HI-SPEED INDUSTRIAL SERVICE
7030 Ryburn Drive Millington, TN 38053 Office: 901-873-5300 Fax: 901-873-5301
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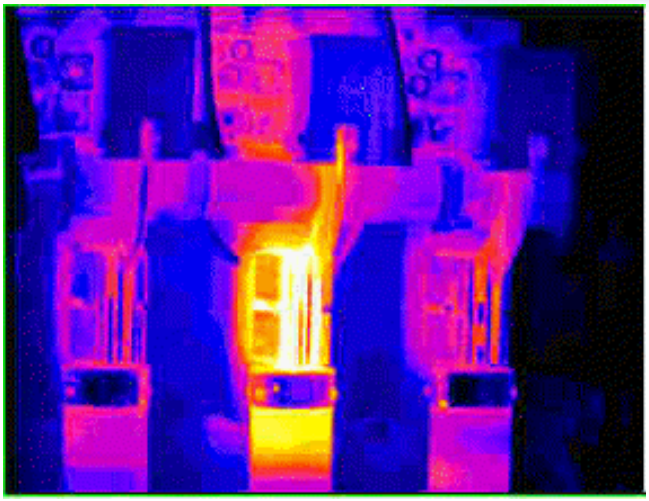
QualiTest IR Radiometric Survey Report



Thyssen Krupp

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Job Number	139568
Survey Date	4-30-19
Report Date	5-13-19

QualiTest IR Radiometric Survey Report

All electrical panels were scanned using a FLIR P60 infrared camera. The following report only contains defects that were found during the survey. Below is our classification system for each defect contained in this report. If there are any questions or comments, please feel free to contact us at any time.

Hi-Speed Industrial Service QualiTest Diagnostics employs a three-step defect rating system:

CLASS I - A defect or defects are present that are likely to cause a problem in the long term (2-6 months). Should be addressed in the normal course of maintenance scheduling; continue to monitor.

CLASS II - A defect or defects are present that are likely to cause a failure in the short term (less than 2 months). Should be addressed as soon as is practical, on a high maintenance priority. Consideration should be given to increased monitoring frequency.

CLASS III - A defect or defects are present that make continued component reliability unpredictable, and likelihood of secondary damage is high. Consideration should be given to an unscheduled shutdown to correct.

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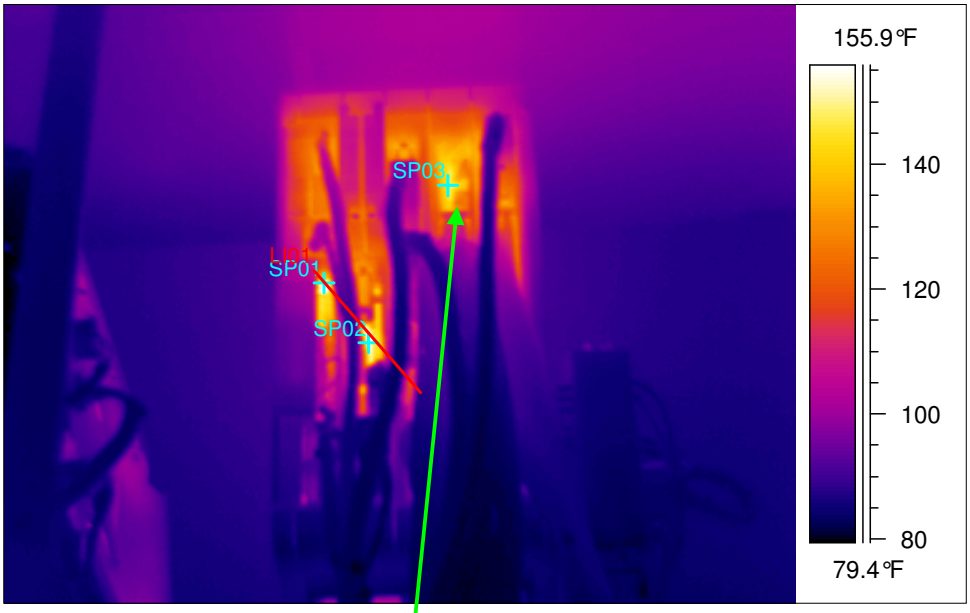
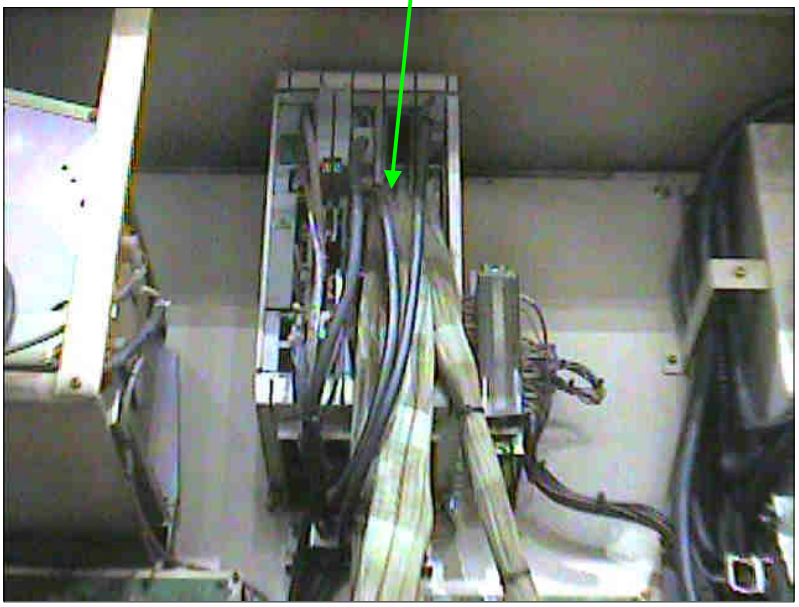
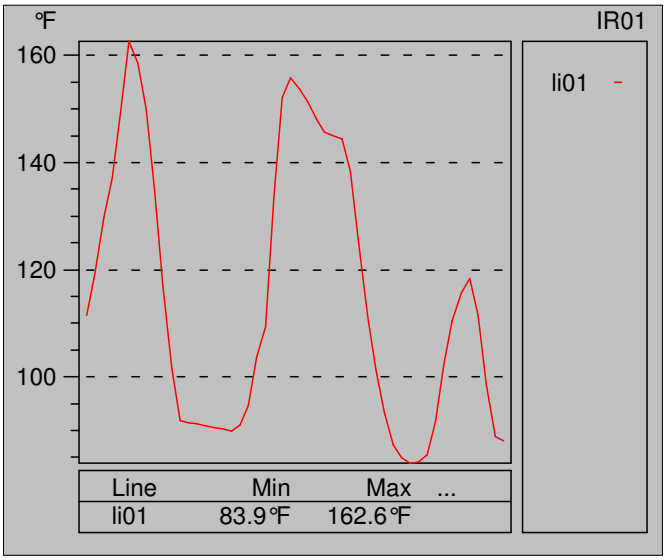
Component	Equipment/Bucket ID	Plant/Area	Date
Drive Unit	Machine 1332	Main	4-29-19



Label	Value
IR : max	162.6°F
IR : min	79.1°F
SP01	162.6°F
SP02	157.1°F
SP03	146.1°F
LI01 : max	162.6°F
LI01 : min	83.9°F





Fault	Possible poor contacts
Defect Rating	Class I

Recommendation

Inspect the unit for overheating and poor connections or contacts. Clean the contacts, replace the unit if necessary.

