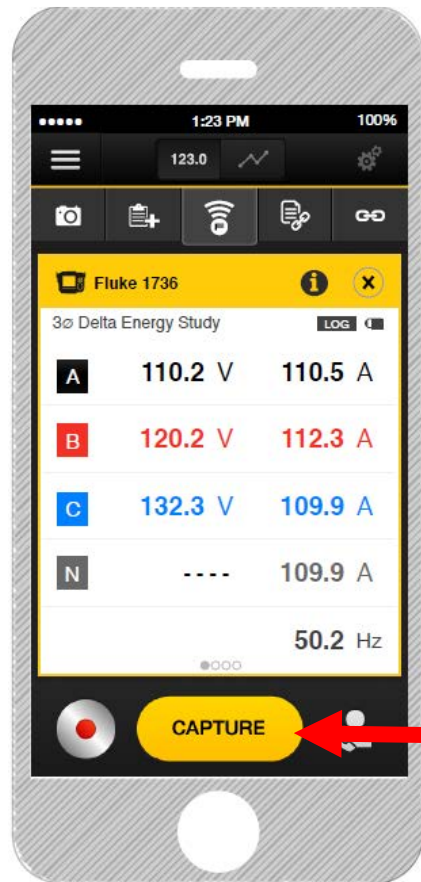
To adjust manually select Correct Digitally switch phases or invert current inputs to correct.

3



Fluke 1738 FC Capabilities

View Data or
Take a
Screen Shot



How would you attach a PQ meter to this switchboard



External Port for PQ Meter

FLUKE®



PQ400

Compressed Air Losses

Genie innovations change the market and set the industry standard for quality, reliability and safety in aerial lift equipment.



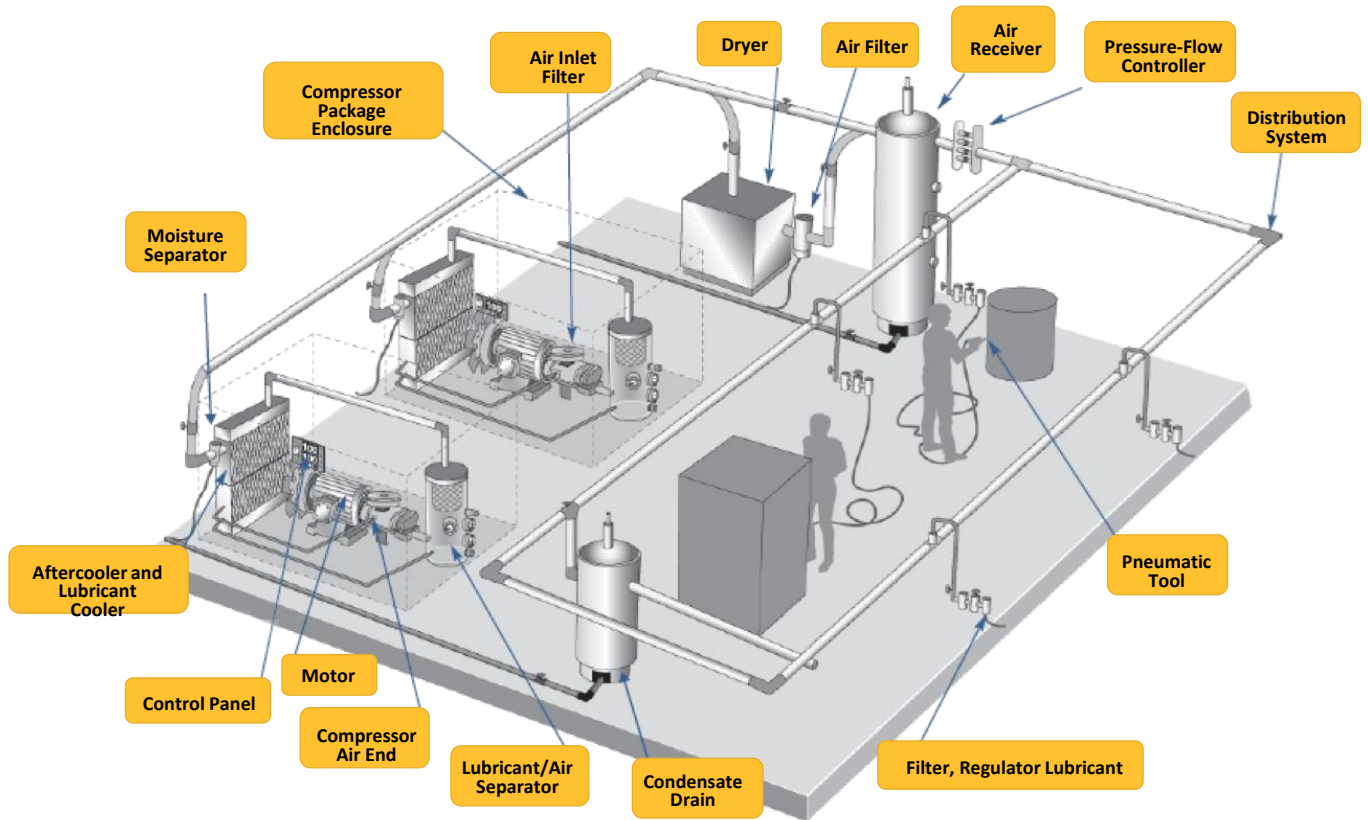
“Finding compressed air leaks is very labor intensive,” says maintenance manager.

