FISHER PIERCE Fault Circuit Indicators with AccQTrip™ Logic Circuitry

FREQUENTLY ASKED QUESTIONS

1. **What is the benefit of fault indicators?**
   Reliability improvement. Reliability indices can be improved by, either reducing the number of outages or reducing the length of time that it takes to bring customers back on line after a fault in the system.

   Fault indicators help reduce the outage duration because they narrow down the location of the fault. By using fault indicators, the operations personnel no longer have to “guess” where the fault may be and re-fuse multiple times until the fault is found.

2. **What is a time-reset fault indicator?**
   This is an indicator that goes from a tripped status to a normal status after a period of time. Fisher Pierce time-reset indicators with AccQTrip logic will trip whenever a current above the trip level is detected. These indicators reset after 4 hours.

3. **What is a voltage-reset indicator?**
   This is an indicator that goes from a tripped status to a normal status when voltage on the line is restored.

   Fisher Pierce voltage-reset indicators with AccQTrip logic will trip when an over-current condition followed by a loss of voltage is detected. These indicators reset when voltage is restored or after 4 hours time lapse from trip time.

4. **How do I use the FTT (Fault Indicator Test Tool)?**
   Use the FTT with the Time Reset Fault indicators as follows:
   1. Remove the Keeper Bar from the FTT.
   2. To simulate an over-current condition, SWIPE the FTT over the “Fisher Pierce” marking on the indicator once. The indicator will start flashing after a couple of seconds.
   3. To reset the indicator HOLD the FTT to the front right hand side bottom corner of the indicator for a couple of seconds. The indicator will stop flashing.
   4. Replace the Keeper Bar on the FTT after use.

   Use the FTT with the Voltage Reset Fault Indicators as follows:
   1. Remove the Keeper Bar from the FTT.
   2. To be able to use the FTT on a voltage-reset unit, FIRST initialize the indicator by installing it on the line.
   3. To reset the indicator HOLD the FTT to the front right hand side bottom corner of the indicator for a couple of seconds. The indicator will reset.

5. **What is adaptive trip?**
   The first fault indicators in the industry were developed using load current as a reference. As such, the trip levels are always supposed to be above the maximum load current in the circuit.
The first indicators had fixed trip settings. So, for example, if the load current in the circuit was 80 Amps and the overload current was 100 Amps, the trip level would be set around 115 Amps. The indicator would operate just fine right up until the moment when the load in the circuit increased. If the load current in the circuit increased to 100 Amps, and the overload current increased to 120 Amps, the indicator’s trip level is now below the overload current. So, every time there is an overload on the line, the indicator will trip. To correct this situation, Fisher Pierce came up with the idea and development of adaptive trip. Every time the load in the circuit increases so does the trip level on the indicator. The Fisher Pierce with adaptive trip technology are the 1547 & 1548. For more details on Fisher Pierce adaptive trip FCIs refer to the Product Guide PG-PC-FP-1008.

6. What is the difference between adaptive trip and Hi/Lo trip?

Hi/Lo Trip fault indicators were developed using fault current as a reference. As such, the trip levels are always below the minimum possible fault current in the circuit.

Fault indicators are used to detect low-impedance / high-current faults. These faults are detected by circuit breakers, interrupters, fuses, which are the normal over-current protective devices in distribution systems. These are the devices that fault indicators must coordinate with.

Low-impedance / Hi-current faults are typically many times the normal load current for any given feeder.

Typical feeders are rated 600 or 200 A, and the maximum load current is a fraction of the total feeder capability. 200 Amp circuits typically carry a maximum of 100 Amp continuously, while 600 Amp circuits typically carry a maximum of 400 A continuously. Fault currents in both cases are considerably higher than the actual maximum continuous.

The trip setting on a fault indicator should be above the maximum load current on the circuit, and high enough to allow normal fluctuations of the load. The trip setting should also be lower than the minimum expected fault current. An exact trip setting for every application is not necessary. A trip setting of 400 Amp for 200 Amp circuits, or 800 Amp for 600 Amp circuits will guarantee enough sensitivity to indicate permanent faults accurately. The only condition is that the fault indicator needs to respond faster than the other protective devices in the system.

7. Is Adaptive Trip better than Hi/Lo Trip?

The end result for the utility is the same in that both types of indicators eliminate tripping due to overload conditions. The main advantage of the adaptive trip indicators is that one indicator may be used for both 200 and 600 Amps. The main advantages of the Hi/Lo Trip indicators are more cost effective.

8. Do we have fault indicators with lower trip levels? Why?

As mentioned in question 7., fault indicators are mostly concerned with low impedance / high current faults. So, there is no need to have trip levels below the settings that we already offer with Fisher Pierce indicators with AccQTrip logic.