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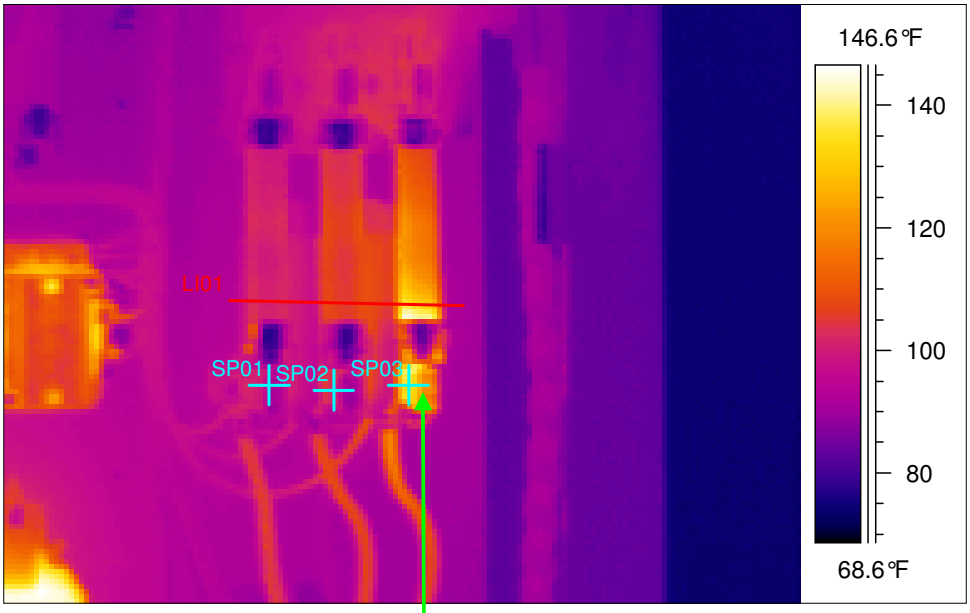
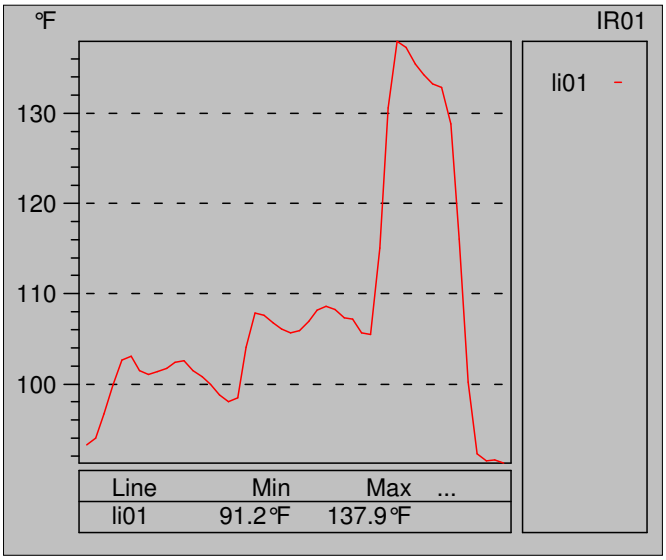
Component	Equipment/Bucket ID	Plant/Area	Date
Switch Fuse Block	Brake Press 2229	Main	4-29-19



Label	Value
IR : max	170.6°F
IR : min	68.2°F
SP01	91.4°F
SP02	100.7°F
SP03	133.6°F
LI01 : max	137.9°F
LI01 : min	91.2°F



Fault	Poor connection at fuse
Defect Rating	Class I

Recommendation

Localized hot spot suggests a poor connection at the bottom right fuse clip.
Inspect and repair or replace.

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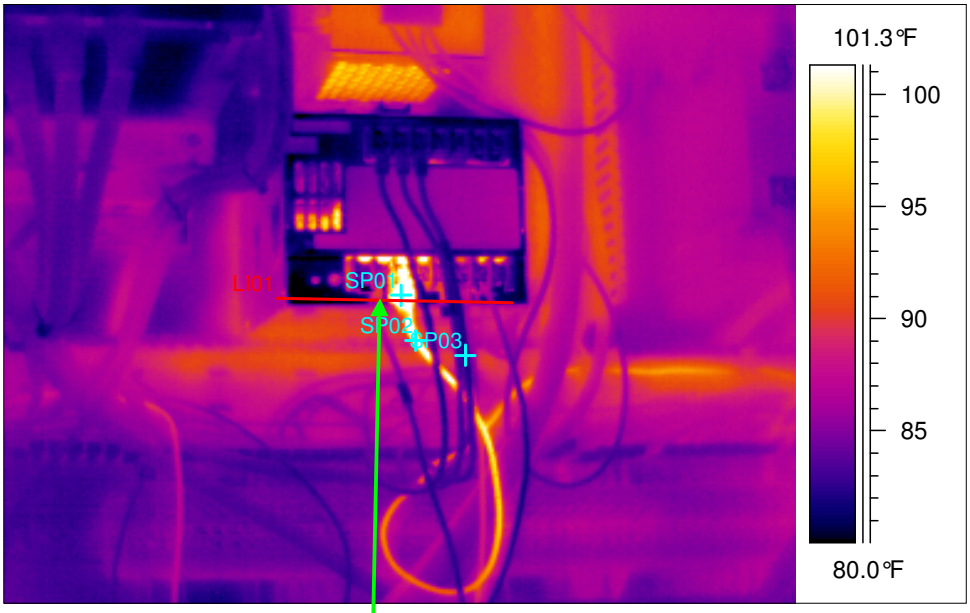
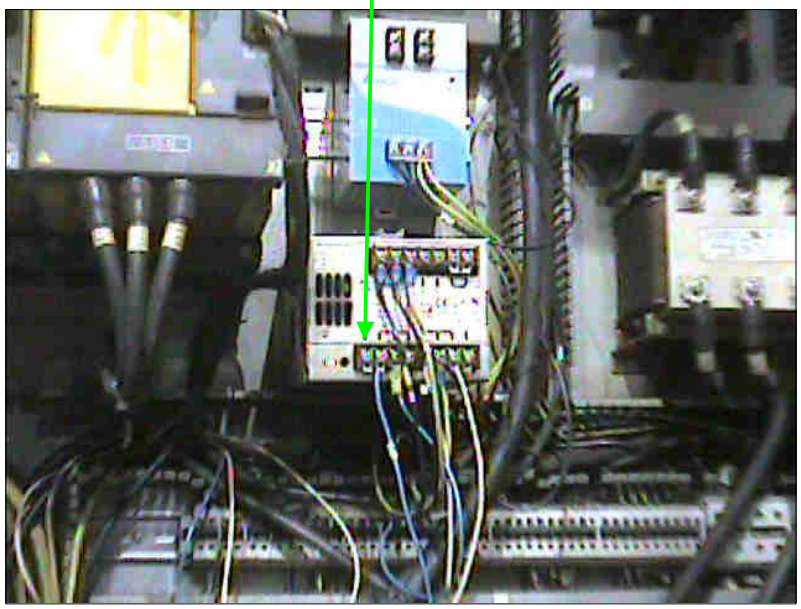
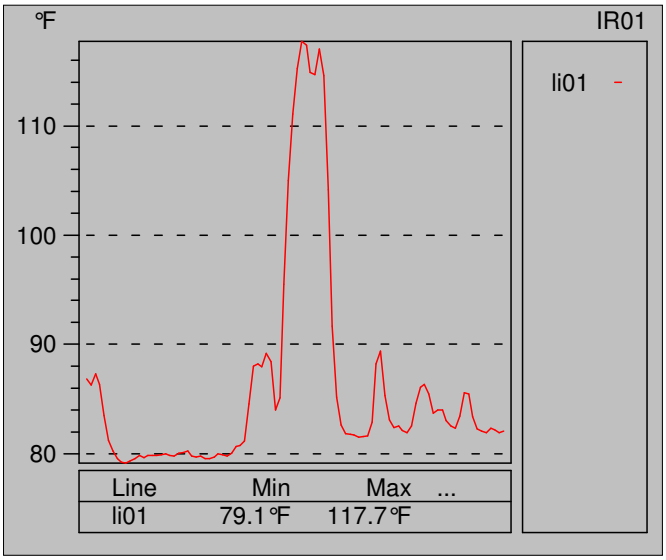
Component	Equipment/Bucket ID	Plant/Area	Date
Power Supply	Machine 1226	Main	4-29-19



Label	Value
IR : max	119.7°F
IR : min	79.1°F
SP01	118.1°F
SP02	108.5°F
SP03	81.8°F
LI01 : max	117.7°F
LI01 : min	79.1°F





Fault	Poor connection
Defect Rating	Class I

Recommendation

Localized hot spot indicates poor connection at wire terminal.
Inspect and tighten connection if possible. Replace as necessary.