“It might take 30 to 45 minutes to find one leak in the rafters, and then come back down to get material to fix it, go back up and fix the leak, and verify with soap and water that the leak was fixed.”

Compressed Air Opportunity

Compressed air, a practical example of saving opportunity

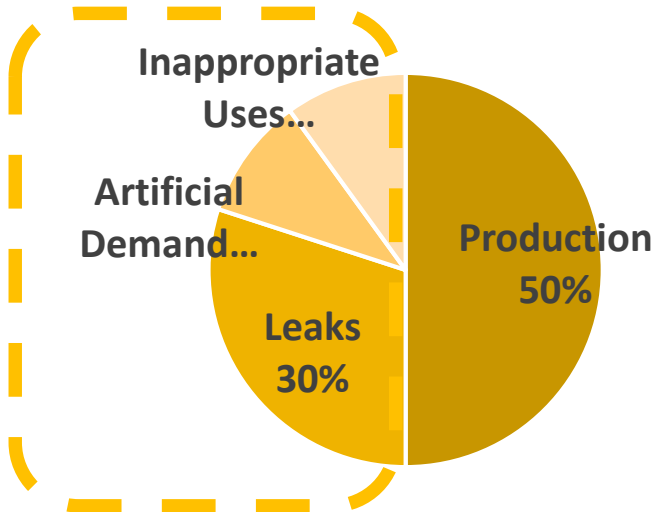
7 out of 10 companies use compressed air in their manufacturing processes



Compressed Air Opportunity

Improving efficiency, Compressed Air System Example

Case Study



Savings Opportunity

- **Equipment Performance**
- **Process Optimization**
- **Human Behavior**

- 1800 to 2600 ***CFM** of compressed air/ day
- 200 torque tools per line
- Move large sheets of half inch steel
- Position parts

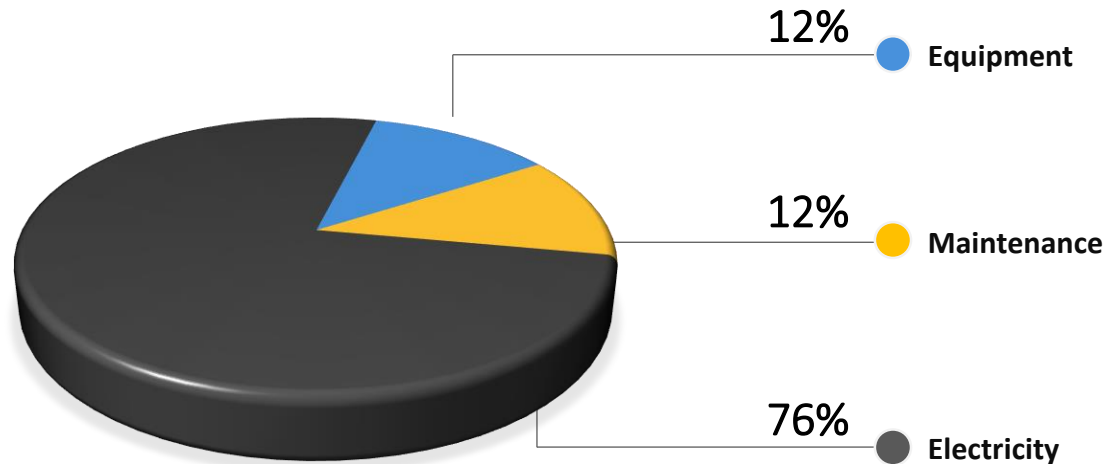
If the tools don't have enough compressed air pressure to function properly, the results could be costly.

****18 kw to produce 100 cfm (320-475 kW)
and 100 kW = 134 hp***

Source: U.S. Department of Energy <https://energy.gov/eere/amo/compressed-air-systems>

Compressed Air Opportunity

Lifetime compressed air costs



Assumptions in example above is for: a 75-hp compressor running 2 shifts/day, 5 days/week, (4,160 hrs/yr) with an aggregate electrical rate of **\$0.05/kWh** over 10 years equipment life

Minimizing compressor leaks

THE COST OF AIR LEAKS

Orifice Size	Leak Rate (SCFM) @100 PSIG	Annual Cost @ \$.15/1000 SCF \$.05 per Kwh	Annual Cost @ \$.45/1000 SCF \$.15 per Kwh
1/16 IN.	• 6.49	\$511	\$1,533
1/8 IN.	• 26.0	\$2,049	\$6,147
1/4 IN.	● 104	\$8,199	\$24,597
3/8 IN.	● 234	\$18,427.5	\$55,283
1/2 IN.	● 415	\$32,718	\$98,154

