

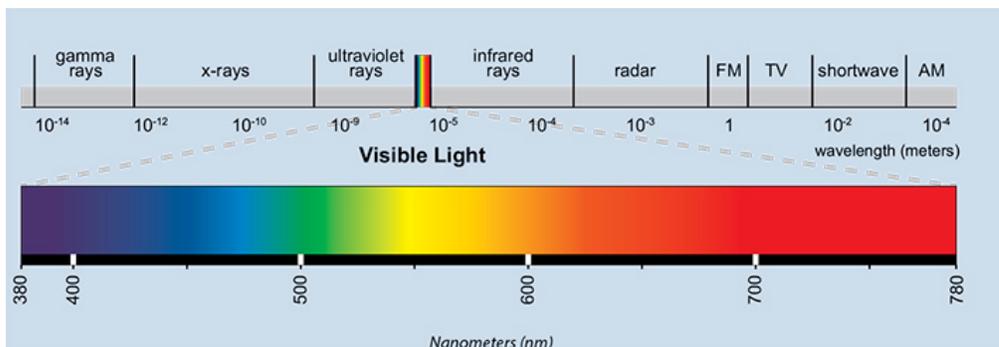


Pow-R-Way III Busway IR Joint Cover

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What is Infrared Thermography and how does it work?

All objects give off infrared energy which is electromagnetic radiation in the spectrum above the wavelength of visible light. Infrared cameras utilize special lenses and detector circuitry to convert the infrared energy into color coded images that make it easy to see temperature differences between objects. Like objects, such as three phases of busway conductor connections with similar load current, should have the same approximate apparent temperature. One conductor showing up “hot” compared to the other two may be indicative of a loose electrical connection with high resistance.

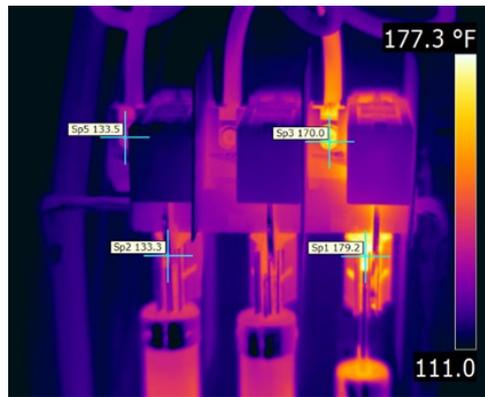


Why use Infrared Thermography as a Condition Based Maintenance Tool?

Infrared Thermography is a non-intrusive technique that can detect subtle temperature differences between components and be conducted while equipment is energized ensuring no interruption to your operations. Along with visual inspection and ultrasound, it forms the triumvirate of technologies for assessing electrical equipment health. thermography can help you migrate from wasteful calendar- based maintenance to more efficient and effective Condition Based Maintenance and decision making.

Can actual target object temperatures be taken using an infrared camera?

With care, actual quantitative temperatures of objects can be determined after factoring in for several variables that can otherwise skew readings. Camera settings can adjust for distance to the target, ambient air temperature, relative humidity, target emissivity and transmission rate of IR window (if applicable). Geometry of the targets can also make a difference in the apparent temperature readings. Certified Thermographers are trained on how to choose their targets and make these camera adjustments so as to secure relatively accurate temperature readings.



What is an Infrared Window and how does it work?

An Infrared Window is designed to allow safe and efficient access to electrical connections that may be prone to loosening over time and overheating. The IR window must be compliant with several equipment component standards related to mechanical strength, ingress protection rating and flammability and Listed or Recognized by UL and/or CSA. The IR window keeps the equipment in an “enclosed and guarded” state even when the cover of the window has been opened for taking measurements. The NFPA 70E standard does not require any special Personal Protective Equipment (PPE) to be worn when performing infrared thermography through an IR window but does require PPE if a panel cover is removed or an equipment door is opened exposing live energized components. The IR window utilizes a lens system with a material that will allow most infrared energy to transmit from the source through the lens media to the camera. Most plastics, glass and metals will NOT allow infrared energy to transmit through. The Pow-R-Way III IR Joint Cover uses a special infrared transmissive reinforced polymer optic lens that has been tested to all the relevant standards and carries a UL Listing.



Are IR cameras expensive? Do I need training to use one?