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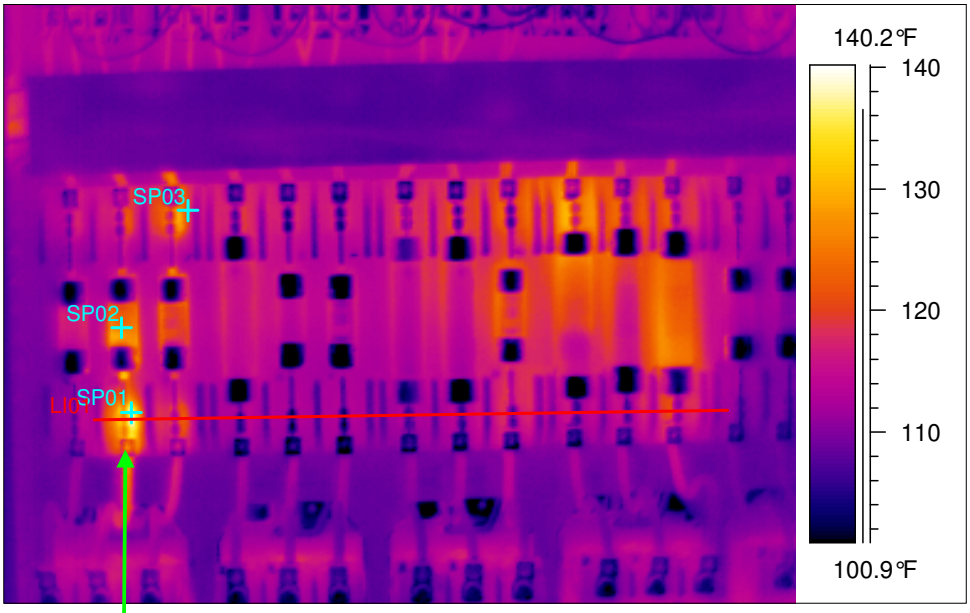
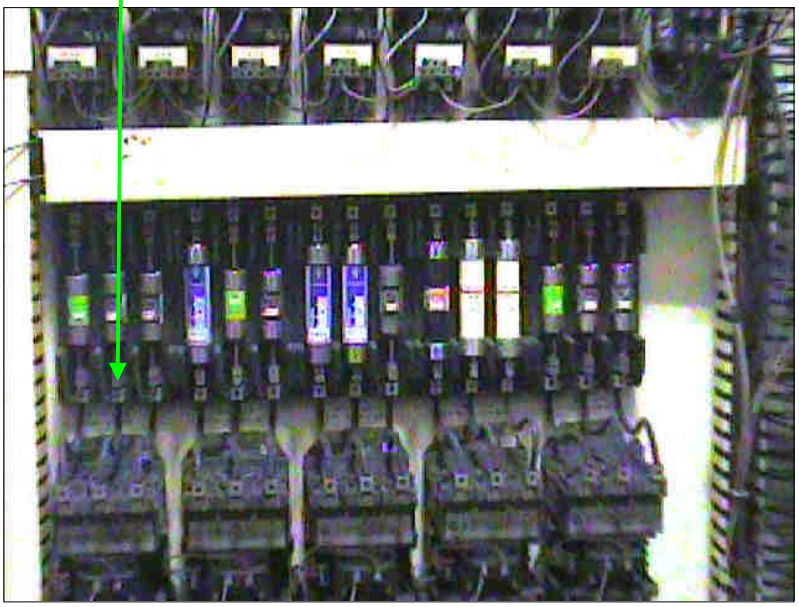
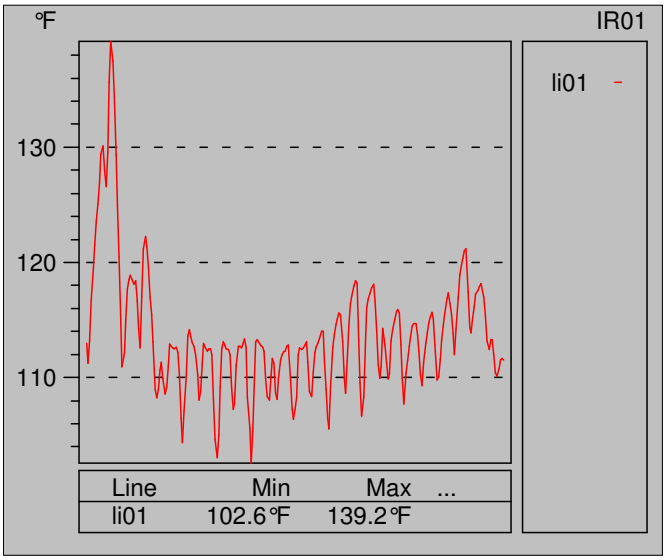
Component	Equipment/Bucket ID	Plant/Area	Date
fuse blocks	Bottom Right Panel	528 2200 Oven	4-29-19



Label	Value
IR : max	139.2°F
IR : min	92.6°F
SP01	137.4°F
SP02	124.7°F
SP03	120.3°F
LI01 : max	139.2°F
LI01 : min	102.6°F





Fault	Poor connection
Defect Rating	Class I

Recommendation

Localized hot spot indicates a poor connection at the left fuse block center phase lower lug and or fuse clip. Clean and inspect. Replace if necessary. 4th set of fuses and connections should be checked as well as the 3rd set. Note the ammount of mismatched fuses.

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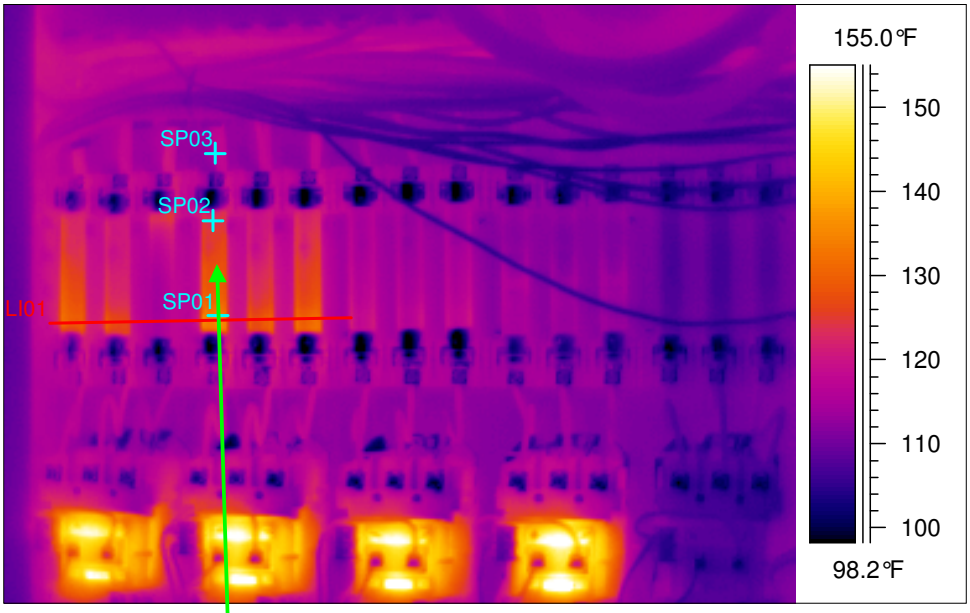
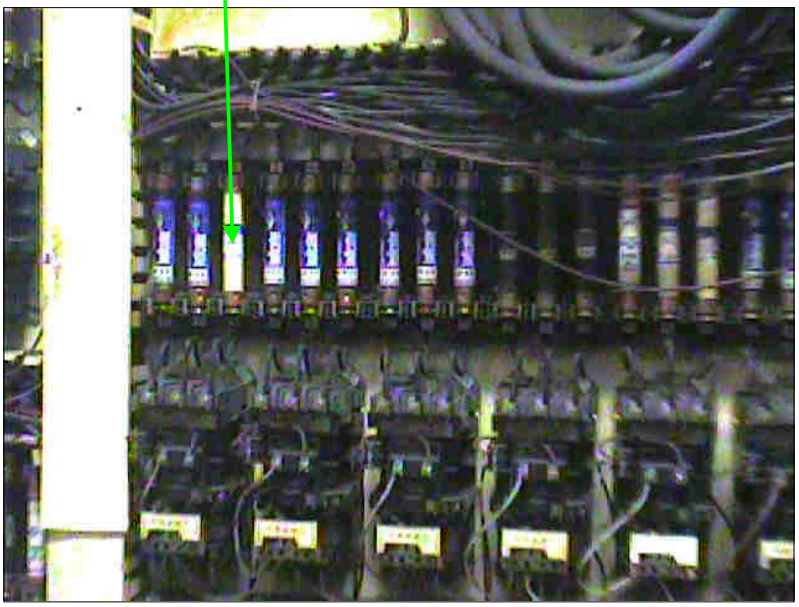
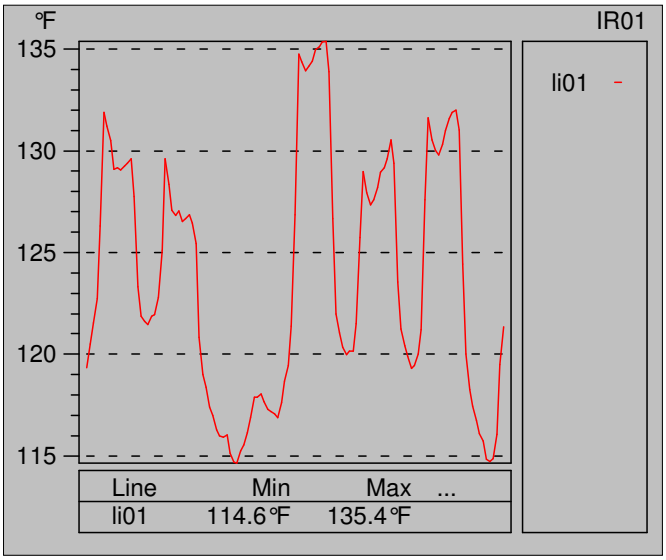
QualiTest IR Radiometric Survey Report

Component	Equipment/Bucket ID	Plant/Area	Date
Fuse Blocks	Top Right Panel	528 2200 Oven	4-29-19



Label	Value
IR : max	166.2°F
IR : min	93.1°F
SP01	134.3°F
SP02	123.7°F
SP03	117.6°F
LI01 : max	135.4°F
LI01 : min	114.6°F





Fault	Poor connection and or worn fuse
Defect Rating	Class I

Recommendation

The fuses in the first and second fuse blocks from the left have slightly elevated temperatures.
Inspect and clean the fuse contacts and connections. Replace if necessary.