This chart is based on 8760 operating hours and 18 kw to produce 100 cfm

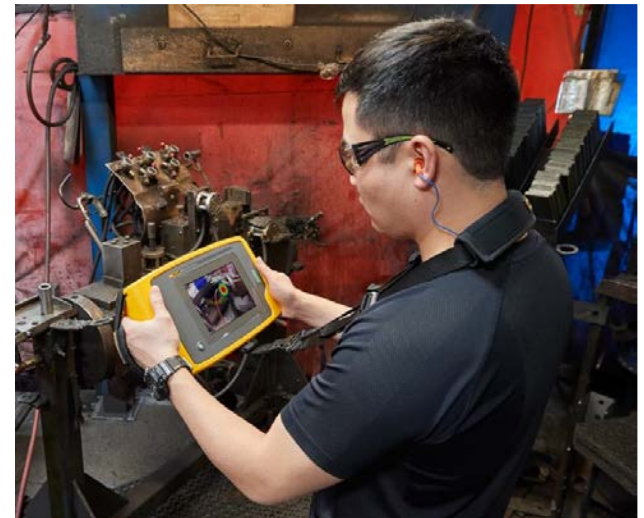
(Information provided by Department of Energy)

Minimizing compressor leaks

Leaks are a significant source of wasted energy in a compressed air system, often wasting as much as **20-30%** of the compressor's output.

Compressed air leaks can also contribute to problems with system operations, including:

- **Fluctuating system pressure**, which can cause air tools and other air-operated equipment to function less efficiently, possibly affecting production.
- **Exceeding compressor capacity**, resulting in higher than necessary Capex cost.
- **Decreasing service life and Increased maintenance of supply equipment** (including the compressor package) due to unnecessary cycling and increased run time.



Case Study

Before and After Leak Inspection

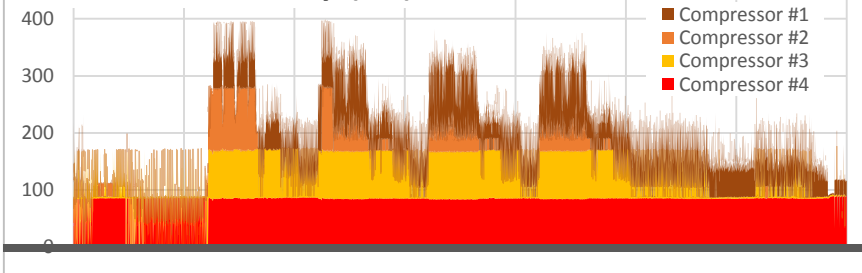
4 AIR COMPRESSORS: (2) 75 HP + (2) 90 HP

Power/Energy Log	Compressor #1	Compressor #2	Compressor #3	Compressor #4	TOTAL
Week Before	7,954 kWh	2,849 kWh	8,502 kWh	13,818 kWh	33,124 kWh
Week After	10,913 kWh	5,513 kWh	6,779 kWh	1,418 kWh	24,623 kWh
Difference	2,959 kWh	2,664 kWh	(1,772) kWh	(12,400) kWh	(8,501) kWh

BEFORE

- 90HP compressor #4 working full-time (red)
- Air working at max capacity at peak times

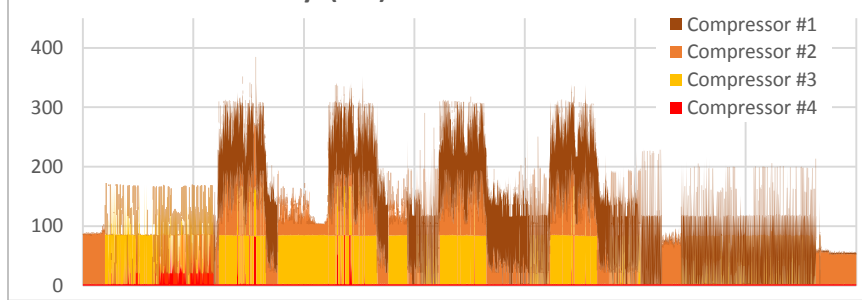
Active Power over 7-day (kW)



AFTER:

- #4 compressor idle
- 25.7% Recovered Capacity
- [\\$48,754 savings](#)

Active Power over 7-day (kW)



Case Study

Before and After Leak Inspection

Annualized Consumption (kWh)