There are however special cases where customers are dealing with long feeders, where the fault levels at the end of the circuit may be below 400 Amps. We have available 200 Amp trip settings for the models UCMTL & OLMTL. To order units with this lower trip setting the cat number should include “CS1211” at the end of the number.
9. My customers do not like LED type indicators because they use batteries? How can I respond?
   There are two alternatives:
   1. Offer the flag indicators. These offer the same logic without using any batteries.
   2. Explain how we use batteries in our indicators. Fisher Pierce indicators with AccQTrip logic do not use the batteries to run the logic. Batteries are only used on indicators with LED displays. The batteries are normally in the inactive state, and are only activated when the LED flashes. The batteries used are rated for over 1200 hours of flashing time, and are made of Lithium Thyonil Chloride. These batteries guarantee consistency of operation throughout the complete temperature rating of the indicators. This type of battery is used in military type applications where they are required to withstand more stringent conditions.

10. What type of batteries do we use in our FCI’s and can they be replaceable?
    Fisher Pierce FCI models (with AccQTrip logic) which feature LED displays incorporate a built in, high capacity 3.6 volt, 2.4 amp-hour lithium cell battery which provides a minimum 1200 flash hours over the battery life of approximately 20 years. The lithium cell battery is non replaceable.

11. What are the major differences between the battery used in Fisher Pierce AccQTrip FCIs (Lithium Thyonil Chloride) and a normal lithium oxide battery?
    Lithium thyonil chloride batteries have a higher operating temperature range (-55 °C to +85 °C) than lithium oxide batteries, which will help to prolong their life.

12. Would it be desirable for the fault indicators to have a light indicating low battery?
    Yes, a low battery light would be desirable, however it also adds an unnecessary expense. As a more cost-effective solution, the Fisher Pierce TPM-VF or the OLM-VF models employ the AccQTrip logic circuitry that allows the FCI to operate without the use of batteries.

13. Some of our customers prefer longer reset times, can we specify/order FCIs with a time delay reset other than 4-hour?
    We have available a 12-hour reset time for all our LED type units. To order units with this extended reset time the cat number should include “CS1155” at the end of the number.

14. Do we have available a unit with lower minimum reset voltage than 5 kV?
    We have available a 2.4 kV minimum voltage reset for the units TPMVL & TPMVF. To order units with this minimum voltage reset the cat number should include “CS1128” at the end of the number.

15. Do our fault indicators have inrush restraint?
    Inrush restraint is standard on all Fisher Pierce FCIs models using the AccQTrip logic circuitry. However, the time reset, LED display models (TPM-TL, OLM-TL, and UCM-TL) do not employ this logic circuitry and thus do not have inrush restraint. The TL models (time reset w/ LED display) are the simplest type of FCIs. They can be permanently installed, or be used in a portable manner as a fault-chasing tool when carried by the crews. The advantage of the TL or time reset models is that they do not need to be powered up or initialized before sensing a fault.
16. Do the Fisher Pierce FCIs with AccQTrip logic have backfeed restraint to prevent wrong operations due to backfeed from motors and/or capacitor banks?
The Fisher Pierce TPMTL & OLMTL model FCIs (time reset w/ LED display) work effectively in these applications to avoid wrong operation due to backfeed, since these devices are not current nor voltage sensitive. Also, our VOL models (TPMVOL & OLMVOL) will trip when an over current is sensed and follow by a loss of voltage. However, it will reset automatically 4 hours after tripping, even if the system is back to normal during the 4-hour interval.

17. Do we have a fault indicator with current reset and manual reset feature?
Fisher Pierce FCIs models using the AccQTrip logic are Time and Voltage reset. The current reset models are our 1547 & 1548 series. All Fisher Pierce FCIs can be reset manually as well.

18. Are the Fisher Pierce FCIs models using the AccQTrip logic have LED flashing lights, readily visible for night or day, in order for crews to locate without having to get out of the vehicle?
Fisher Pierce FCI’s with AccQTrip incorporated LED lights that are visible day or night. We also can offer a remote-mounted display model that incorporates remote displays for URD applications.

19. Can we use our Fisher Pierce FCIs models using the AccQTrip logic on any wire size?
The Overhead Line Mount (OLM models) and the Underground Cable Mount (UCM models) use the AccQClamp mounting provision. The AccQClamp will keep a constant trip current calibration (factory set) regardless of the conductor/cable O.D. This is accomplished by the clamp jaws’ contoured shape which keeps the center of the conductor (from .4”-2.22” O.D.) and the over current sensor located within the indicator body at a constant distance regardless of conductor/cable O.D. Without incorporating this design feature, the trip level would increase as the conductor/cable O.D. increases, and decrease as the conductor/cable O.D. decreases. The design feature eliminates the need for the customer to supply the conductor/cable O.D. information before ordering Fisher Pierce FCI’s.

20. Are the Fisher Pierce FCIs models using the AccQTrip logic affected by the proximity of other lines? i.e. faults on adjacent lines/phases should not cause wrong operation of the FCI’s.
Fisher Pierce FCIs with AccQTrip exceed the ANSI/IEEE Standard 495-1986 for adjacent phase tripping @ 4” on center (cable to cable).

21. Can the time reset overhead units be used in Underground installations?
Yes, Fisher Pierce FCIs models using the AccQTrip logic with time reset can be used in overhead and underground installations.

22. Do our fault indicators meet the applicable ratings at substation for 1,000, or 2,000 or 3,000 amps at the end of the line?
Fisher Pierce FCIs with AccQTrip logic exceed the ANSI/IEEE Standard 495-1986 for this requirement.