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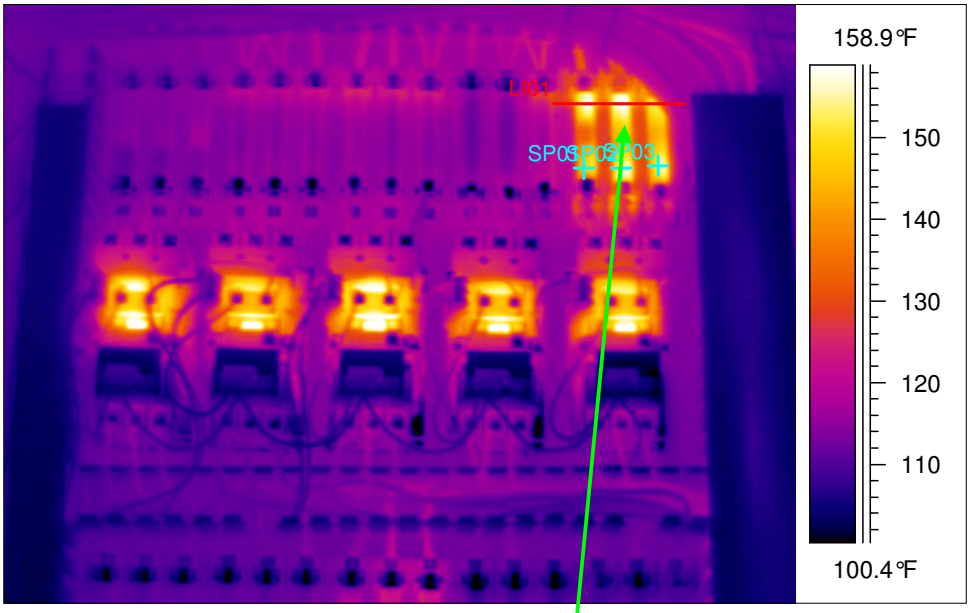
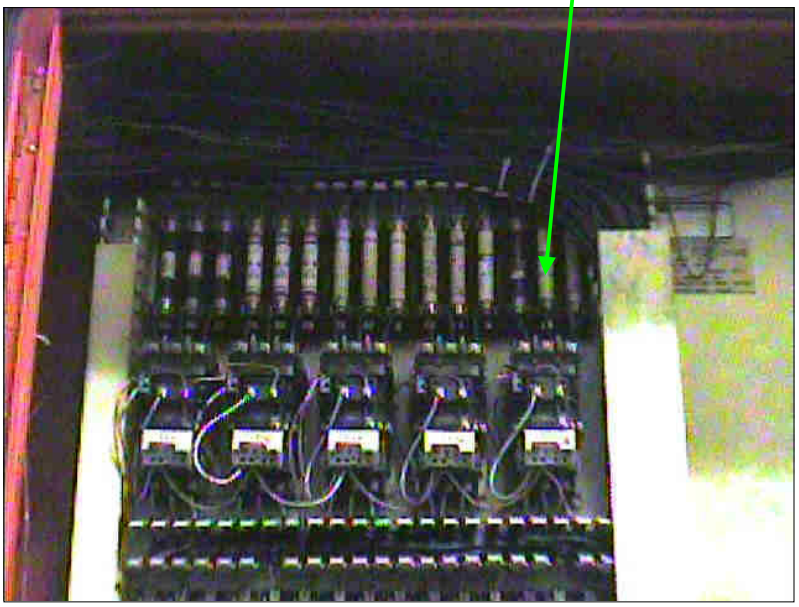
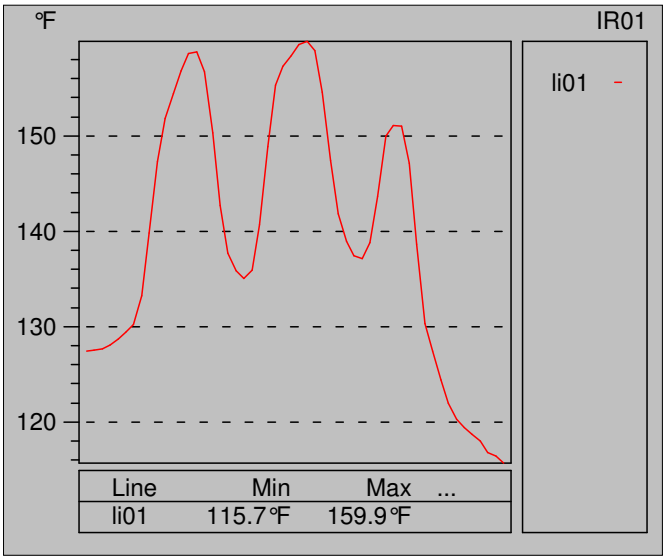
Component	Equipment/Bucket ID	Plant/Area	Date
Fuse Block	Top Center Panel	528 2200 Oven	4-29-19



Label	Value
IR : max	176.6°F
IR : min	95.5°F
SP01	146.3°F
SP02	155.0°F
SP03	152.7°F
LI01 : max	159.9°F
LI01 : min	115.7°F





Fault	Poor connections or high amp draw
Defect Rating	Class I

Recommendation

All 3 fuses have temperatures near 150 Degrees F.
That could be an indication of high amp load or poor connections at the fuse clips and connections.
Worn fuses could also show similar characteristics.
Inspect and clean the fuse block components. Replace as necessary. Replace the fuses as precautionary. Perform an amp draw test before and after service to confirm repairs.

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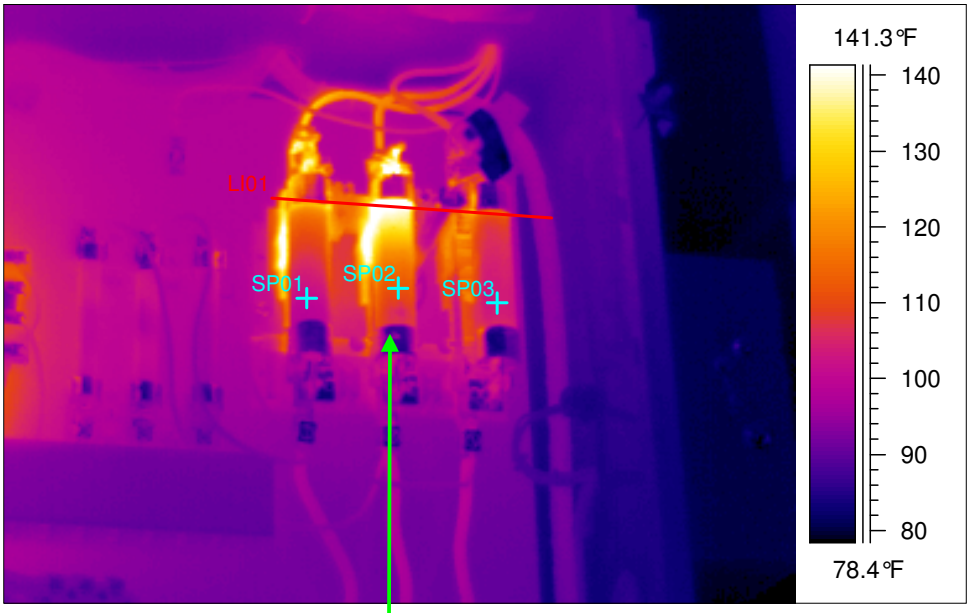
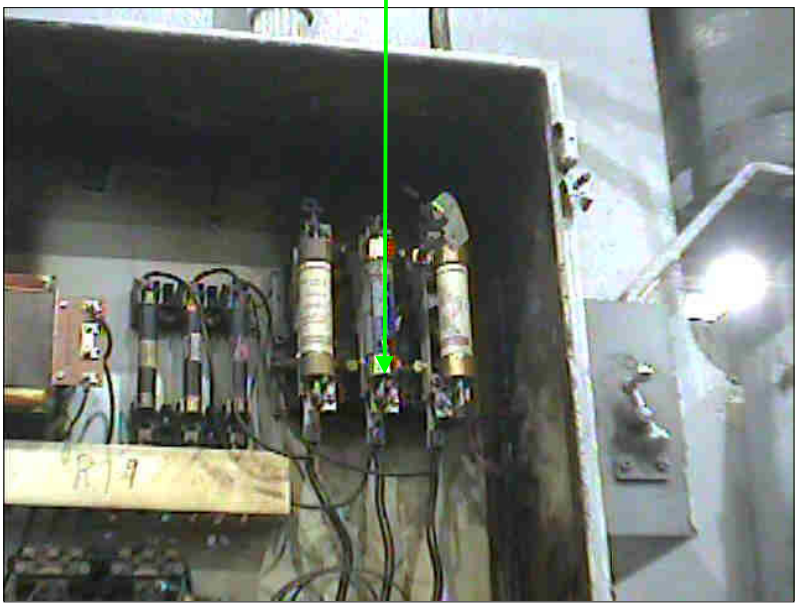
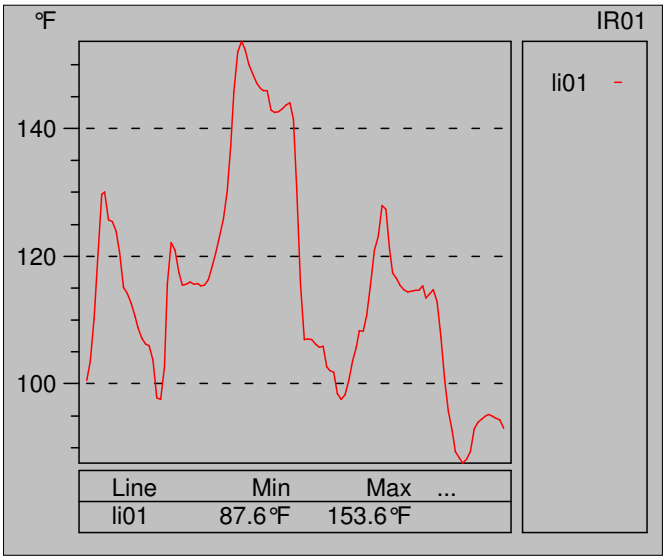
Component	Equipment/Bucket ID	Plant/Area	Date
Main Switch Fuse Block	2612 Shear	Main	4-29-19