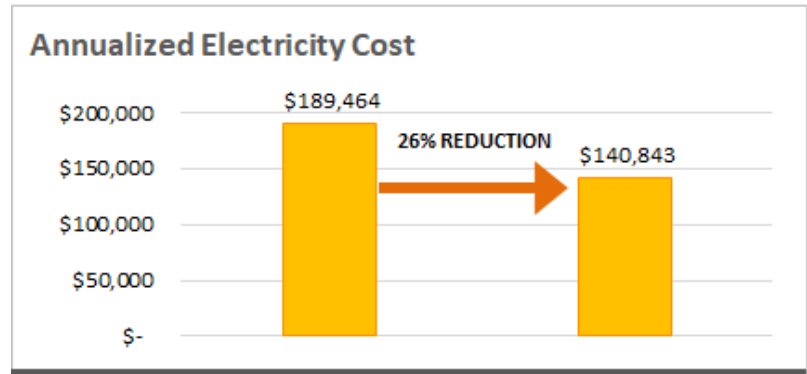
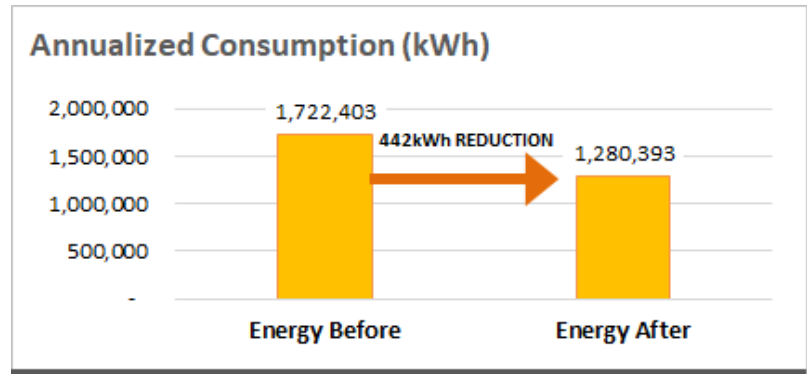
Energy Before	1,722,403 kWh
Power Bill Before	\$189,464
Energy After	1,280,393 kWh
Power Bill After	\$140,843
% Saved	25.7%

Energy Savings

Per Day	1,214 kWh
Per Month	36,429 kWh
Per Year	443,225 kWh

\$ Savings

Per Day	\$133
Per Month	\$4,007
Per Year	\$48,754



\$48,754 = Savings in Electricity Bills **25.7%** = Compressed Air Capacity Recovered

Fluke ii900 – Sonic Industrial Imager

TARGET APPLICATION:

Compressed Air and Vacuum, because it is widespread among industrial plants, expensive to produce and easy to leak.

- Compressed air is the most expensive energy source across all types of factories
- According to a US DOE study, compressed-air leaks account for 20% to 30% of the total produced capacity in an average facility
- A single 1/8” leak in a compressed air line can cost upwards \$2,000 a year in energy utility bills

Uses:

Discrete Manufacturing:

Automotive, Heavy Machinery, Metals, Plastics, Pulp&Paper

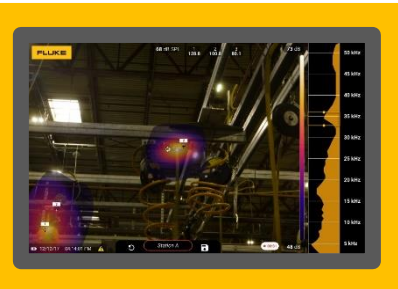
Process Manufacturing:

F&B, Chemical, Pharma, Glass, Cement, Pulp & paper

Oil & Gas and Mining

Other:

Hospitals



Feature	Customer Benefit
Visualization of Leaks	Inspections are done 5 to 10 times faster by spotting leaks on the screen over live image.
Intuitive Interface	Little to no training required. First time users start finding leaks within minutes.
Reporting leaks by pictures	Easy tagging and communication of the exact location of leaks to teams fixing them
Based on sound	Non depending on ambient temperature or air/gas temperature, no matter if indoors or outdoors.
Ultrasonic range	Detects leaks even under loud noise conditions
For Air, Vacuum, Gas or Steam	Detects leaks of any type of compressed gas, including vacuum leaks

Applications

Factories and Plants with Large Air Compressors. Plants with compressors larger than 50HP.

Commercial facilities where Air / Vacuum is critical (e.g. Hospitals)

Plants that contract air-audit leak-inspection services. Customers that hire external services to perform air leak audits.

Maintenance teams with in-house leak inspection PM programs. Customers that have in-house leak experts using ultrasonic leak detectors

Service providers performing air leak inspections, from Compressor OEMs or from 3rd party companies performing air-efficiency audits.

