Arc flash hazard protection of personnel working on or near energized electrical equipment is crucial. The 2011 NEC standard and the 2014 NEC, Article 240.87, requires arc energy reduction for 1200A or higher rated circuit breakers. An acceptable method to reduce arc energy is a maintenance switch, AC-PRO® Quick-Trip® from Utility Relay Company, which adds a switchable instantaneous trip function to the AC-PRO trip unit with an adjustable pick-up setting. This can reduce the arc flash hazard by reducing the fault interruption time.

Combining Quick-Trip with KIRK® interlocks assures the predetermined sequence of arc flash energy reduction procedures are followed. Personnel can operate at a lower Risk Hazard Category and Personnel Protective Equipment requirements according to NFPA 70E.

A typical arc flash reduction system using KIRK® interlocks and URCs Quick Trip® unit is detailed on the reverse side.
INITIAL SYSTEM STATUS:
Main breaker and feeder breakers are energized. Panel doors are locked closed and Quick-Trip™ Unit is disengaged. Key A is trapped in KIRK® PPS Interlock.

SYSTEM OPERATION:
1) Turn Quick-Trip to the ON position at the main breaker by turning and releasing Key A
2) Insert Key A in transfer interlock to release keys B, C and D. Key A is now trapped.
3) Use Keys B, C and D to unlock the three feeder compartment door interlocks.
4) Keys B, C and D are trapped in the door interlock when the compartment door is opened.
5) Rack the feeder breaker in or out.
6) Reverse the sequence to turn the Quick-Trip to the OFF position at the main breaker.

Note: Personnel safety is improved by assuring the use of Quick-Trip™ during maintenance.
Is your facility emergency power ready? In a situation in which power has been lost, it may be necessary to connect to an emergency power generator. An installed tap box at your facility, equipped with KIRK® trapped key interlocks, will ensure you can safely restore power. This lower cost manual transfer system is an alternative to more expensive automatic transfer systems, and will have your business back to operations with minimal time and dollars lost.

KIRK® key interlocks ensure that a predetermined sequence of operations is performed to prevent crucial safety measures from being omitted while restoring power. KIRK® key interlocks can be installed in the field to existing/ previously installed tap boxes, often, without interrupting power. Once installed, the power restoration process can be implemented safely during lost power situations.

See back side for a typical tap box application and scheme.
INITIAL SYSTEM STATUS:
Main service breaker is closed and Key A is trapped.

SYSTEM OPERATION:
1) Open main breaker. Extend bolt on main breaker interlock and release Key A. Main breaker is now locked open.
2) Insert Key A into access interlock on tab box cable access door and turn key. Open door. Key A is now trapped.
3) Connect generator cables in appropriate tab box connectors. Key A is trapped until generator cables are disconnected and tap box connect cable access door is closed.
4) Power up generator and restore power to facility.
5) To return service back to main breaker panel, power off generator and reverse sequence.

Legend:
- Key Free
- Key Trapped

The interlocking logic shown illustrates a typical sequence for restoring power with a quick connect tap box and remote power service.

Note: To prevent paralleling of lines, single load fed from either source.
Enhancing your lockout tagout procedure with KIRK® trapped key interlocks ensures energy isolation procedures cannot be circumvented. Typical industrial equipment may contain hot fluids, blades, fans, pinch points, and moving parts hazardous to workers and other equipment. A written lockout tagout procedure is used to document the steps to remove/isolate energy source(s). KIRK® trapped key interlocks can aid in isolating the energy source(s) and the lock and tag can be applied to the interlock.

This partnership between the interlock and lockout tagout prevents personnel from mistakenly removing the lock and tag, and re-energizing the equipment. The key is removed from the interlock and is with the personnel performing the lockout tagout procedure. The equipment cannot be re-energized until the uniquely coded KIRK® key has been re-entered into the sequence after all workers are clear from the completed task and out of harm’s way.

A simple lockout tagout scheme, enhanced with KIRK® trapped key interlocks, is detailed step by step on the back side.
ENHANCED LOTO PROCESS
APPLICATION DATA SHEET

TRAPPED KEY INTERLOCK + LOTO

ENHANCED LOTO LOGIC

The interlocking logic shown illustrates a typical lockout tagout system enhanced with KIRK® interlocks.

LEGEND

Key Free

Key Trapped

OPERATION

INITIAL SYSTEM STATUS:
Equipment is energized. To prevent opening of Guard B for a predetermined time after removal of power, disconnect switch is closed. Key A-1 is held in disconnect switch interlock. Guard B (or door) is locked closed by means of Type D access interlock.

SYSTEM OPERATION:
1) Turn off power with control stop releasing Key A-1.
2) Open disconnect.
3) Insert Key A-1 and turn to lock open. Attach lockout tagout padlock to interlock bolt. Turn and remove Key A-2.
4) Verify power is off with control stop.
5) Insert and turn Key A-2 in TDKRU, starting time delay.
6) Signal lights on TDKRU; turn and remove Key A-3.
7) Insert and turn Key A-3 on guard B and attach lockout tagout padlock.
8) Turn and remove Key A-4; the personnel key.
9) Open guard B.
10) To restore power, reverse sequence and remove lockout tagout padlocks.

INTERLOCKING SEQUENCES CAN BE DESIGNED TO SUIT ANY OPERATIONAL OR PROCESS REQUIREMENTS
When a ship comes to port and is mooring at dock, ships equipped with an Alternative Maritime Power (AMP) cable reel are able to shut down their generators, reducing noise and air pollution, and connect to land based power. This process is also known as cold ironing. Using Kirk interlocks when connecting ship’s power cables to on shore power will ensure that the cables are properly coupled to the junction box before energizing.

The application overleaf provides a step by step process of performing the connection of the AMP cables to the junction box in the quayside vaults.

“Since 2003 Cavotec has helped the Ports in California by addressing the technical challenges for shore power connection to docking container ships. We at Cavotec appreciate the support Kirk Key provides to our Alternative Marine Power boxes, by increasing the safety of the electrical system with their mechanical interlock components.”

—Rob Thompson AMP Product Manager, Cavotec USA, Inc.
INITIAL STATE OF SHIP:
• Ship is moored at dock
• Ships generators are powered off

Typically, 2 Kirk type DMs are installed on the medium voltage socket handles and a 3-key Kirk transfer block is installed directly to the front of the junction box, located in the quayside vaults. The DM latch bolt with cable connection is installed directly on the ships shore power plug. An F-lock is installed directly on the upstream breakers powering the junction box in the vault, and is keyed to coordinate with the transfer block within the quayside vault.

INITIAL SYSTEM STATUS:
All socket handles trap Key A and Key B in the socket handle until the switch is engaged.

SYSTEM OPERATION:
1) Lower cable with DM latch bolt attached from ship until it reaches SPO vault on the wharf.
2) Pull back the plug protection bell and secure ship cable using the Kellum grip
WARNING: Before connecting plug and socket, verify that there is no presence of water in the plug or socket and contact pins are undamaged.
3) Remove the PC5 shore plug covers.
4) Insert the DM latch bolts fixed to the ship plugs into each Kirk type DM lock attached to socket handles and rotate 90° to release trapped Key A and Key B.
5) Insert Key A and Key B into the Kirk transfer block and rotate to trap Key A, Key B and release Key C.
6) Follow the ports sequence of operations for initiating power using Key C.

Note: An additional interlock may be added to accommodate a ground switch.

The interlocking logic shown illustrates a typical cold ironing mechanical bolt interlock system.

INTERLOCKING SEQUENCES CAN BE DESIGNED TO SUIT ANY OPERATIONAL OR PROCESS REQUIREMENTS