Label	Value
IR : max	156.5°F
IR : min	77.0°F
SP01	101.0°F
SP02	112.5°F
SP03	103.9°F
LI01 : max	153.6°F
LI01 : min	87.6°F





Fault	Poor conncetion at fuse block
Defect Rating	Class I

Recommendation

Localized hot spots at the fuse clips and or connectors.
Clean and inspect the fuse block. Replace if necessary. Replact the fuses with 3 new ones.

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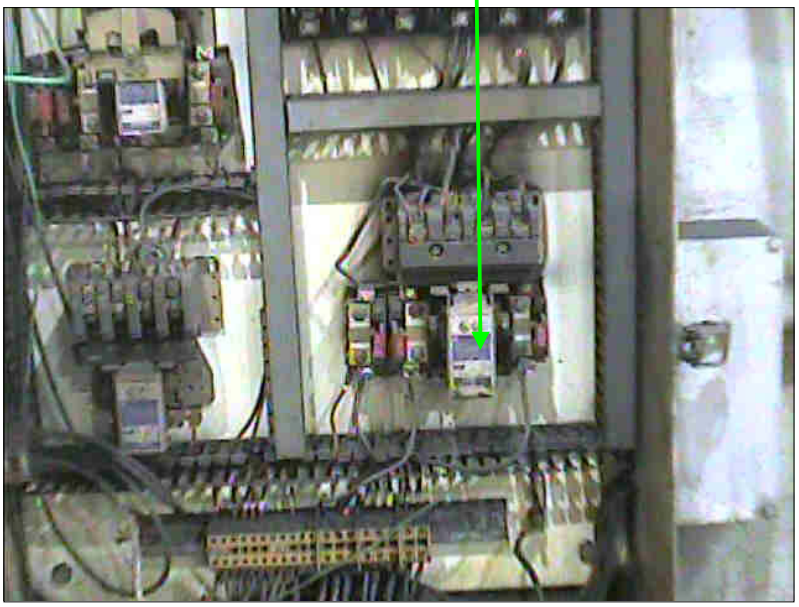
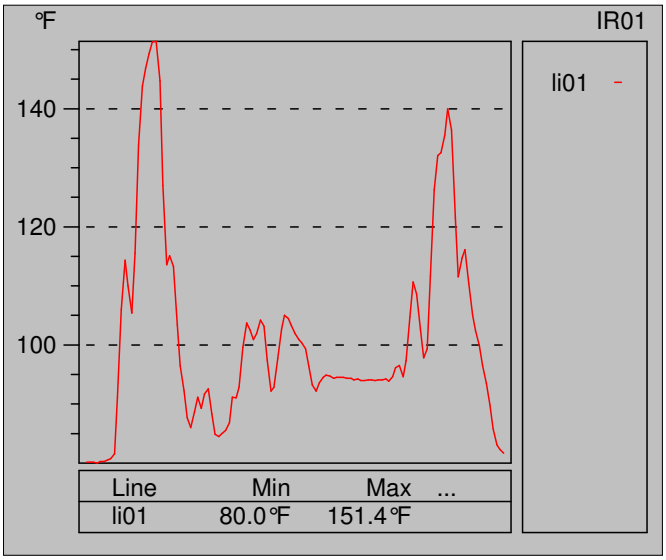
Component	Equipment/Bucket ID	Plant/Area	Date
Heater Connections	2609 Shear	Main	4-29-30

Label	Value
IR : max	154.4°F
IR : min	75.0°F
SP01	104.3°F
SP02	89.3°F
SP03	97.4°F
LI01 : max	151.4°F
LI01 : min	80.0°F





Fault	Poor connections at heater lugs.
Defect Rating	Class I

Recommendation

IR image suggests loose connections at the left and right heater output lugs. Clean, inspect and tighten the screws. Replace if necessary.

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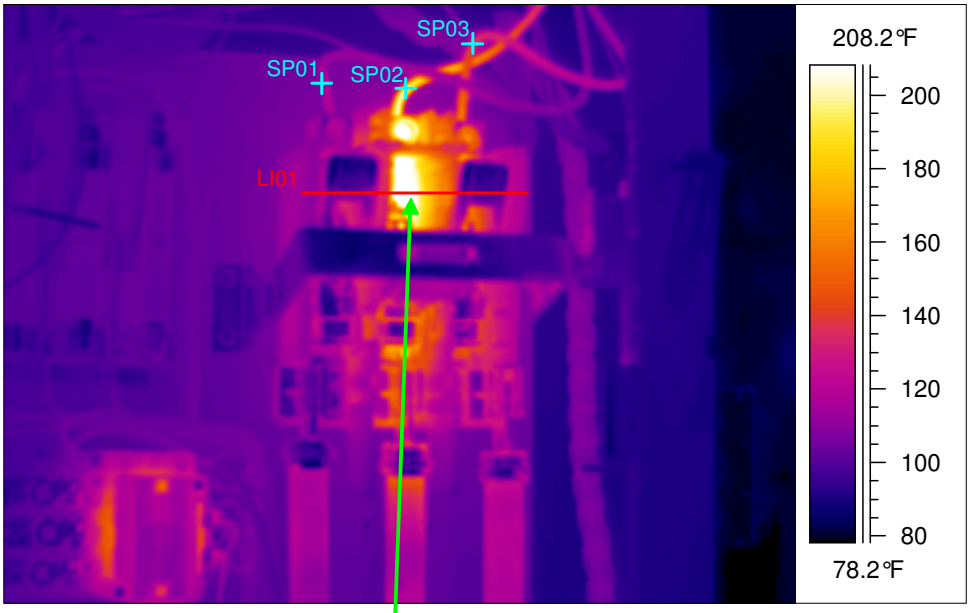
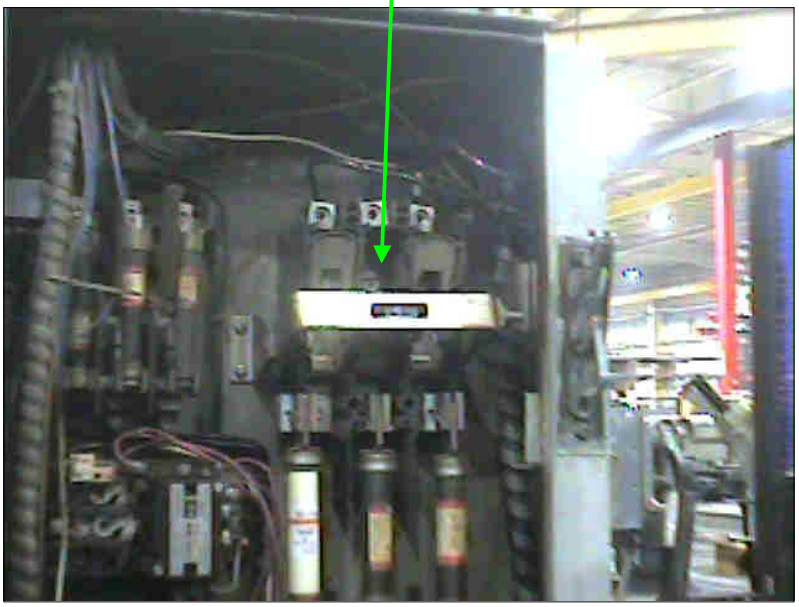
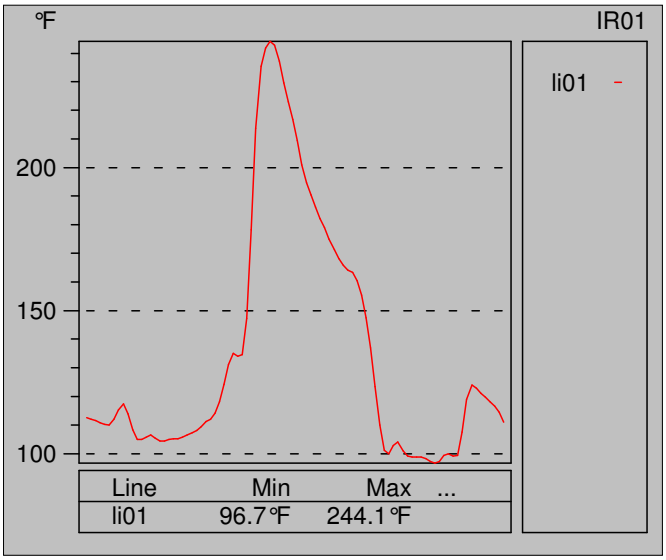
Component	Equipment/Bucket ID	Plant/Area	Date
Main Switch	2227 Brake	Main	4-29-19