Pricing and Accessories

Model name	Item number	Item description	Price (to be filled in)
ii900	5075603	Fluke ii900 Sonic Industrial Imager	
ii900ACC	5075994	Hand Strap for Fluke ii900 Sonic Industrial Imager	
ii900ACC	5075982	Protective Cover for Fluke ii900 Array, set of 2	
ii900ACC	5077735	External Dual-bay Charger for Models BP290 and BP291	
BP291	3894688	Fluke BP291 High Capacity Li-Ion Battery for ii900	
CXT1000	4628917	Universal Extreme Hard Carrying Case with Configurable Foam Inserts	
TIX5XACC	4574715	Fluke TIX5XX-NECK Neck strap	
L206	2098595	Deluxe Hat Light with 3 Bright White LEDs	
BPAK	4983088	Industrial-Grade Professional Tool Backpack with 30 Pockets	



Hard Case



Fluke Pack30



EDBC290 Dual-bay
Battery charger



Shoulder/Neck Strap



BP291 Battery
Pack



Array cover x2



L206 LED light

FLUKE

54 dB



High Risk Areas

50 dB

- 50 kHz
- 45 kHz
- 40 kHz
- 35 kHz
- 30 kHz
- 25 kHz
- 20 kHz
- 15 kHz
- 10 kHz
- 5 kHz

09/17/2019 11:14 AM

59 dB

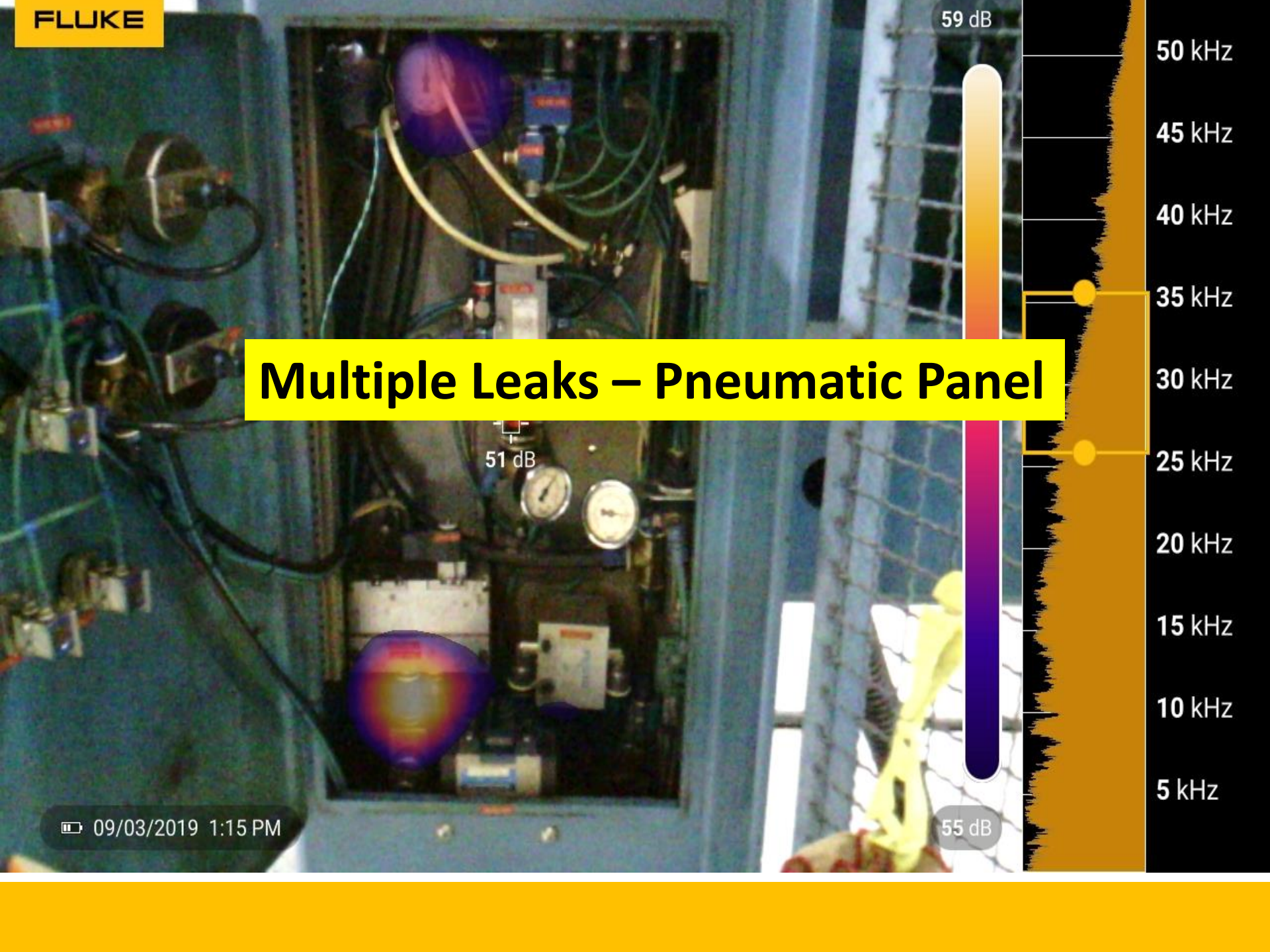
50 kHz
45 kHz
40 kHz
35 kHz
30 kHz
25 kHz
20 kHz
15 kHz
10 kHz
5 kHz