The cost of Infrared cameras has come down dramatically in the past 10 years. Smartphones with a built in IR camera with both still and video recording capability are now available for less than \$700 while a very good mid-range handheld camera now costs less than \$4,000. Low-end cameras may not have all the settings needed to get accurate temperature readings but will allow for good qualitative analysis. A mid-range camera will allow both qualitative and quantitative measurements to be made. It is recommended that personnel attend an accredited Level 1 Thermography training course before attempting to use an IR camera as the danger of both missing real problems and reporting false positives is possible without proper training.

Why can't I just scan the joints from the outside of the equipment without the special IR Joint Cover?

Infrared is not x-ray vision - Infrared energy will not transmit through solid substances like sheet metal. You can attempt to compare sequential busway joints from their exterior to look for temperature variation but the busway itself has significant thermal mass. A problem that is causing a 50°C temperature rise on a loose connection inside the joint might manifest as only 1-2°C of temperature variance on the exterior of the joint which can easily be missed. The joint cover, when opened for inspection, allows a direct field of view of the internal connections of the joint ensuring that any problem will be seen immediately.

How often should I scan the Busway joints to detect problems?

At a minimum, we recommend annual scanning of busway joints. In critical power applications such as data centers, hospitals, airports and some industrial applications, more frequent inspection may be prudent. In these segments, it is not unusual for inspections to be done on a quarterly basis.

What constitutes an unusual temperature anomaly?

NETA guidelines suggest that any temperature variance greater than 3°C (like components under similar load) or greater than 10°C versus ambient air temperature indicates a probable deficiency that should be repaired as time permits. Furthermore, NETA suggests that temperature variance greater than 15°C (like components under similar load) or greater than 40°C versus ambient air temperature indicates a major discrepancy that requires immediate repair.

Thermographic Survey Suggested Actions Based on Temperature Rise

Temperature difference (ΔT) based on comparisons between similar components under similar loading.	Temperature difference (ΔT) based on comparisons between components and ambient temperatures	Recommended Action
1°C - 3°C	1°C - 10°C	Possible deficiency; warrants investigation
4°C - 15°C	11°C - 20°C	Indicates probable deficiency; repair as time permits
-----	21°C - 40°C	Monitor until corrective measures can be accomplished
>15°C	>40°C	Major discrepancy; repair immediately

What should I do if I detect an anomaly?

Double check your camera settings and record the time, location and temperature values of the suspect busway connection. Note which phase was manifesting as the source of the heat, if applicable. Utilize the NETA guidelines to determine the best course of action and when a shutdown should be scheduled to implement corrective actions.



How do I know which Busway Joint Cover I need for my existing Pow-R-Way III Bus System?

Pow-R-Way III bus system joint covers are all 12.88" long but vary in width with four standard sizes: 4.75", 4.94", 5.31" and 5.50". By measuring your existing covers, you can choose the appropriate size of replacement unit. Alternately, the busway nameplate will tell you the Phase-Wire Configuration and the Ground Configuration and the table below can be used to cross reference the appropriate replacement cover.

Phase-Wire Configuration	Ground Configuration	Joint Cover Required (IRISS Part Number)	Width
3 Phase, 3 Wire	Integral	BCC-475	4.75"
3 Phase, 3 Wire	50% Internal	BCC-494	4.94"
3 Phase, 3 Wire	50% Internal/ Isolated	BCC-494	4.94"
3 Phase, 3 Wire	100% Internal	BCC-494	4.94"
3 Phase, 4 Wire 100% Neutral	Integral	BCC-475	4.75"
3 Phase, 4 Wire 100% Neutral	50% Internal	BCC-494	4.94"
3 Phase, 4 Wire 100% Neutral	50% Internal/ Isolated	BCC-494	4.94"
3 Phase, 4 Wire 100% Neutral	100% Internal	BCC-494	4.94"
3 Phase, 4 Wire Oversized Neutral	Integral	BCC-531	5.31"
3 Phase, 4 Wire Oversized Neutral	50% Internal	BCC-531	5.31"
3 Phase, 4 Wire Oversized Neutral	50% Internal/ Isolated	BCC-550	5.50"
3 Phase, 4 Wire Oversized Neutral	100% Internal	BCC-550	5.50"

Will the UL Certification of my Pow-R-Way III busway system be impacted by installing these replacement covers?

The replacement Pow-R-Way III Busway joint covers with IR scanning capability have been certified by UL both as an infrared window under IRISS blanket custom window file and with the OEM as an approved component of their busway system. Approval involved short circuit testing of the busway assembly with the new covers as well as bend and crush testing as required by UL.