Label	Value
IR : max	244.1°F
IR : min	77.7°F
SP01	115.8°F
SP02	194.0°F
SP03	138.1°F
LI01 : max	244.1°F
LI01 : min	96.7°F





Fault	Poor connection at switch contact.
Defect Rating	Class III

Recommendation

The center phase switch connection is extremely poor. Temperature delta is over 100 Degrees F between phases. Damage probably has occured already so we recommend replacing the switch as soon as possible.
Make sure all connections are tight before putting back into service.

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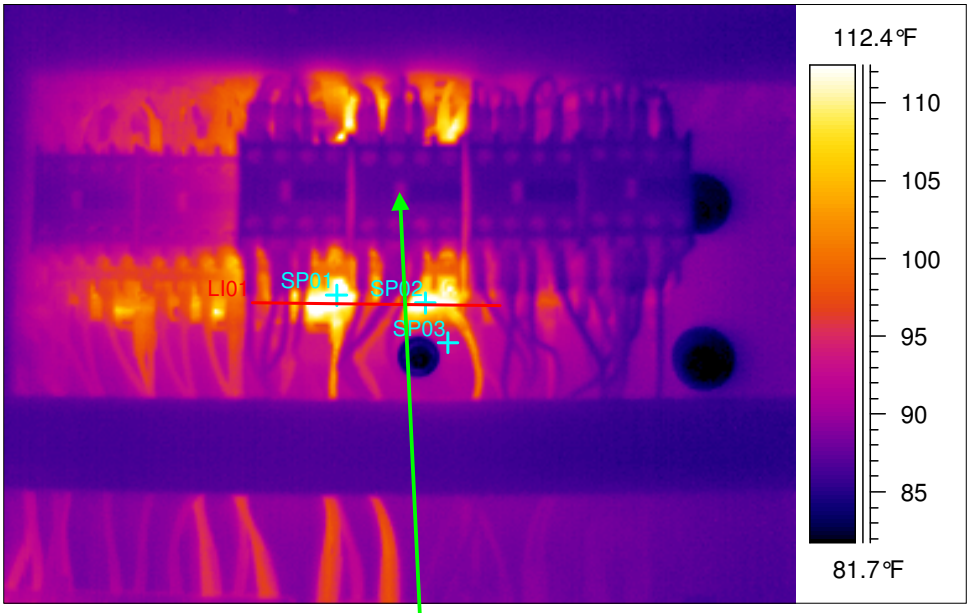
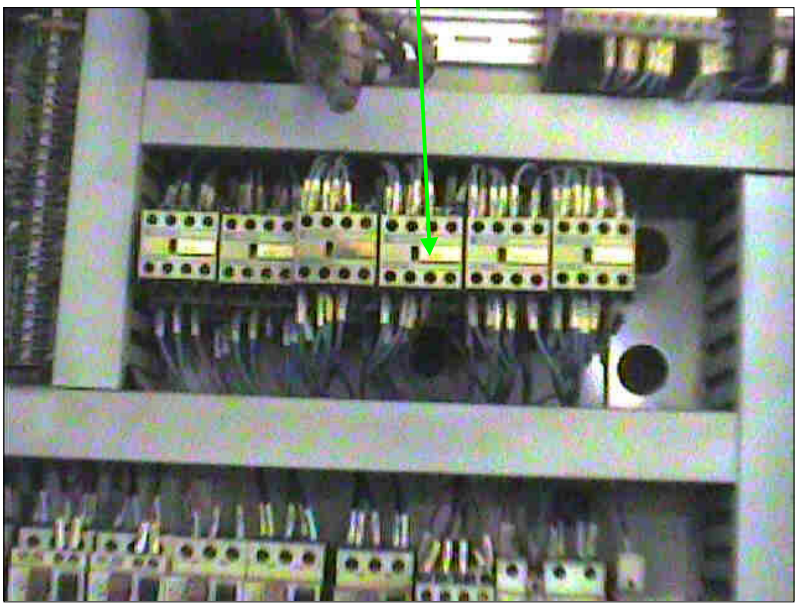
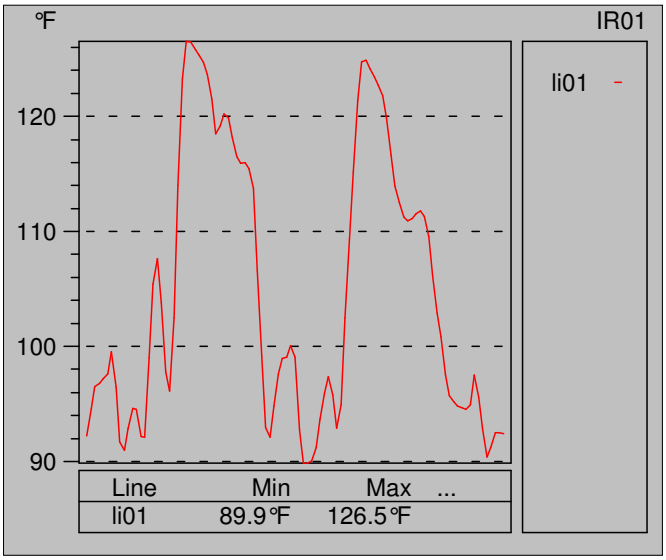
Component	Equipment/Bucket ID	Plant/Area	Date
Control Relays	1129 Left Panel	Tube	4-29-19



Label	Value
IR : max	126.5°F
IR : min	80.8°F
SP01	114.2°F
SP02	121.3°F
SP03	93.2°F
LI01 : max	126.5°F
LI01 : min	89.9°F





Fault	Relay Coils
Defect Rating	NON Rated

Recommendation

The temperature rise is not quite enough to warrant replacing the relays or coils.