Multiple Leaks – Pneumatic Panel

51 dB

55 dB

09/03/2019 1:15 PM



FLUKE

Hard to Access and/or Find

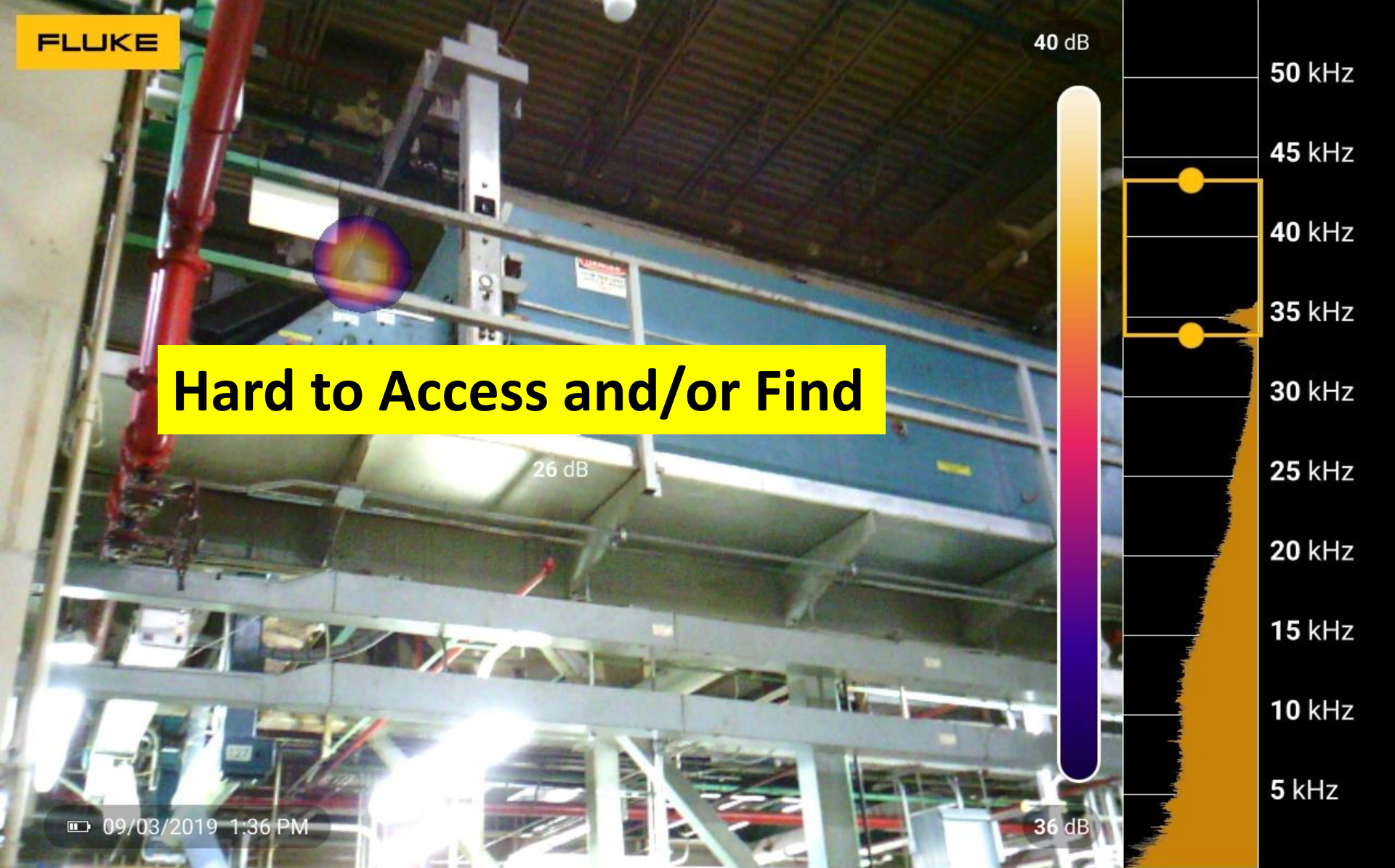
40 dB

26 dB

36 dB

- 50 kHz
- 45 kHz
- 40 kHz
- 35 kHz
- 30 kHz
- 25 kHz
- 20 kHz
- 15 kHz
- 10 kHz
- 5 kHz