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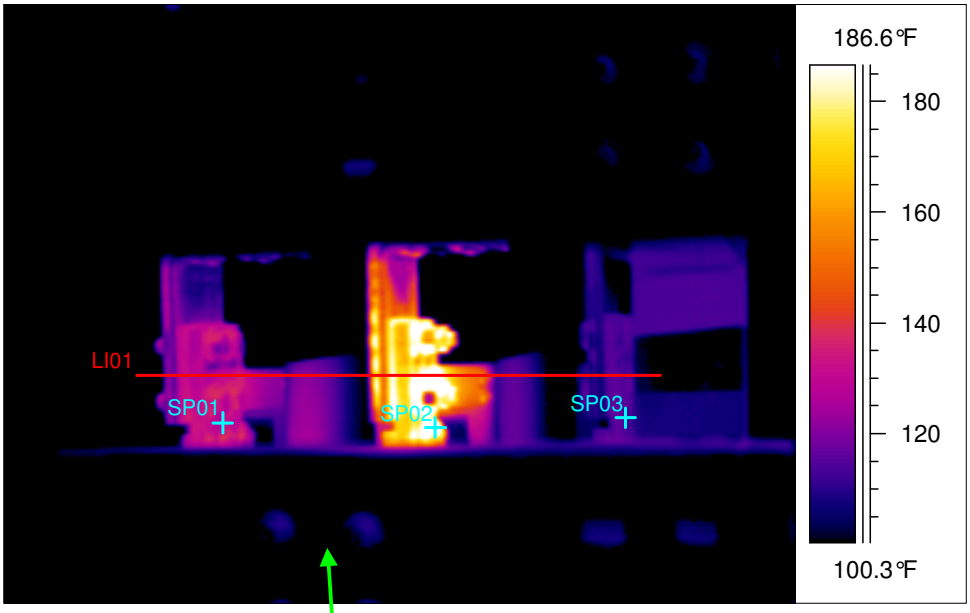
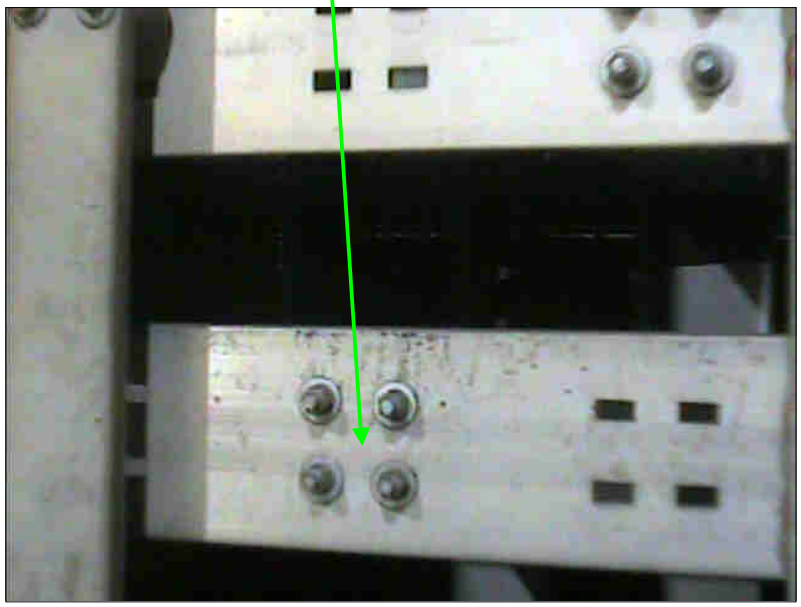
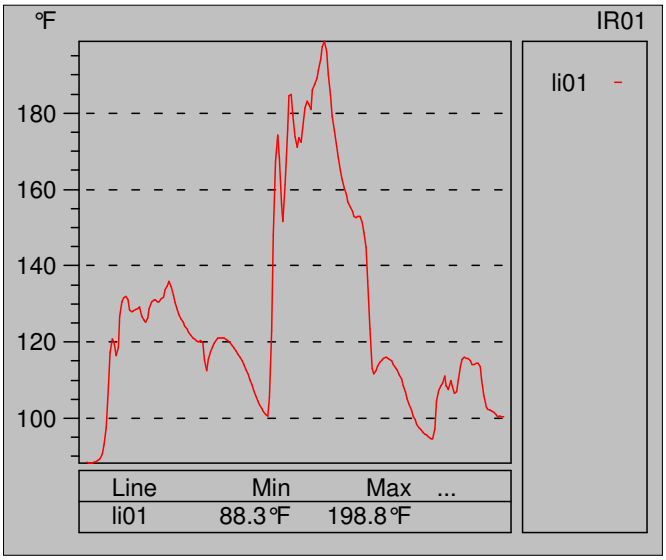
Component	Equipment/Bucket ID	Plant/Area	Date
Buss Connection	MCC Switch	533 DAP/DPL	4-30-19



Label	Value
IR : max	209.3°F
IR : min	85.3°F
SP01	131.5°F
SP02	209.3°F
SP03	113.3°F
LI01 : max	198.8°F
LI01 : min	88.3°F





Fault	Poor conection at buss bar.
Defect Rating	Class III

Recommendation

The vertical center buss bar connector is much hotter than adjacent bars. We suspect the connection fasteners are loose. Clean, inspect, re-torque and test to confirm repairs.

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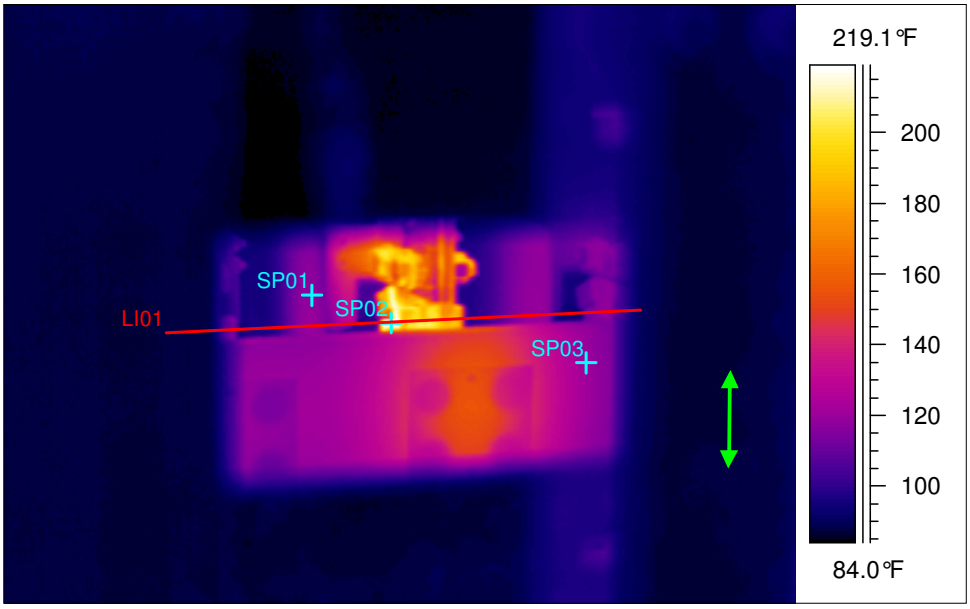
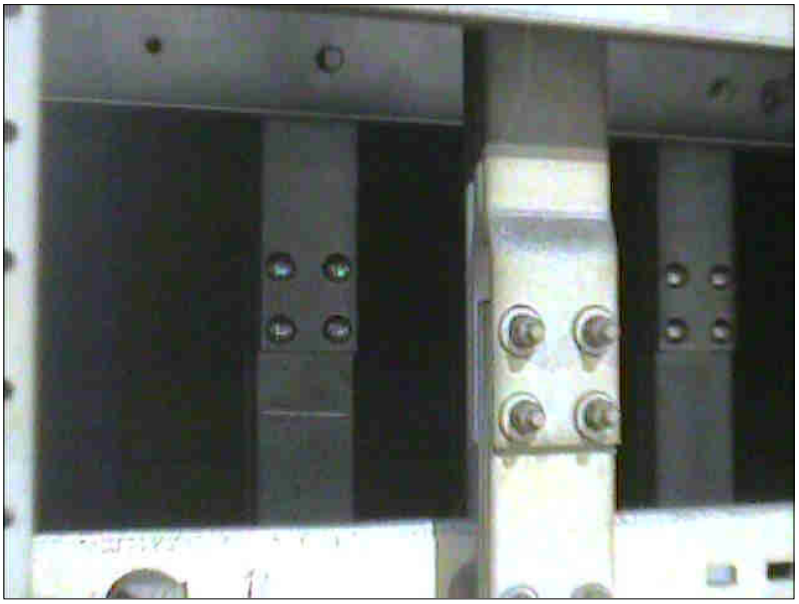
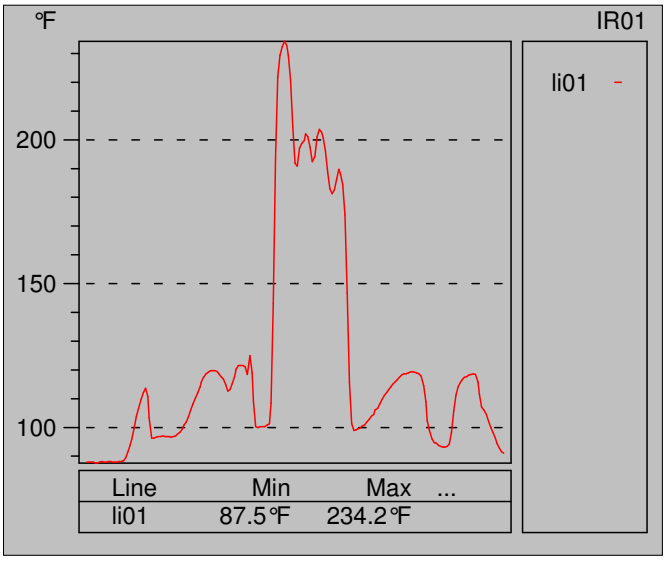
Component	Equipment/Bucket ID	Plant/Area	Date
Buss Connection	MCC Switch	533 DAP/DPL	4-30-19



Label	Value
IR : max	234.2°F
IR : min	83.8°F
SP01	118.5°F
SP02	234.2°F
SP03	121.2°F
LI01 : max	234.2°F
LI01 : min	87.5°F





Fault	Same poor conection at buss bar.
Defect Rating	Class III

Recommendation

The vertical center buss bar connector is much hotter than adjacent bars. We suspect the connection fasteners are loose. Clean, inspect, re-torque and test to confirm repairs ASAP. Check all buss bar fasteners.