09/03/2019 1:36 PM



FLUKE

33 dB

50 kHz

45 kHz

40 kHz

35 kHz

30 kHz

25 kHz

20 kHz

15 kHz

10 kHz

5 kHz

Leaking Piston

28 dB

DO NOT WEB AROUND BAR

09/03/2019 1:29 PM

31 dB



FLUKE

32 dB

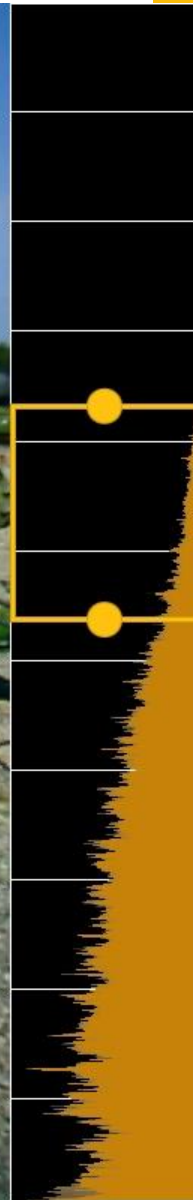
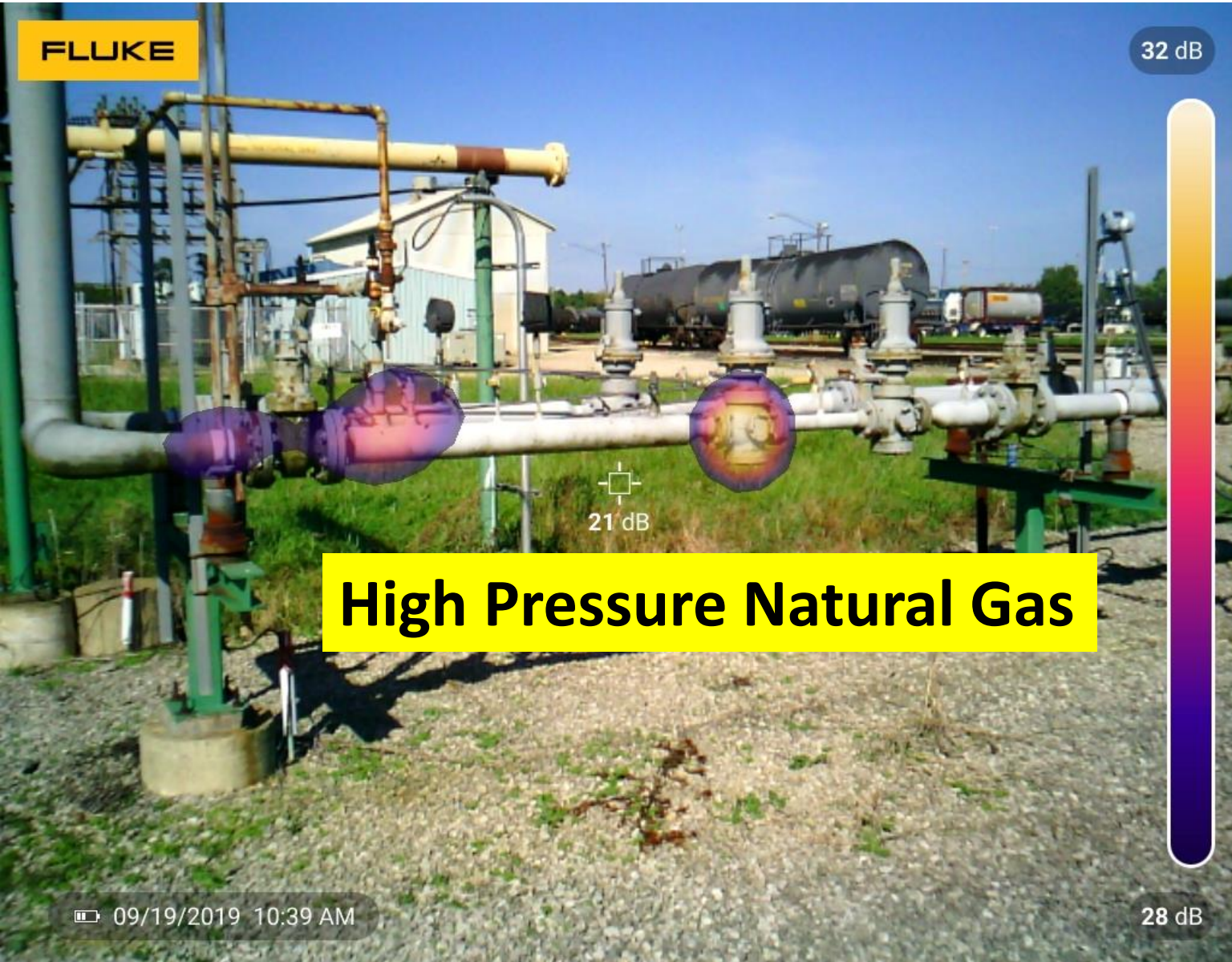
21 dB

High Pressure Natural Gas

09/19/2019 10:39 AM

28 dB

- 50 kHz
- 45 kHz
- 40 kHz
- 35 kHz
- 30 kHz
- 25 kHz
- 20 kHz
- 15 kHz
- 10 kHz
- 5 kHz



FLUKE

28 dB



Nitrogen

14 dB

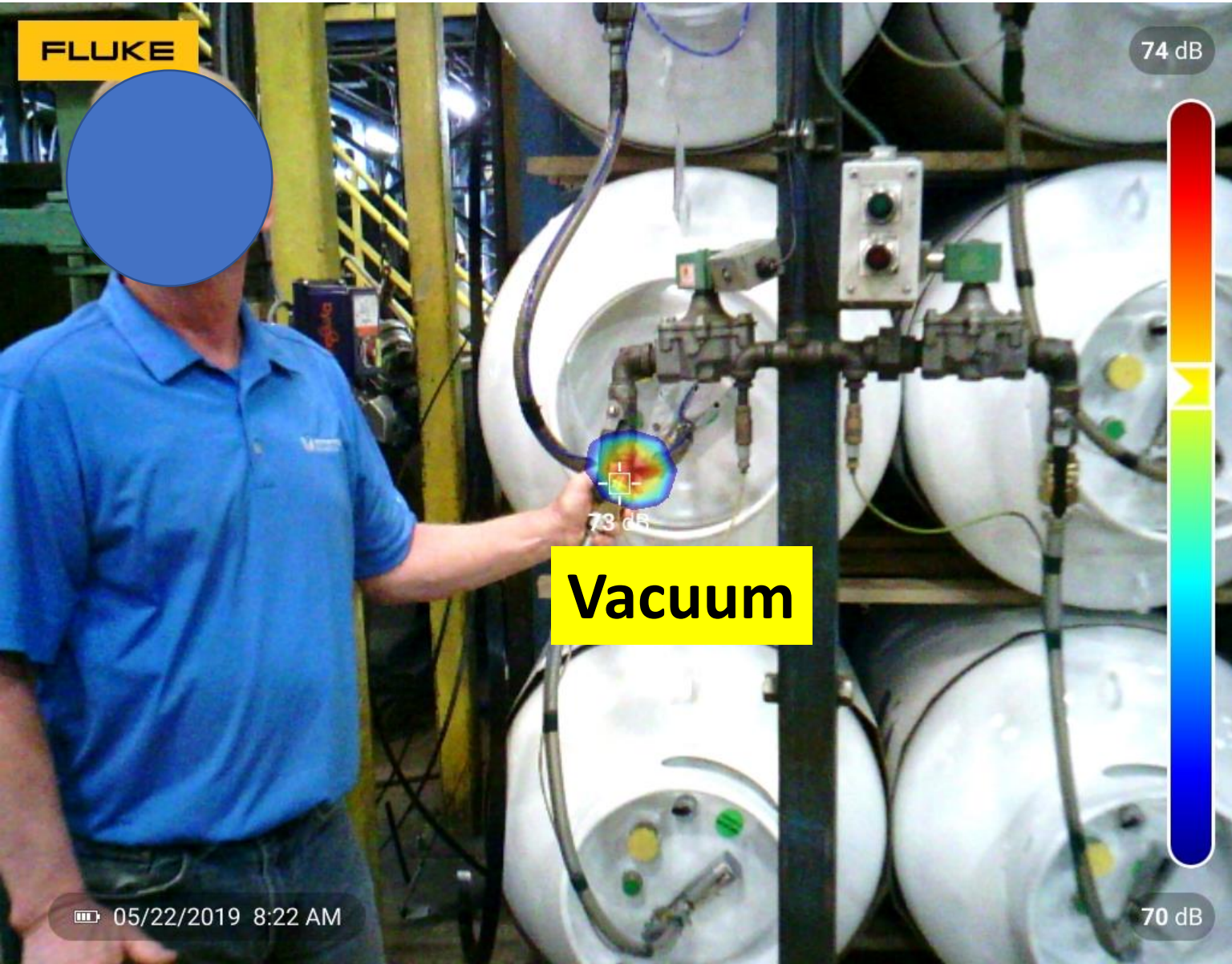


50 kHz
45 kHz
40 kHz
35 kHz
30 kHz
25 kHz
20 kHz
15 kHz
10 kHz
5 kHz

10/29/2019 2:38 PM

24 dB

FLUKE



Vacuum

74 dB

73 dB

70 dB



50 kHz
45 kHz
40 kHz
35 kHz
30 kHz
25 kHz
20 kHz
15 kHz
10 kHz
5 kHz

05/22/2019 8:22 AM

FLUKE

82 dB



High Volume – Cracked Fitting



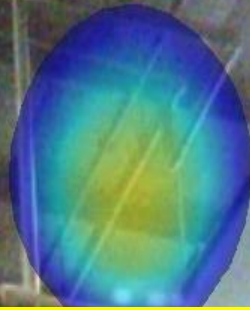
50 kHz
45 kHz
40 kHz
35 kHz
30 kHz
25 kHz
20 kHz
15 kHz
10 kHz
5 kHz

09/26/2019 11:09 AM

77 dB

FLUKE

58 dB



Extreme- High Volume Leak

49 dB



05/22/2019 8:07 AM

54 dB

Why does measuring energy matter?

Measurement data supports the decisions and actions that reduce energy consumption and cost, such as:

- Equipment upgrade analysis and ROI
- Supply/demand right-sizing and optimization
- Justification for introducing controls and automation
- **Applications for utility incentives**
- **Repairs**



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For you. For us.
For growth.