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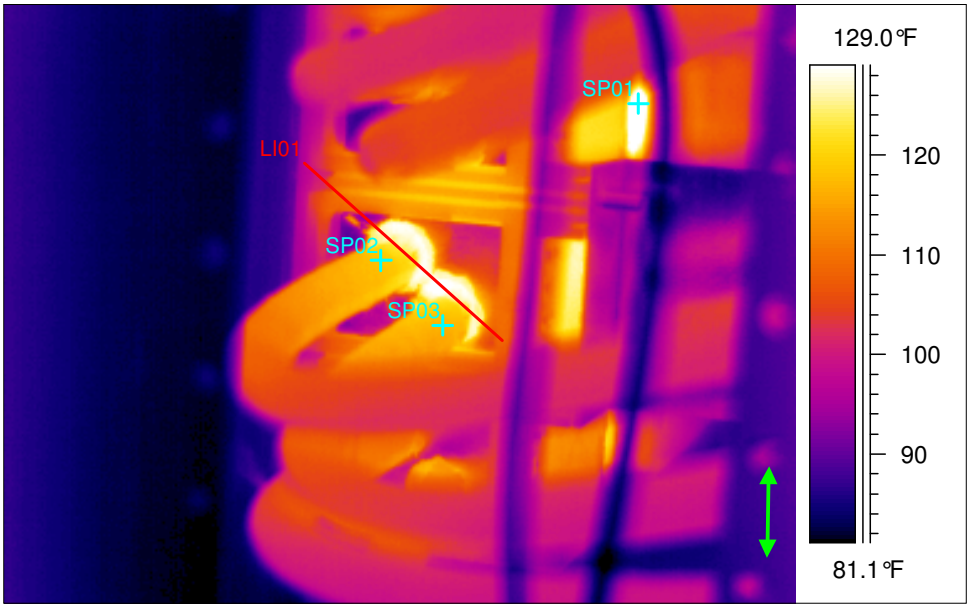
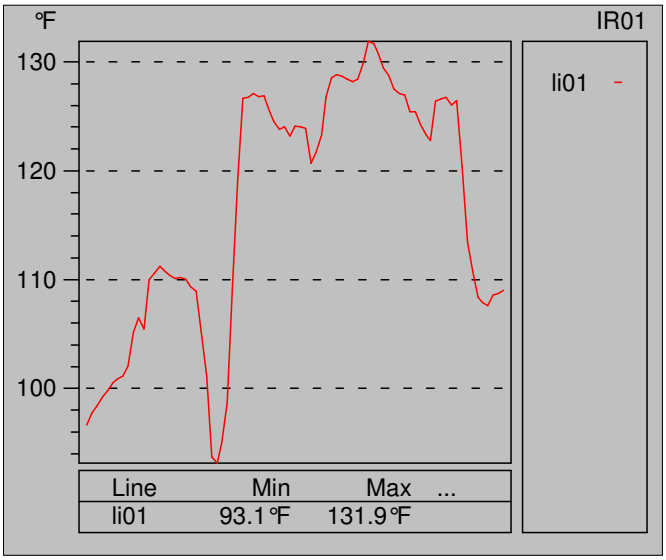
Component	Equipment/Bucket ID	Plant/Area	Date
Air Compressor 2 CB	South Wall MCC	PF Line	4-30-19



Label	Value
IR : max	147.2°F
IR : min	80.5°F
SP01	146.4°F
SP02	119.2°F
SP03	117.3°F
LI01 : max	131.9°F
LI01 : min	93.1°F



Fault	Worn switch or loose connections.
Defect Rating	Class II

Recommendation

The air compressor circuit breaker temperature is warm and appears to have a possible poor connection at the main buss, or the internals are worn. Clean and inspect and re-torque all fasteners ASAP. Re-check temperatures after reapirs to confirm if replacement is warranted. Alsp perform amp draw test before and after repairs.

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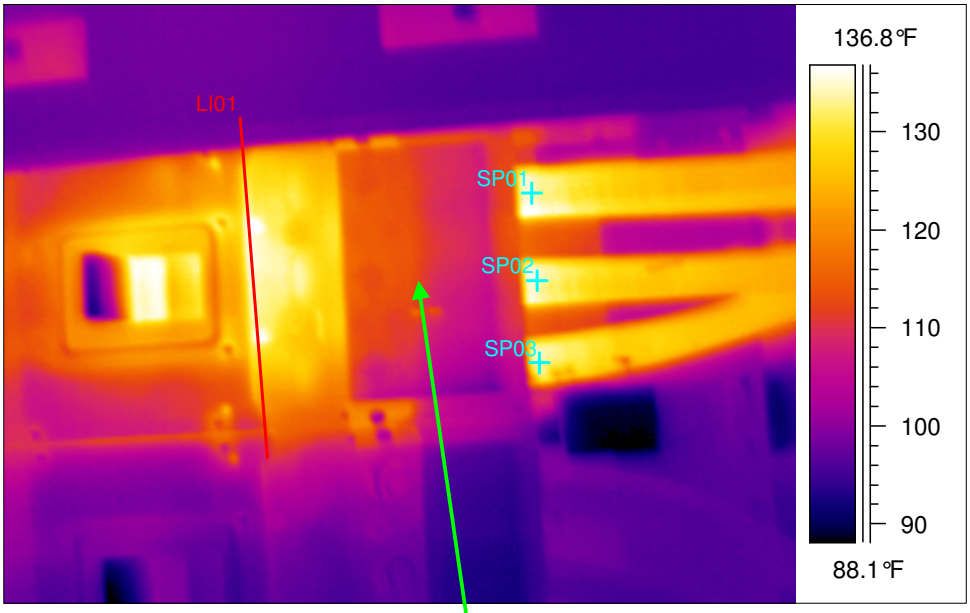
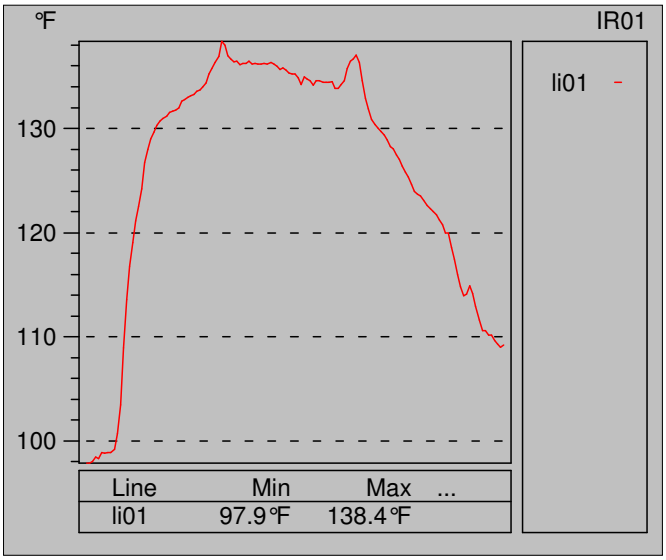
Component	Equipment/Bucket ID	Plant/Area	Date
Air Compressor 1 CB	2008 SALV 1 MDP	Salvano	4-30-19



Label	Value
IR : max	139.3°F
IR : min	87.8°F
SP01	134.8°F
SP02	135.0°F
SP03	133.6°F
LI01 : max	138.4°F
LI01 : min	97.9°F



Fault	Worn switch or loose connections.
Defect Rating	Class II

Recommendation

The air compressor circuit breaker temperature is warm and appears to have a possible poor connection at the main buss, or the internals are worn. Clean and inspect and re-torque all fasteners ASAP. Re-check temperatures after reapirs to confirm if replacement is warranted. Alsp perform amp draw test before and after repairs.